ISSN 2067-4082
e-ISSN 2068-9969
L-ISSN 2067-4082

Journal of Urban and Regional Analysis

Volume XIII - Issue 1 - February, 2021

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Journal of Urban and Regional Analysis

Volume XIII - Issue 1 - February, 2021

Journal indexed in:

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The review is issued under the aegis and the support of the
University of Bucharest - Interdisciplinary Centre for Advanced Research on Territorial Dynamics (CICADIT)
Professional Association of Romanian Geographers (APGR)

Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 5 - 18
https://doi.org/10.37043/JURA.2021.13.1.1

UNRAVELING THE (INTRINSIC) LINKAGE BETWEEN SOCIAL SPENDING AND REGIONAL DEVELOPMENT: AN EMPIRICAL ANALYSIS FOR EUROPEAN UNION COUNTRIES

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Abstract: Theoretical approaches and place-specific solutions are required to face with the intrinsic linkage between social welfare and macroeconomic stability in advanced economies, especially in Europe. In this regard, the 2007 recession has influenced extensively the wide spectrum of social policies applicable in the European Community. New socioeconomic divides emerged and fiscal austerity urged Member States to resettle policy discourses, advancing social needs in a more effective way. In line with this evidence, our commentary discusses recent literature and it outlines policy implications of different political, institutional and socioeconomic settings. By analyzing cross-country variations in the shape and extent of welfare policies at the European level, our study evaluates apparent (and latent) performances of welfare systems in a comparative perspective, with a specific focus on Southern European countries. The existence of a latent relationship between social policy expenditures (SPE) and per-capita GDP was demonstrated. However, social expenditures may differ for a given level of income: for instance, Latvia had a lower level of social expenditures given its income level. Italy, Greece, Spain and Portugal were clustered together displaying a lower share of social spending in the total GDP in respect with the remaining European countries. This comparison suggests how Mediterranean countries are institutionally fragile and with a moderately higher level of corruption in respect with North-western countries. The results of this work contribute to bridge the semantic dichotomy between theoretical approaches and empirical findings in socioeconomic policy impact analysis.

Key Words: *social policy, welfare systems, indicators, recession, Southern Europe*.

Introduction

Although in a provisional form, strategies toward a pan-European social policy have been envisaged since the Treaty of Rome (1957), and the need for "harmonization" of social regimes emerged as a pre-requisite for a truly effective and integrated European Union (Baldwin 1990). At the same time, territorial cohesion among Member States was pursued during the long process of convergence among countries, assuming economic growth as a dimension integrating social cohesion and sustainable development (Ciommi et al. 2018).

In this line of thinking, since the early 2000s, the Lisbon Treaty indicates the basic objectives for the European Union common developmental policies (Salvati et al. 2017). Economic and institutional development, employment, environmental security, social protection, inclusion, justice, and equality – in addition to cross-generation solidarity and safeguard of children's rights – have been the main goals of a truly European-based strategy for social development and wellbeing (Salvati and Carlucci 2011, Bruun et al. 2012, Chelli et al. 2016, Salvati et al. 2016). A (more or less evident) crisis has affected the national welfare systems in Europe because of scarce economic resources and stringent budgetary constraints resulting from the 2007 recession and the consequent austerity policies (Consoli 2015, Salvati 2016, Ciommi et al. 2017). Emergence (and consolidation) of global challenges including aging and low fertility, new family patterns, immigration, globalization and youth unemployment, contributed to the inherent crisis of social policies in Europe (Gavalas et al. 2014, Rontos et al. 2016, Carlucci et al. 2017).

The expansion of the European Community southwards, especially in the 1980s, fueled concerns of social dumping in affluent economies of Northwestern Europe, since Mediterranean countries were frequently seen as locked traditional economies – and sometimes depicted as 'lazy' societies or even 'pigs' – featuring lower institutional, political and socioeconomic standards (Guillen and Matsaganis 2000, Carlucci et al. 2017, Rontos et al. 2017). Consequently, the increasing integration of peripheral countries and the convergence pressure towards core economies (Castles 1995) have intensified and formalized the vision for a unique social policy in the European Union (Pavolini and Ranci 2008). Apart from Italy, one of the founders of the European Community in 1957, a relatively fast and homogeneous socioeconomic development in Spain, Portugal and Greece, coincided with the collapse of dictatorial regimes in the mid-1970s, fostering a huge increase in social expenditures (Saraceno 2008). This happened especially when these countries tried to adapt their national welfare system to the dominant 'North-Western' experiences, likely delineating the most recognized welfare system in Europe (De Simone et al. 2012).

While member states have distinctive welfare, defining similarities among countries in social security systems has been a common research issue since the late-1980s (Bonoli et al. 2000, Ebbinghaus and Manow 2004, Taylor-Gooby 2004). Grounding the social contract between state and citizens in the domain of market economy, welfare states have been investigated considering the (intrinsically) historical dimension of social development (Esping-Andersen 1996). In this perspective, Esping-Andersen (1990) identified three types of welfare states in Europe: (i) the liberal type (United Kingdom, Ireland), (ii) the social-democratic type (Scandinavian countries, especially Denmark, Sweden, Finland), and (iii) the 'corporatism' type, characteristic of Germany, Austria, France and, partly, Italy. Assuming the relation between state, family and market as an analytical dimension explaining the intrinsic differences between welfare systems, these typologies were derived considering the distinctive political and cultural development of each country (Deacon 2000, Pascall and Manning 2000, Fritzell et al. 2001, Armingeon and Beyeler 2004).

While encouraging the development of a free market, provisions to combat poverty in the liberal type of welfare state are limited to those who cannot meet their own needs in other ways (Kuhnle 2003). Reducing income differentials is the main objective of the social-democratic welfare, organized as a universal social security system (Majone 1993). In such a context, inhabitants are fully entitled to collective benefits for a wide spectrum of social risks, reflecting high labor participation rates, especially of women – although part-time jobs are very common (Rhodes and Mény 1998). Being oriented toward maintenance of long-lasting living standards, 'corporativistic' schemes of welfare aimed more specifically at different occupational groups and civil servants are sometimes privileged because of their intrinsic role in state's functioning (Taylor-Gooby et al. 2017, van Berkel et al. 2017, Pascall and Lewis 2020).

With the exception of Italy, Mediterranean countries (and, more recently, the new European Union member states, e.g. in Eastern Europe) have been excluded from the classification illustrated above (Petmesidou and Guillén 2017). The supposed distinctiveness of Mediterranean countries from Western, Northern and Central European counterparts has been highlighted widely in earlier studies (Taylor-Gooby and Leruth 2018). Despite distinctive social traits, Greece, Spain and Portugal present common characteristics and a sort of shared identity (Williams 1984). Ferrera (1996) argues that social security systems in Greece, Spain and Portugal should be considered as a sort of separate type of welfare state from the wealthiest countries in Europe, having no clear social safety net in the form of a subsistence benefit (Steinebach et al. 2019). Up to the last economic crisis, pensions in Mediterranean countries have been relatively high also because of clientele since politicians pursued to attract votes by promising enlarged pension provisions (Arts and Gelissen 2001).

Mediterranean European countries constitute a separate cluster with a distinctive welfare

regime from other European countries (Saraceno 2016). This regime was characterized by a sort of 'Latin Rim' welfare model with a rudimental system of social protection, a strong influence of religion and secularism, family ties as a key welfare provider (i.e. playing the role of a primary safety net), as well as economic structures in which agriculture is still important – at least in rural areas (Papadopoulos 2015, Branco et al. 2019, Moury and Afonso 2019). Additional studies took account of other factors, like capitalist development, class formation and the role of the state, the multifaceted inter-linkage between state, family and welfare budgeting (Petmesidou 1996), and the dominance of clientele practices (Ferrera 1996, Ferrera 2005).

Inclusive growth featured high on the Commission's social agenda (Obermaier 2016). In these regards, Greece, Spain, Portugal, and Italy form a distinct group of "lagging" countries in Europe with regard to social spending (Carlucci et al. 2017). In particular, based on Eurostat data, the aforementioned countries expanded their social protection expenditures by nearly 70% in the 1980s, whereas the EU average approximated 41%. The expansion of these welfare structures has been mostly realized in a period of economic stagnation, in contrast with Western and Northern European countries – which benefited from the massive economic expansion of the 1960s and early 1970s (Schubert et al. 2016, Antonelli and De Bonis 2017, Pennings and Seeleib-Kaiser 2018). The exceptional expansion of social expenditure in Mediterranean countries was not sustainable on a long-run base, evolving in an economic environment of retrenchment (Katrougalos and Lazaridis 2003, Ferreiro at al. 2010, Baute et al. 2019). In this regard, persistent, wide-ranging poverty has been frequently seen as a symptom of the low effectiveness of social protection schemes in Southern Europe (Saraceno 2016).

Assuming welfare systems as a composite research dimension (Titmuss 1950, Myrdal 1960), the investigation of social security systems requires a refined analysis of economic patterns, social structures, political settings, welfare state characteristics, together with an exploration of long-term expenditure trends (Esping-Andersen 1993). With regard to social expenditures efficiency, it was demonstrated how public spending is less effective in countries with high levels of corruption. Corruption tends to finance investment practices that generate the highest bribes, reducing social advantages of universal welfare systems (Shleifer and Vishny 1993). Moreover, corruption introduces distortions in both the amount and composition of social expenditures and the efficiency of measures directed towards poverty reduction. This confirms that welfare ineffectiveness may reflect the outcomes of a generalized state of corruption (Popova and Podolyakina 2014).

A significant containment of corruption would enable to improve human development through the reduction of infant mortality and the improvement of primary school rates (Menz 2019). Thus, social expenditures leverage human development. The state ability to produce well-being depends on political choices and government effectiveness, which is in turn related to the ability of the state to consistently design and apply policies (Abed and Gupta 2002). Increased political rights and extended civil liberties are also assumed to positively impact social spending (Faricy 2011). Rising personal incomes result in increased social expenditures. At the same time, these expenditures are closely linked to economic structure and performances, delineating the quantity and quality of monetary resources and the way a given society contributes to guaranteeing social protection to its members (Peacock 1960).

Based on these premises, our study provides an empirical verification of Esping-Andersen categories in light of a 'Mediterranean' typology of welfare state. More specifically, an interpretative model was developed considering the social expenditure in the total gross domestic product as a function of economic performances and socio-cultural, political and institutional factors. This model was aimed at providing an integrated vision of the distinctive functioning of welfare systems in Southern Europe, considering specific – and sometimes novel

– dimensions (in respect with 'mainstream' European studies of welfare systems), such as corruption, political rights and freedom level. With this perspective in mind, the results of our work provide guidance concerning the fundamental determinants of between-country variations in the shape of European welfare policies – with a peculiar emphasis on peripheral countries in Europe – and the corresponding performance of welfare systems under a comparative perspective.

Methodology

Study area

The present study focused on the 28 European Union countries and the related analysis covered the time interval between 2009 and 2017. The initial year of study (2009) reflects the outbreak of the financial crisis in Europe, being intertwined with downward budget pressures on welfare programs especially for Mediterranean countries (Steinebach et al. 2019).

Data and indicators

A number of indicators were collected and elaborated in this study. Data on welfare systems have been derived from official statistics and other well-known international data sources. Social protection statistics have been derived from Eurostat and consider all the formal (public) measures covering households and individuals from the burden of a set of risks or needs that include sickness and healthcare, disability, elderly, unemployment, parental responsibilities, the loss of a spouse or parent, housing and social exclusion. The corruption level was estimated, for each country, through the Corruption Perception Index (CPI) released by Transparency International (TI) and available at the website: https://www.transparency.org. The values of this indicator range between 0 and 100; 0 denotes a country perceived as highly corrupted, and 100 means that a country is perceived as very clean.

The Freedom Rating (FR) index, including a basic assessment of the range of Political Rights (PR), and the extent of Civil Liberties (CL) provided by the Freedom House organization (www.freedomhouse.org) were also included in our study. The PR rating was based on the evaluation of three partial indicators (i.e. electoral process, political pluralism, public participation/functioning of government). The CL indicator was composed of four partial indicators (freedom of expression and belief, associational and organizational rights, rule of law, personal autonomy and individual rights). More specifically, the FR index was computed as the average of PR and CL scores and it gives a provisional estimation of the associated level of democracy in a given country. The scoring scale of PR and CL indicators varies between 1 and 7, with lower values representing improved freedom standards. The Freedom Rating (FR) index has been rescaled here to facilitate empirical estimation and cross-country comparisons. Thus, the values of Political Rights (PR) and Civil Liberties (CL) indicators vary between 1 and 7, with lower values representing deteriorated levels of freedom standards. While countries with an average score of 1 to 2.5 were regarded as "free", scores from 3 to 5 indicate "partly free" countries and scores from 5 to 7 delineate "non-free" contexts.

Per-capita Gross Domestic Product (purchasing power parity or constant international dollars, GDP.pc.ppp) was used here to estimate the level of economic growth in each country and it was derived from the World Bank database (http://data.worldbank.org/indicator). International dollars have the same purchasing power over GDP as a US dollar in the United States. This variable was adopted with the aim at comparing countries considering living standards, since purchasing power parities take account of the relative cost of living in a given country.

The human development index (HDI) was adopted here as a composite estimate of the level of human development in a given country. Being released by the United Nations Development Program, it assesses the average achievements in three relevant dimensions of human

development (a long and healthy life, access to knowledge and a decent standard of living). The HDI was adopted for analysis of both developing countries and advanced economies, including the 28 European Union countries (Kiseľáková et al. 2019). The HDI in developed countries has been frequently related to corruption (Lalountas et al. 2011) and an interrelated concept, which is the quality of government regarding the European Union member countries, was extensively investigated (Charron et al. 2013).

To assess the capacity of governance to formulate and implement sound policies, the Government Effectiveness (GE) indicator (Kaufmann et al. 1999) was finally considered. The GE index evaluates the perception about the quality of public services, the quality of public services and the degree of independence from political pressures, the quality of policy formulation (and implementation) and the credibility of government's commitment to such policies. The GE index ranges between -2.5 and 2.5; higher values of the index correspond to a better governance level (https://info.worldbank.org/).

Summary statistics of the indicators considered in our study indicate that a particularly high range in the share of social protection expenditures in total GDP was observed in the European countries, ranging between 14.6% and 33.9%. The corruption index (CPI) varies from 4.0 (the highest corruption level) to 9.1 (the lowest corruption level). However, no country in Europe is completely free from corruption, since the maximum theoretical value (CPI = 10) has been not recorded in the sample.

Statistical analysis

Assuming the above-mentioned dimensions as basic factors of social spending, a linear model estimating Social Protection Expenditures (SPE) in total GDP as a function of the following variables has been specified as follows:

$$SPE = \beta_0 + \beta_1 CPI + \beta_2 FR + \beta_3 \ln(GDP.pc.ppp) + \beta_4 HDI + \beta_5 GE + \varepsilon$$

The combination of time series with cross-sections improves the estimation performance in ways that would be impossible using only one of the two characteristic dimensions of time series, i.e. quality and quantity of data (Gujarati 2003). In these regards, panel analysis (or cross-sectional time series data analysis) allows the investigation of latent dynamics within shorter time series (Yaffee 2003).

A panel regression was estimated in the present study adopting the Fixed Effects (FE) approach and applying the White diagonal correction of standard errors for heteroschedasticity and autocorrelation. A Hausman test was run (Baltagi 2005) that indicates when FE should be preferred against the Random Effects (RE) approach. FEs were extensively run on panel data to quantify the effect of time-varying independent variables under time-constant (omitted) variables (Wooldridge 2013). The unobserved heterogeneity was treated assuming that omitted variables do not change over time and as a result by eliminating their effect through FE (Lamonica and Chelli 2018). Therefore, with omitted variables correlated with the variables included in the model, the FE model provides a tool controlling for omitted variable bias (Salvati et al. 2019). With regard to this empirical model, it might be assumed that omitted variables remain constant over time due to the limited time window (t = 8 years). To test the validity of the model's outcomes, Random Effects (RE) and the Panel Least Squares method (without fixed or random effects for both cross section and time series data) have been also run and results were illustrated considering the predictors' coefficients and the related statistical significance (Ciommi et al. 2019, Lamonica et al. 2020).

Results

Results of a correlation analysis (based on Pearson pair-wise coefficients) delineating the most significant relationships between social protection expenditures and contextual factors have been illustrated in Table 1. Economic growth [ln(GDP.pc.ppp)] displayed a positive correlation with social protection expenditures (SPE). A positive correlation was also observed between social spending (SPE) and the corruption index (CPI), indicating a negative association between corruption and social spending levels, since CPI was inversely related to corruption levels. The pair-wise relationship between CPI and the human development index (HDI) was also found intense and positive (r = 0.85). Additionally, the results show how countries with less government quality (GE) had, on average, a lower level of social spending.

Table 1

Pair-wise correlation coefficients between relevant indicators in the European Union member states

Variable	SPE	CPI	GCI	ln(GDP)	HDI
CPI	0.87				
FR	0.77	0.65			
ln (GDP)	0.83	0.71	0.94		
HDI	0.40	0.85	0.51	0.85	
GE	0.64	0.73	0.45	0.39	0.31

Fig. 1 illustrates the relationship between the levels of social protection expenditures and wealth for the time interval between 2009 and 2017, confirming the existence of a latent relationship between social policy expenditures (SPE) and per-capita GDP. Based on this scatterplot, Germany, Austria and France were demonstrated to cluster together, whereas the United Kingdom and Ireland constitute a separate group, as well as the wealthiest countries in Europe, such as Denmark, Sweden and Finland, structurally devoting larger amounts on their social budget. Economically disadvantaged countries in Europe (e.g. Bulgaria, Romania, Lithuania and Estonia) destined less monetary resources of their national budget to social expenditures. However, social expenditures may differ for a given level of income: for instance, Latvia had a lower level of social expenditures given its income level. Italy, Greece, Spain and Portugal were clustered together displaying a lower share of social spending in total GDP in respect with the remaining European countries. This comparison suggests how Mediterranean countries are institutionally fragile and with a moderately higher level of corruption in respect with North-western countries. The empirical results of this preliminary analysis corroborates the assumptions of Esping-Andersen classification.

Results of the panel regression based on Fixed Effects (FE), Random Effects (RE) and Panel Least Squares (PLS) approaches were illustrated in Table 2 providing coefficient estimates, the standard error, the *t*-statistic and the *p*-value, together with the results of the Hausman test. The final outcomes of the three estimations are quite similar. The estimated corruption coefficient (CPI) was positive and statistically significant in all specifications of the basic model. According to FE estimate, a one-point increase in the corruption index increased social public expenditures index by 0.029 points.

Based on the estimation results, if Italy (41) had the level of corruption of Denmark (91), which is the best performer in the sample under consideration in terms of corruption, then social expenditures in Italy (30%) would increase and approximate that of Finland (32%). The

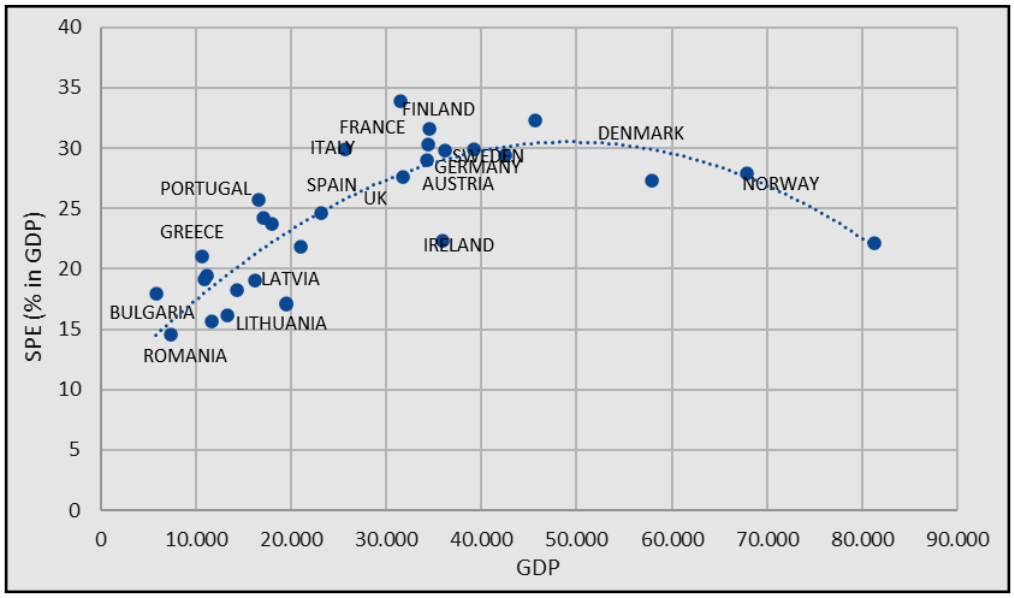

Fig. 1 – **The relationship between the share of Social Public Expenditures (SPE) in total value added (%) and the per-capita Gross Domestic Product (GDP)**
Source: *own elaboration on Eurostat data*

democracy index (FR) and the income level [ln(GDP.pc.ppp)] were statistically significant at $p < 0.01$. The Human Development Index (HDI) was moderately significant, likely because of the high correlation between HDI and CPI. The indicator quantifying government effectiveness (GE) also exerted a positive and significant impact on social spending. The specific impact of individual predictors on the variability of the dependent variable was assessed considering an elasticity index. By using this approach, the level of corruption in a given country, in addition to per-capita GDP and political freedoms – followed by government effectiveness and human development – resulted to be highly related to social protection expenditures.

Discussion

Considering the institutional configuration of their policy regime, building a social safety net in such countries was a true challenge because of the specificity of their economic context, socio-political culture and norms (Pierson 2001, Moreno 2003, Aspalter 2019). Mediterranean European countries played an active part in the European Union agenda on territorial cohesion, poverty and social exclusion. The results of the present study provide an indirect confirmation to the Esping-Andersen classification (Antonelli and De Bonis 2017). Social protection expenditures were mostly dependent on the (intrinsic) institutional structure of countries, in turn reflected in the levels of economic development, political freedoms and corruption, together with the government ability to effectively formulate and apply policies (Branco et al. 2019). The results indicate how economic growth effectively provides the basis for enhancing the social objectives, being instrumental for human progress (Chelli and Rosti 2002, Castagnetti et al. 2005, Saraceno 2008, Rosti and Chelli 2009).

Table 2

Results of a panel regression (2009-2017) estimating the impact of selected predictors on the level of social spending in 28 European Union member countries based on Fixed Effects (FE), Random Effects (RE) and Panel Least Squares (PLS)

Variable	FE (1)	RE (2)	PLS (3)
Constant	2.103*** 0.358 5.741 0.000	2.019*** 0.437 4.306 0.000	21.648*** 1.868 11.586 0.000
CPI	0.029*** 0.670 0.011 2.636 0.000	0.352*** 0.051 6.902 0.000	0.284*** 0.052 5.462 0.000
FR	0.326*** 0.470 0.089 3.663 0.001	0.122*** 0.054 2.815 0.006	0.442*** 0.096 4.604 0.000
ln (GDP.pc.ppp)	0.321*** 0.580 0.115 2.744 0.008	0.499*** 0.148 3.006 0.004	0.246*** 0.041 5.234 0.000
HDI	0.107** 0.210 0.051 2.038 0.046	0.155** 0.071 2.316 0.024	0.123** 0.060 2.067 0.039
GE	0.083* 0.320 0.054 1.578 0.115	0.483* 0.287 1.683 0.095	0.241* 0.142 1.697 0.092
$\bar{R}_2$	0.986	0.985	0.859
F-statistic	360.443	358.749	709.401
Prob(F-statistic)	0.000	0.000	0.000
Hausman Prob	120.709 0.000	136.785 0.000	196.842 0.000

***, **, * denote the statistical significance at 1%, 5% and 10% level, respectively; in the table, coefficients respectively estimate, from up to down, the elasticity index, the standard error, the *t*-statistic and the *p*-value (except for the constant where the elasticity is not estimated)

Social policy analysis was associated with the emergence of welfare states in European countries. Social policy is frequently conceived as imperative to social development and as a key instrument that works in parallel with economic policy, assuring targets of universal social protection and equity (Chelli et al. 2009). Assessing social policies under a purely 'developmental' perspective is in line with the political context within which they are being formulated and implemented (Gigliarano and Chelli 2016). Welfare states satisfy a minimum standard of living for all citizens, providing security to individuals and families when unfavorable circumstances occur, and guaranteeing access to fundamental rights for all citizens (Rosti and Chelli 2012). The specific tools through which the welfare state has operated so far included allowances related to family life, old age, maternity, disability and unemployment, cash payments to address specific living or family conditions, the provision of education, healthcare, and housing services, as well as granting of tax benefits for family needs (Saraceno 2016).

In the present study, the dominant European social protection systems have been contextualized within the wider historical and cultural circumstances of member countries (Menz 2019). Three theoretical welfare types were detected delineating public social expenditure patterns (Schubert et al. 2016). Clusters were identified according to the prevailing welfare models; institutional variables have been considered in addition to the expenditure profile of each country. With this line of thinking, the cluster of "Mediterranean European countries" has not only territorial implications but also a profound political and socioeconomic value (Saraceno 2016).

The 'Mediterranean' social model is a political construct that captures important similarities among Italy, Greece, Spain and Portugal (Rontos et al. 2017). Despite the intense convergence toward the 'Northern' European welfare standards, huge social disparities persist in such countries, based on labor market segmentation and the intrinsic reliance on the family for social assistance (De la Porte and Pochet 2002). At the same time, significant differences between the four countries were observed and the between country, within-region variation was greater than in the Scandinavian region, while remaining lower than in Central-Eastern Europe (Bettio and Plantenga 2004).

The results of this study finally indicate how the overall well-being of a society is the product of three dimensions, namely the State, the family and the market. The degree of collective protection against social threats results from the interplay of the three aforementioned regulation spheres. Despite the European unification and convergence to pre-defined standard models, designing an effective and universal welfare state largely remains a national issue applicable to the socioeconomic framework of countries based on their institutional, political, and cultural settings (Steinebach et al. 2019). Unveiling institutional rigidities and administrative incapacity, corruption depresses the efficacy of public spending on social outcomes, reducing the quality of public services and driving monetary allocation among different budgetary functions. In these regards, political development in terms of freedom rights and civil liberties exerts a positive impact on social spending (Baute et al. 2019). However, it should be mentioned how additional forces can be relevant in such contexts, including trust/ distrust in state authorities or strength/weakness of the civil society. For instance, voluntary associations are having in some European countries an important share in social security expenditures, although their impact on the structure of social spending is recognized to be less intense in Mediterranean countries.

Policies implemented to raise welfare standards are meaningless without understanding the underlying socioeconomic context (Branco et al. 2019). The omission of appropriate factors of social change has been identified as one of the main constraints when building effective and sustainable welfare models. Our study makes a systematic attempt in this direction by

analyzing the social policy and by assessing the intrinsic relationship between welfare spending and economic development (Moury and Afonso 2019). The empirical results of panel regressions reject the hypothesis of a univocal linkage between public social spending and national wealth. It is true that economic development in high-income countries was associated with increasing social protection expenditures, whereas low-income economies allocated restricted funds for social protection. At the same time, welfare divergences remain in South European countries, despite their efforts to converge toward Northern European standards. This finding can be explained with corruption penetrating into the 'value system' of a society (De Rosa and Salvati 2016), and being sometimes considered an essential mechanism of survival for socially excluded people exposed to poverty risk (Giordono et al. 2019).

The extent of political freedoms represented by civil liberties seems to be another key factor affecting social expenditures. The higher is the index of civil liberties, the lower are the risks for politically motivated violence and destabilization. The smooth functioning of 'democratic' political institutions and civil liberties contributes to the functioning of effective and universal welfare regimes. Operational dimensions such as freedom of expression and belief, the protection of civil rights, the promotion of the rule of law, the defense of personal autonomy and individual rights are elements at the base of a politically free state (Charron et al. 2013). Nevertheless, the long-run health of the political system often requires internal checks and balances, whereas openness and transparency are the best ways of ensuring that such structural mechanisms develop (Aspalter 2019).

A better understanding of the aforementioned attributes of social protection systems largely unveils persistent social problems. In this regard, policy strategies should be compatible with social constraints and the (changing) economic structure, tuning finely with the broader political framework under which they operate. In other words, social welfare policy design reflects the respective economic, political and social systems (Pennings and Seeleib-Kaiser 2018). While policy prescriptions should be not applied uniformly in countries with different economic, cultural and institutional contexts, ignoring the aforementioned divergences may lead to fallacious inferences regarding the social policy, which should be treated as a truly multidimensional and non-linear dimension of change.

Conclusions

The results of the analysis presented in our study imply that design and implementation of universal policy recommendations for advanced economies, regardless of their social, cultural and political background, prove to be partly ineffective and unresponsive. To put it differently, in case that corruption is endemic, deeply embedded in the political and social culture of a country, policy initiatives taken to support welfare dynamics should be more adapted to individual sociopolitical traits of countries, responding to a specific policy mix, targeted reforms and structural adjustments. These long-run factors are important under the wide spectrum of sustainability options and opportunities. Future strategies are increasingly required to incorporate the concerns of improved social capabilities along with intensified efforts targeting economic development and reducing the scope of corruption, as effective tools containing welfare failures and losses.

References

ABED G. T., GUPTA S. (eds.) (2002), *Governance, Corruption and Economic Performance*, International Monetary Fund, Washington D.C.

ANTONELLI M. A., DE BONIS V. (2017), *Social spending, welfare and redistribution: a comparative analysis of 22 European countries*, Modern Economy 8 (11), 1291-1313.

ARMINGEON K., BEYELER M. (eds.) (2004), *The OECD and European welfare states*,

Edward Elgar, Cheltenham.

ARTS W., GELISSEN J. (2001), *Welfare states, solidarity and justice principles: Does the type really matter?*, Acta Sociologica 44 (4), 283-299.

ASPALTER C. (2019), *Welfare regime analysis: 30 years in the making*, International Social Work 62 (1), 76-88.

BALDWIN P. (1990), *The politics of social solidarity: Class bases of the European welfare states 1875–1975,* Cambridge University Press, Cambridge.

BALTAGI B. H. (2005), *Econometric analysis of panel data*, John Wiley & Sons, London.

BAUTE S., MEULEMAN B., ABTS K. (2019), *Welfare state attitudes and support for social Europe: Spillover or obstacle?*, Journal of Social Policy 48 (1), 127-145.

BETTIO F., PLANTENGA J. (2004), *Comparing care regimes in Europe*, Feminist Economics 10 (1), 85-113.

BONOLI G., GEORGE V., TAYLOR-GOOBY P. (2000), *European welfare futures*, Polity Press, Oxford.

BRANCO R., CARDOSO D., GUILLÉN A. M., SACCHI S., BALBONA D. L. (2019), *Here to stay? Reversals of structural reforms in Southern Europe as the crisis wanes*, South European Society and Politics 24 (2), 205-232.

BRUUN N., LÖRCHER K., SCHÖMANN I. (eds.) (2012), *The Lisbon Treaty and Social Europe*, Hart, Berlin.

CARLUCCI M., GRIGORIADIS E., RONTOS K., SALVATI L. (2017), *Revisiting a hegemonic concept: Long-term 'Mediterranean urbanization' in between city re-polarization and metropolitan decline*, Applied Spatial Analysis and Policy 10, 347-362.

CASTAGNETTI C., CHELLI F., ROSTI L. (2005), *Educational performance as signalling device: Evidence from Italy*, Economics Bulletin 9 (4), 1-7.

CASTLES F. G. (1995), *Welfare state development in Southern Europe*, West European Politics 18 (2), 291-313.

CHARRON N., LAPUENTE V., ROTHSTEIN B. (2013), *Quality of government and corruption from a European perspective: A comparative study of good government in EU regions*, Edward Elgar, London.

CHELLI F., GIGLIARANO C., MATTIOLI E. (2009), *The impact of inflation on heterogeneous groups of households: An application to Italy*, Economics Bulletin 29 (2), 1276-1295.

CHELLI F., ROSTI L. (2002), *Age and gender differences in Italian workers' mobility*, International Journal of Manpower 23 (4), 313-325.

CHELLI F. M., CIOMMI M., EMILI A., GIGLIARANO C., TARALLI S. (2016), *Assessing the Equitable and Sustainable Well-Being of the Italian Provinces*, International Journal of Uncertainty, Fuzziness and Knowlege-Based Systems 24 (Suppl. 1), 39-62.

CIOMMI M., CHELLI F. M., CARLUCCI M., SALVATI L. (2018), *Urban growth and demographic dynamics in southern Europe: Toward a new statistical approach to regional science*, Sustainability (Switzerland) 10 (8), 2765.

CIOMMI M., CHELLI F. M., SALVATI L. (2019), *Integrating parametric and non-parametric multivariate analysis of urban growth and commuting patterns in a European metropolitan area*, Quality & Quantity 53, 957-979.

CIOMMI M., GIGLIARANO C., EMILI A., TARALLI S., CHELLI F. M. (2017), *A new class of composite indicators for measuring well-being at the local level: An application to the Equitable and Sustainable Well-being (BES) of the Italian Provinces*, Ecological Indicators 76, 281-296.

CONSOLI M. T. (2015), *Introduction*, in: Consoli M. T. (ed.), Migration towards Southern Europe: The case of Sicily and the separated children, Franco Angeli, Milan.

DEACON B. (2000), *Eastern European welfare states: the impact of the politics of globalization*, Journal of European Social Policy 10 (2), 146-161.

DE LA PORTE C., POCHET P. (2002), *Building Social Europe through the open*

method of co-ordination, Peter Lang, Brussels.

DE ROSA S., SALVATI L. (2016), *Beyond a 'side street story'? Naples from spontaneous centrality to entropic polycentricism, towards a 'crisis city'*, Cities 51, 74-83.

DE SIMONE E., GAETA G. L., ERCOLANO S. (2012), *Exploring public social expenditure trends in the globalization era*, European Research Studies Journal 15 (1), 23-42.

EBBINGHAUS B., MANOW P. (eds.) (2004), *Comparing welfare capitalism: Social policy and political economy in Europe, Japan and the USA*, Routledge, London.

ESPING-ANDERSEN G. (1990), *The three worlds of welfare capitalism*, Polity Press, Cambridge.

ESPING-ANDERSEN G. (1993), *The comparative macro-sociology of welfare states*, in: Moreno L. (ed.), Social exchange and welfare development, CSIC, Madrid, pp. 123-36.

ESPING-ANDERSEN G. (1996), *Welfare states in transition: National adaptations in global economics*, London, Sage.

FARICY C. (2011), *The politics of social policy in America: The causes and effects of indirect versus direct social spending*, The Journal of Politics 73 (1), 74-83.

FERREIRO J., GARCÍA-DEL-VALLE M. T., GÓMEZ C. (2010), *Social preferences and fiscal policies: An analysis of the composition of public expenditures in the European Union*, Journal of Post Keynesian Economics 32 (3), 347-370.

FERRERA M. (1996), *The 'Southern model' of welfare in Social Europe*, Journal of European Social Policy 6 (1), 17-37.

FERRERA M. (ed.) (2005), *Welfare state reform in Southern Europe: Fighting poverty and social exclusion in Italy, Spain, Portugal and Greece*, New York, Routledge.

FRITZELL J., HVINDEN B., KAUTTO M., KVIST J., UUSITALO H. (eds.) (2001), *Nordic welfare states in the European context*, Routledge, London.

GAVALAS V. S., RONTOS K., SALVATI L. (2014), *Who Becomes an Unwed Mother in Greece? Sociodemographic and Geographical Aspects of an Emerging Phenomenon*, Population, Space and Place 20 (3), 250-263.

GIGLIARANO C., CHELLI F. M. (2016), *Measuring inter-temporal intragenerational mobility: an application to the Italian labour market*, Quality and Quantity 50, 89-102.

GIORDONO L. S., JONES M. D., ROTHWELL D. W. (2019), *Social policy perspectives on economic inequality in wealthy countries*, Policy Studies Journal 47 (S1), S96-S118.

GUILLEN A. M., MATSAGANIS M. (2000), *Testing the 'Social Dumping' hypothesis in Southern Europe: Welfare policies in Greece and Spain during the last 20 years*, Journal of European Social Policy 10 (2), 120-145.

GUJARATI D. N. (2003), *Basic Econometrics*, McGraw Hill, New York.

KATROUGALOS G., LAZARIDIS G. (2003), *Southern European Welfare States: Problems, Challenges and Prospects*, Palgrave Macmillan, London.

KAUFMANN D., KRAAY A., ZOIDO-LOBATÓN P. (1999), *Governance matters*, Policy Research Working Paper 2196, World Bank, Washington, D.C.

KISEĽÁKOVÁ D., ŠOFRANKOVÁ B., GOMBÁR M., ČABINOVÁ V., ONUFEROVÁ E. (2019), *Competitiveness and its impact on sustainability, business environment, and human development of EU (28) countries in terms of global multi-criteria indices*, Sustainability 11 (12), 1-25.

KUHNLE S. (2003), *The survival of the European welfare state*, Routledge, London.

LALOUNTAS D. A., MANOLAS G. A., VAVOURAS I. S. (2011), *Corruption, globalization and development: How are these three phenomena related?*, Journal of Policy Modeling 33 (4), 636-648.

LAMONICA G. R., CHELLI F. M. (2018), *The performance of non-survey techniques for constructing sub-territorial input-output tables*, Papers in Regional Science 97 (4), 1169-1202.

LAMONICA G. R., RECCHIONI M. C., CHELLI F. M., SALVATI L. (2020), *The efficiency of the cross-entropy method when estimating the technical coefficients of input–output tables*, Spatial Economic Analysis 15 (1), 62-91.

MAJONE G. (1993), *The European Community between social policy and social*

regulation, Journal of Common Market Studies 31 (2), 153-170.

MENZ G. (2019), *Understanding the identity of a policy field: the European Commission and liberal modernization in the domain of labour and social policy*, Comparative European Politics 17, 603-618.

MORENO L. (2003), *Europeanisation, mesogovernments and 'safety nets'*, European Journal of Political Research 42 (2), 271-285.

MOURY C., AFONSO A. (2019), *Beyond conditionality: policy reversals in Southern Europe in the aftermath of the Eurozone crisis*, South European Society and Politics 24 (2), 155 -176.

MYRDAL G. (1960), *Beyond the welfare state: Economic planning and its international implications*, Yale University Press, New Haven.

OBERMAIER A. J. (2016), *The end of territoriality? The impact of ECJ rulings on British, German and French social policy*, Routledge, London.

PAPADOPOULOS A. G. (2015), *The impact of the CAP on agriculture and rural areas of EU Member States*, Agrarian South: Journal of Political Economy 4 (1), 22-53.

PASCALL G., LEWIS J. (2020), *Emerging gender regimes and policies for gender equality in a wider Europe*, Journal of Social Policy 33 (3), 373-394.

PASCALL G., MANNING N. (2000), *Gender and social policy: comparing welfare states in Central and Eastern Europe and the former Soviet Union*, Journal of European Social Policy 10 (3), 240-266.

PAVOLINI E., RANCI C. (2008), *Restructuring the welfare state: reforms in long-term care in Western European countries*, Journal of European Social Policy 18 (3), 246-259.

PEACOCK A. T. (1960), *The welfare society*, Liberal Publication Department, London.

PENNINGS F., SEELEIB-KAISER M. (eds.) (2018), *EU citizenship and social rights: entitlements and impediments to accessing welfare*, Edward Elgar, Cheltenham.

PETMESIDOU M. (1996), *Social Protection in Southern Europe: Trends and prospects*, Journal of Area Studies 4 (9), 95-125.

PETMESIDOU M., GUILLÉN A. M. (eds.) (2017), *Economic crisis and austerity in Southern Europe: threat or opportunity for a sustainable welfare state*, Routledge, London.

PIERSON P. (2001), *The New Politics of the Welfare State*, Oxford University Press, Oxford.

POPOVA Y., PODOLYAKINA N. (2014), *Pervasive impact of corruption on social system and economic growth*, Procedia – Social and Behavioral Sciences 110, 727-737.

RHODES M., MÉNY Y. (eds.) (1998), *The future of European welfare: a new social contract?*, Palgrave Macmillan, London.

RONTOS K., GRIGORIADIS E., SATERIANO A., SYRMALI M., VAVOURAS I., SALVATI L. (2016), *Lost in protest, found in segregation: Divided cities in the light of the 2015 "Οχι" referendum in Greece*, City, Culture and Society 7 (3), 139-148.

RONTOS K., SYRMALI M.-E., VAVOURAS I. (2017), *The Relationship between economic and social development with competitiveness: An empirical study*, Social Cohesion and Development 12 (1), 21-37.

ROSTI L., CHELLI F. (2009), *Self-employment among Italian female graduates*, Education + Training 51 (7), 526-540.

ROSTI L., CHELLI F. (2012), *Higher education in non-standard wage contracts*, Education + Training 54 (2/3), 142-151.

SALVATI L. (2016), *The Dark Side of the Crisis: Disparities in per Capita income (2000–12) and the Urban-Rural Gradient in Greece*, Tijdschrift voor Economische en Sociale Geografie 107 (5), 628-641.

SALVATI L., CARLUCCI M. (2011), *The economic and environmental performances of rural districts in Italy: Are competitiveness and sustainability compatible targets?*, Ecological Economics 70 (12), 2446-2453.

SALVATI L., CIOMMI M. T., SERRA P., CHELLI F. M. (2019), *Exploring the spatial structure of housing prices under economic expansion and stagnation: The role of socio-*

demographic factors in metropolitan Rome, Italy, Land Use Policy 81, 143-152.

SALVATI L., SATERIANO A., GRIGORIADIS E. (2016), *Crisis and the city: profiling urban growth under economic expansion and stagnation*, Letters in Spatial and Resource Sciences 9, 329-342.

SALVATI L., GUANDALINI A., CARLUCCI M., CHELLI F. M. (2017), *An empirical assessment of human development through remote sensing: Evidences from Italy*, Ecological Indicators 78, 167-172.

SARACENO C. (ed.) (2008), *Families, ageing and social policy: Intergenerational solidarity in European welfare states*, Edward Elgar, Cheltenham.

SARACENO C. (2016), *Varieties of familialism: Comparing four southern European and East Asian welfare regimes*, Journal of European Social Policy 26 (4), 314-326.

SCHUBERT K., DE VILLOTA P., KUHLMANN J. (eds.) (2016), *Challenges to European Welfare Systems*, Springer, Berlin.

SHLEIFER A., VISHNY R. W. (1993), *Corruption*, The Quarterly Journal of Economics 108 (3), 599-617.

STEINEBACH Y., KNILL C., JORDANA J. (2019), *Austerity or welfare state transformation? Examining the impact of economic crises on social regulation in Europe*, Regulation & Governance 13 (3), 301-320.

TAYLOR-GOOBY P. (2004), *New risks, new welfare: the transformation of the European welfare state*, Oxford University Press, Oxford.

TAYLOR-GOOBY P., LERUTH B. (eds.) (2018), *Attitudes, aspirations and welfare: Social policy directions in uncertain times*, Palgrave Macmillan, Cham.

TAYLOR-GOOBY P., LERUTH B., CHUNG H. (2017), *After austerity: Welfare state transformation in Europe after the great recession*, Oxford University Press, Oxford.

TITMUSS R. M. (1950), *Problems of social policy*, HMSO and Longmans, London.

VAN BERKEL R., CASWELL D., KUPKA P., LARSEN F. (2017), *Frontline delivery of welfare-to-work policies in Europe: Activating the unemployed*, Routledge, New York.

WILLIAMS A. M. (1984), *Southern Europe transformed: Political and economic change in Greece, Italy, Portugal and Spain*, Harper & Row, London.

WOOLDRIDGE J. M. (2013), *Introductory Econometrics: A modern approach*, South-Western, Cengage Learning, Mason.

YAFFEE R. (2003), *A Primer for Panel Data Analysis*, Connect: Information Technology at NYU, 1-14.

Initial submission: 14.08.2020
Revised submission: 12.10.2020
Final acceptance: 15.10.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 19 - 34
https://doi.org/10.37043/JURA.2021.13.1.2

THE ROLE OF COOPERATION IN THE INNOVATION ACTIVITY OF ENTERPRISES: THE CASE OF POLISH REGIONS

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Abstract: Innovations are seen as an important factor of regional growth, but what influences the innovation activity of enterprises? In the regional innovation system, the set of actors interacting with each other is surrounded with a specific socio-economic environment. In the present research, the following economic and social features in a region – human capital, social capital, the level of economic development, and the existence of FDI – are analysed as possible factors of the innovation activity undertaken by enterprises. Two types of innovation activity are analysed: in-house R&D and the acquisition of machinery, software and equipment. The analysis was conducted for the years: 2004-2006, 2006-2008, 2008-2010, 2010-2012, 2012-2014, and the 16 Polish NUTS-2 regions. Based on the results of econometric panel models, innovation cooperation was found to be significant and positively related with both types of innovation activity. Moreover, public financial support and the level of foreign capital involvement were found positively related with the in-house R&D activity.

Key Words: *regional innovation system, innovation cooperation, panel data models.*

Introduction

According to the economic theory (Abramovitz 1956, Solow 1956, Solow 1957, Romer 1990), innovativeness is one of the main factors of economic growth. At regional level, researchers found the same relationship – a level of innovativeness can explain the differences in the development of individual regions (Niedzielski and Jaźwiński 2002, Crescenzi 2005, Fagerberg and Godinho 2005, Cooke et al. 2011). The development of a knowledge-based economy is also one of the main goals of the European Union. "Innovation Union" was set out as one of the priorities of the Europe 2020 Strategy (European Commission 2010a). The need for smart growth at a regional level was also noticed, and the Smart Specialisation approach was introduced as part of the "Innovation Union" programme to promote innovations in EU regions (European Commission 2010b).

The two main types of innovations are the products and the process innovations. They can be introduced in various ways: e.g. internal R&D, external R&D, acquisition of machinery, software and equipment, acquisition of patents and licencing (OECD and Eurostat 2018). Internal R&D activity is seen as an important factor in the catching-up process (Segerstrom 1991, Davidson and Segerstrom 1998, Griffith et al. 2004). Although, there is some evidence at national level that in-house activity occurs more often in more developed countries, and the acquisition of machinery, equipment, and knowledge is more often considered as a way to innovate in catching-up countries (Nölke and Vliegenthart 2009, Veugelers and Mrak 2009, Radosevic and Kaderabkova 2011, Geodecki 2014, Grodzicki and Geodecki 2016, Lopez-Rodriguez and Martinez 2017).

However, most of the research on the determinants of regional innovativeness (Pangsy-Kania 2007, Crescenzi and Rodríguez-Pose 2011, Czupich 2012, Paas and Triin 2012, Naz et al. 2015, Dzemydaitė et al. 2016, Krakowiak-Bal and Ziemiańczyk 2017, Dziallas and Blind 2019) only measures innovation using indicators related to the R&D activity such as R&D

expenditure, R&D personnel or the number of patent applications. Martin (2013) underlined this omission as a challenge faced by studies on innovations. Similarly, Pino and Ortega (2018) stressed out the lack of appropriate measures of RIS in previous research. The present research tries to fill this gap and to analyse both the main ways of introducing innovations – internal R&D, and the acquisition of machinery, software and equipment. It is assumed that both these types need different preconditions and the existence of different socio-economic features within regions. The main aim of the research is to identify the regional factors of both types of innovation activity to support the understanding of how the regional environment influences the various ways of implementing innovation within regions.

The paper is structured as follows. Section 2 introduces a theoretical framework. The data employed and methodology are explained in Section 3. Section 4 presents the results which are discussed in Section 5.

Theoretical framework

The theoretical base to the conducted research is the concept of regional innovation systems (RIS). The regional innovation system concept is an analytical model of innovation activity in regions (Braczyk et al. 1998). Despite much research on RISs (Wiig and Wood 1995, Asheim and Isaksen 1997, Cooke et al. 1997, Autio 1998, Howells 1999, Doloreux 2002, Evangelista et al. 2002, Doloreux and Parto 2005, Iammarino 2005, Świadek 2011, Todtling and Trippl 2011, Weresa 2013), there is a lack of a common definition. In most cases, an RIS is understood as a set of interacting private and public units, formal institutions and other organisations focused on the generation, use and diffusion of knowledge (Doloreux and Parto 2004), or in a broader sense focused on the production, import, modification, and diffusion of new technologies (Evangelista et al. 2002). At the base of this concept lies an assumption that innovation activity is a non-linear and strongly interactive process, and that innovative firms do not operate in isolation. The concept underlines the importance of communication and cooperation between different actors such as enterprises, universities, educational units, financial units, firms, associations, and governmental agencies. Innovative processes are geographically localised, and territorial features, among others, are reflected in the technological systems, production processes, manufacturing organisation, social and political surroundings. Also, some of the factors of innovation, such as tacit knowledge or institutions, are immobile to some extent (Cooke and Morgan 1998, Nauwelaers 2011, Todtling and Trippl 2011). Moreover, Doloreux and Gomez (2017) underlined the evolutionary and dynamic nature of RIS.

Previous research on RISs, in most cases, is based on case studies (Wiig and Wood 1995, Asheim and Isaksen 1997, Acs et al. 1998, Smith et al. 1998, Asheim and Isaksen 2002, Gerstlberger 2004, Iammarino 2005, Innovating Regions in Europe 2008, Florio et al. 2014, Ligenzowska 2016). Qualitative research was based, among others, on the IAIF-RIS database (Buesa et al. 2007), the Eurostat database (Hájková and Hájek 2010), on surveys (Świadek 2011), and on R&D and patent statistics (Weresa 2012). The Community Innovation Survey (CIS) at regional level was successfully used by Evangelista et al. (2002), among others, but that research rarely referred to the Polish regions. In the present analysis, the RISs of Polish regions are pictured in a quantitative way by using detailed data from the Community Innovation Survey (CIS).

In the present research, the following dimensions of RISs are measured: innovation activity of enterprises, involvement of the public sector in R&D, human capital, social capital (namely social trust and the social tendency to network), and the innovation cooperation of enterprises with any public or private partner. Human capital is defined after Becker et al. (1990: 15) as ‘embodied knowledge and skills’, while social capital is understood as social trust, norms of reciprocity, and networks of civic engagement (Putnam et al. 1993).

Regions differ significantly according to the quantity and quality of the factors of innovations, such as: the quality of institutions, the relations between innovative entities, intangible assets (such as human capital, social capital), and cultural aspects (Council on Competitiveness 2005, Kosała and Wach 2011, Nowakowska 2011, Markowska 2012, Camagni and Capello 2013, Crescenzi and Rodriguez-Pose 2013, Park 2015). It is assumed that the differences in the following economic and social features in a region – human capital, social capital, level of economic development, and the existence of FDI – can influence the type of innovation activity undertaken by the enterprises. Four hypotheses are tested in the research. H1: A higher level of human capital in a region is positively related to the engagement of innovative enterprises in in-house R&D. Human capital was found to be an important factor in innovations in a region in previous research (Broekel and Brenner 2011, Bellmann et al. 2013, Naz et al. 2015). H2: A higher level of innovative cooperation is positively related to the engagement of innovative enterprises in in-house R&D. Networks of cooperation are seen as an important element of the regional innovation environment (Tura and Harmaakorpi 2010), and a crucial part of the innovation system, where various actors interact with each other (Cooke et al. 1997, Autio 1998, Howells 1999, Doloreux 2002, Doloreux and Parto 2005). H3: A higher level of FDI in a region is positively related to the engagement of innovative enterprises in the acquisition of machinery and equipment. Fu (2008) suggested that the role of FDI in the development of innovations can be of a twofold nature, and it depends on the type of investment. On the one hand, for low-cost production and export-oriented investments, FDI would support the acquisition of already developed technologies and licencing. On the other hand, for R&D investments, FDI would support internal R&D in the region of the investment, but then a high level of regional human capital is a precondition. In the case of Poland and the manufacturing sector, the former was found to be predominant (Grodzicki and Geodecki 2016). H4: A higher level of public financial support in a region is positively related to the engagement of innovative enterprises in in-house R&D. Mazzucato (2013) underlined the role of public financing in innovation development.

Methodology

The analysis was conducted for the years: 2004-2006, 2006-2008, 2008-2010, 2010-2012, 2012-2014 (the years of the analysis are based on the availability of social diagnosis and the Community Innovation Survey data), and for the 16 Polish NUTS-2 regions: Łódzkie (PL11), Mazowieckie (PL12), Małopolskie (PL21), Śląskie (PL22), Lubelskie (PL31), Podkarpackie (PL32), Świętokrzyskie (PL33), Podlaskie (PL34), Wielkopolskie (PL41), Zachodniopomorskie (PL42), Lubuskie (PL43), Dolnośląskie (PL51), Opolskie (PL52), Kujawsko-Pomorskie (PL61), Warmińsko-Mazurskie (PL62), Pomorskie (PL63). To identify clusters of regions with a similar level of indicators for the features of a regional innovation system (Table 1), hierarchical clustering methods (namely, the Ward's method) were applied[2)]. Calculations were done in the R environment with the *stats* package (R Core Team 2018).

To examine the relationship between the various elements of the socio-economic environment (human capital, social capital, public sector financial support, FDI) and the engagement of innovative enterprises in an innovation activity, the estimation of the econometric panel models for the selected variables was performed. Calculations were done in the R environment (R Core Team 2018) using the *plm* package (Croissant and Millo 2008). The panel was built for 16 Polish NUTS-2 regions over five sets of years (2004-2006, 2006-2008, 2008-2010, 2010-2012, 2012-2014). The model (*pooled*) is based on the classical OLS regression estimated using an à

1) Data from CIS were delivered by the Polish National Statistical Office (GUS) in the form of aggregated data at NUTS-2 level. The acquisition of data was financed by the National Science Centre, Poland, grant no. 2016/21/N/HS4/02098.

2) For example, Yuan et al. (2013) tested a more advanced grey fixed weight clustering method in their research.

Table 1

Indicators used as quantitative measures of RIS components

RSI component	Indicator	Basic data name/label	Source [indicator code]
Human capital	K1`	% of graduates (ISCED 1997 level 5) in physics, chemistry, biology, mathematics and computing, informatics, environmental protection, engineering, manufacturing and processing, architecture and construction, as a percentage of graduates of public and private higher education units in all fields	Central Statistical Office of Poland (GUS)
	K2	Scientists and engineers as percentage of the active population	Eurostat [hrst_st_rcat]
Social capital	N1	Percentage of respondents who are members of one or more associations	Social Diagnosis (2016)
Cooperation	C1	Percentage of innovative enterprises (manufacturing sector) engaged in any type of cooperation	GUS
	C2	Percentage of PCT co-patent applications made within the region	OECD
Innovation activity of enterprises	IA1	Average rate of innovative enterprises in the total number of enterprises	GUS
	IA2	Expenditure of innovative enterprises on R&D as percentage of the total innovative activity expenditure	GUS
	IA3	Expenditure of innovative enterprises on the acquisition of machinery, software and equipment as percentage of the total innovative activity expenditure	GUS
Research activity	RD1	Public sector (government + higher education) R&D expenditure as percentage of the total R&D expenditure	Eurostat [rd_e_gerdreg]
	RD2	R&D personnel and researchers in the public (government + higher education) R&D sector as percentage of the total R&D personnel and researchers	Eurostat [rd_p_persreg]
	RD3	Patent applications to the EPO by priority year per million inhabitants	Eurostat [pat_ep_rtot]

**All indicators were normalised using the min-max normalisation method:* $X_{nit} = \frac{x_{it} - \min(x_t)}{\max(x_t) - \min(x_t)}$

Source: Lubacha (2019: 232)

la Newey and West estimator (NW) (Millo 2017).

Individual effects were tested with the Breusch-Pagan test (Breusch and Pagan 1980). Random effects were tested with the Baltagi & Li AR-RE test (Baltagi and Li 1991, Baltagi and Li 1995). In case of individual effects, the fixed effect and random effect estimators should be tested (Baltagi 2005). The data used in the models are presented in Table 2.

Public R&D based regions are mostly in Eastern Poland such as Podlaskie, Lubelskie and Świętokrzyskie; they are also part of a group of underdeveloped regions in Poland in terms of GDP (below 20% of the EU average in 2004, and below 30% in 2013). Diversified innovation activity regions – Małopolskie, Śląskie, Dolnośląskie, Pomorskie, and Mazowieckie – are regions with a high FDI share (from 5 [Małopolskie] to 19 [Mazowieckie] enterprises with foreign capital per 10,000 inhabitants in 2013) and a high level of new enterprise creation (almost 45% of all new enterprises created every year in Poland are established in those

Table 2

Description of the variables used in the models for the innovation activity

Variable	Description	Data source	Years covered
Dependent variable			
rd_{it}	Innovative enterprises engaged in internal R&D activity (% of total innovative enterprises)	GUS (CIS)*	2004-2006, 2006-2008, 2008-2010, 2010-2012, 2012-2014
me_{it}	Innovative enterprises engaged in the acquisition of machinery and equipment (% of total innovative enterprises)		
Independent variables (explanatory variables)			
$K1_{it}$	Scientists and engineers as percentage of the active population	Eurostat	2005, 2007, 2009, 2011, 2013
$C1_{it}$	Percentage of innovative enterprises (manufacturing sector) engaged in any type of cooperation	GUS	
$FCapital_{it}$	Enterprises with foreign capital, per 10,000 residents	GUS	
$PublicFin_{it}$	Innovative enterprises supported by the national government (% of total innovative enterprises)	GUS (CIS)*	2004-2006, 2006-2008, 2008-2010, 2010-2012, 2012-2014

**Data calculated by GUS based on CIS data*
Notion: All variables are expressed in natural logarithms; variable subscriptions relate to the i^{th} region in t^{th} period.
Source: *own elaboration*

regions). Podkarpackie is an example of a private R&D based region, and what is interesting is that data shows a low level of human capital, but a very high level of innovation cooperation. It can be assumed that capital and cooperation in the Podkarpackie region are high and they can support the innovation activity.

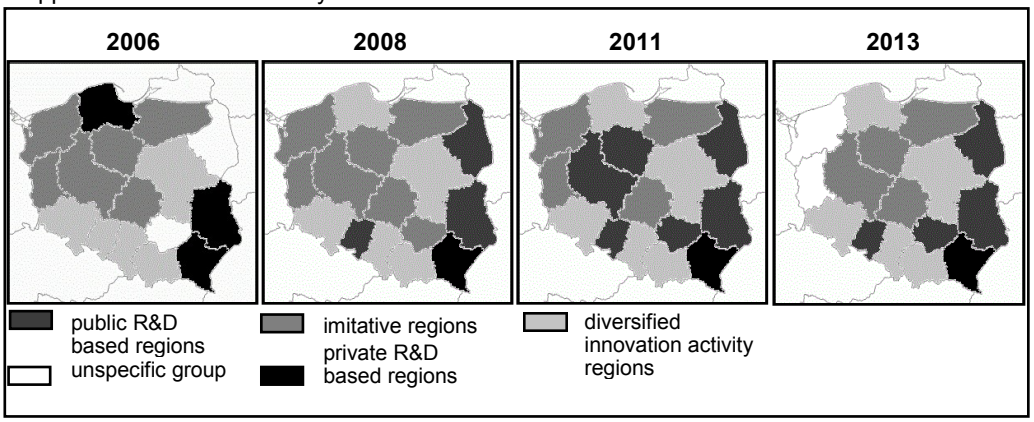

Fig. 1 **– Regional innovation systems in Polish regions**
Source: *own elaboration*

Results

Based on the clustering results, four types of RISs in Polish regions can be identified: (1) public R&D based regions; (2) imitative regions, (3) private R&D based regions, (4) diversified innovation activity regions (Fig. 1, Table 3).

Table 3

Types of regional innovation systems

Group	Group characteristic	Group	Group characteristic
I – public R&D based regions	• Low or very low level of human capital • High or moderate level of social capital • Low or very low level of business sector R&D expenditure • High or very high level of governmental R&D expenditure • High or very high level of public sector R&D personnel	II – imitative regions	• Low or very low level of human capital • Low or very low level of innovation cooperation • High or very high level of patenting cooperation • Low or very low rate of innovative enterprises • Low or moderate level of business sector R&D expenditure • High or very high level of business sector expenditure for the acquisition of machinery, software and equipment • High or very high level of public sector R&D personnel
III – private R&D based regions	• Low or very low level of human capital • High or very high level of social capital • High or very high level of innovation cooperation • High or very high rate of innovation enterprises • High or very high level of business sector R&D expenditure • Low or very low level of business sector expenditure for the acquisition of machinery, software and equipment • Low or very low level of governmental R&D expenditure • Very low level of public sector R&D personnel	IV – diversified innovation activity regions	• High or very high level of human capital • High or moderate level of social capital • High or very high level of patenting cooperation • High or moderate rate of innovation enterprises • Very high, high or moderate level of business sector R&D expenditure • Low or moderate level of business sector expenditure for the acquisition of machinery, software and equipment • High or moderate level of public sector R&D personnel • Very high, high or moderate level of patenting activity
V – unspecific group	Regions which are not characterised by any specific pattern in a given year. In the remaining years they are grouped within one of the four identified groups.		

Source: *Lubacha (2019: 234)*

Public R&D based regions are mostly in Eastern Poland such as Podlaskie, Lubelskie and Świętokrzyskie; they are also part of a group of underdeveloped regions in Poland in terms of GDP (below 20% of the EU average in 2004, and below 30% in 2013). Diversified innovation activity regions – Małopolskie, Śląskie, Dolnośląskie, Pomorskie, and Mazowieckie – are regions with a high FDI share (from 5 [Małopolskie] to 19 [Mazowieckie] enterprises with foreign capital per 10,000 inhabitants in 2013) and a high level of new enterprise creation (almost 45% of all new enterprises created every year in Poland are established in those regions). Podkarpackie is an example of a private R&D based region, and what is interesting is that data shows a low level of human capital, but a very high level of innovation cooperation. It can be assumed that capital and cooperation in the Podkarpackie region are high and they can support the innovation activity.

In the case of both models for innovation activity, the results of the Breusch-Pagan test ($p > 0.05$) do not allow the rejection of the hypothesis about a lack of individual effect. Likewise, the results of the Baltagi & Li AR-RE test ($p > 0.05$) do not allow the rejection of the hypothesis about a lack of random effects. Therefore, the results of the OLS models can be interpreted as reliable (Table 4).

In the model for in-house R&D activity rd_{it}), (innovation cooperation, public financing and the level of foreign capital in the region were found to be significant. Hypothesis 1 cannot be rejected because of the insignificance of variable *K1* for human capital. Hypotheses 2 and 4 can be confirmed, as the higher level of innovation cooperation and public financing were found to be positively related with the engagement of innovative enterprises in the in-house R&D. In the model for the acquisition of machinery and equipment (me_{it}), only innovation cooperation was found to be significant. Hypothesis 3 cannot be rejected because of the insignificance of the variable *FCapital*. Although, the level of foreign capital engagement in the region (enterprises with foreign capital) was found to be positively related to the in-house R&D activity.

Table 4

Determinants of the two types of innovation activity

Model	rd_{it}	me_{it}
intercept	2.9394 (0.0000) ***	4.3135 (0.0000) ***
$K1_{it}$	-0.0288 (0.7383)	-0.0322 (0.4578)
$C1_{it}$	**0.0721 (0.0018) ** **	**0.0488 (0.0007) *** **
$FCapital_{it}$	**0.063 (0.0388) * **	-0.0218 (0.1663)
$PublicFin_{it}$	**0.1916 (0.0001) *** **	-0.009 (0.730)
model's parameters	Balanced Panel: n = 16, T = 5, N = 80	
R-Squared	0.26864	0.22799
Adj. R-Squared	0.22963	0.18681
F-statistic	p-value: 0.0244	p-value: 0.0362

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10

Source: *own calculations with plm package in R (Croissant and Millo 2008)*

For both types of innovation activity, the innovation cooperation was shown to be positively related. In the Polish regions, for the period 2004-2006, on average 56% of innovative enterprises introduced an innovation developed by themselves, while in the years 2012-2014 it was 50%. Nevertheless, an increase in the engagement of Polish enterprises in the development of innovation in cooperation is visible in the analysed period. In 2004-2006, only 7% (the average for the 16 NUTS-2 regions) of innovative enterprises introduced innovations developed in cooperation with Polish entities, and in the years 2012-2014 it was 12%. In the case of the introduction of innovations developed in an international cooperation, it was 2% in 2004-2006 and 4% in 2012-2014, on average.

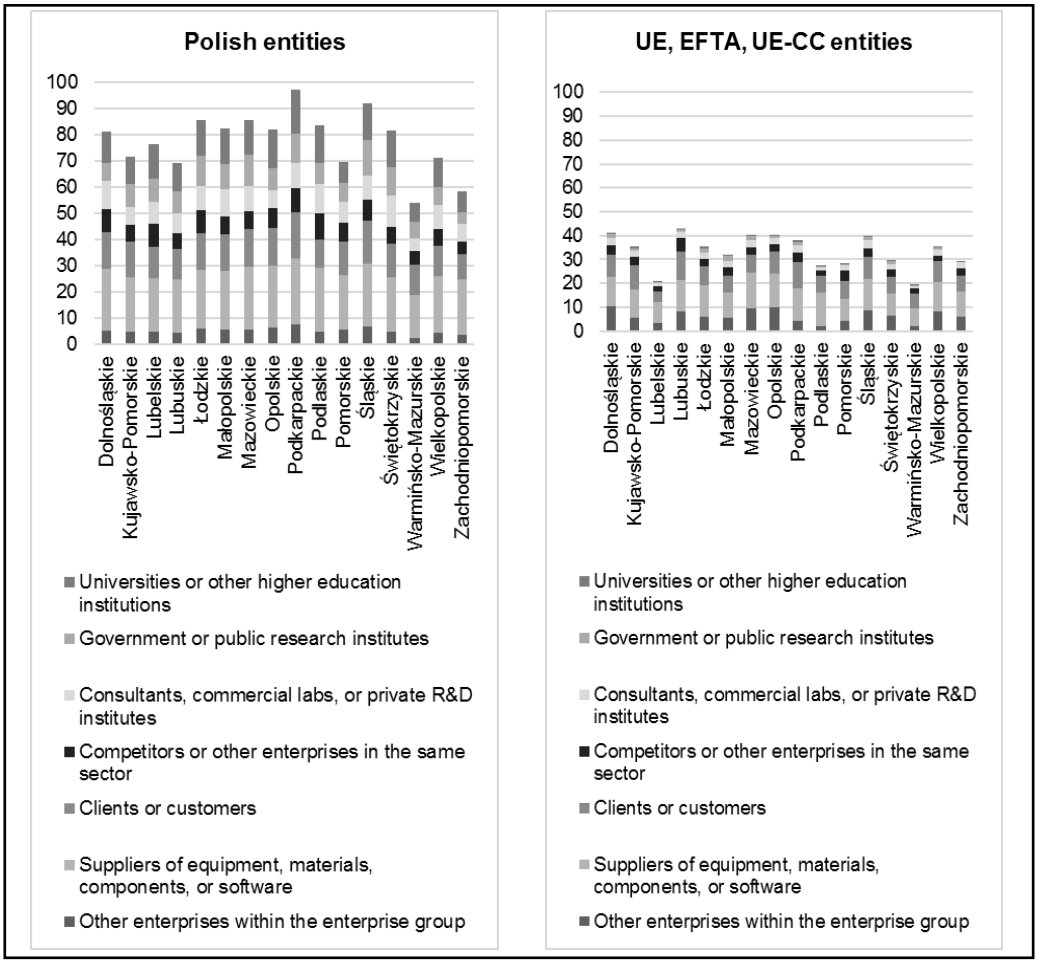

Fig. 2 – **Breakdown of types of co-operators in innovation cooperation with Polish and UE, EFTA, UE-CC entities (average for the years 2004-2014)**

Notion: *the CIS question about the type of cooperation is a multiple choice question, and the answers do not add up to 100%*

Source: *own elaboration based on GUS (CIS) data. (Data from CIS were delivered by the Polish National Statistical Office (GUS) in the form of aggregated data at NUTS-2 level. The acquisition of data was financed by the National Science Centre, Poland, grant no. 2016/21/N/HS4/02098).*

Innovation cooperation can include various types of co-operators: other enterprises from the same group, suppliers, clients, competitors, but also private and public research units and higher education units. The main type of co-operators in the case of national cooperation are the suppliers (16-25%), customers (10-18%) and universities (7-17%). Cooperation with international research units and universities is below 3%. In the case of some regions, the more important partner in international rather than national cooperation are other enterprises within the enterprise group (Fig. 2).

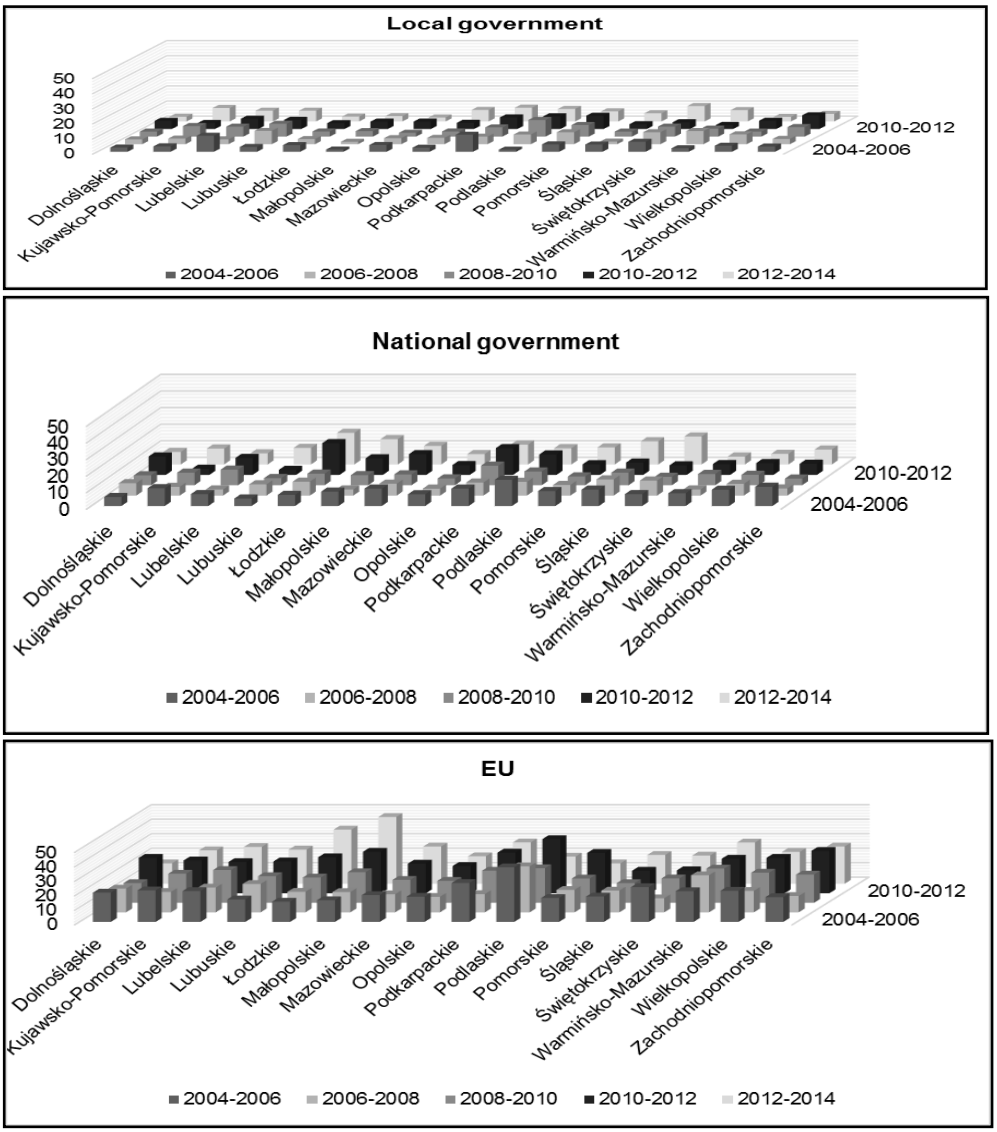

Fig. 3 **– Percentage of innovative enterprises supported with external public funding (local, national, EU), in the years 2004-2014**
Source: *own elaboration based on GUS (CIS) data*

Public financial support is not limited to national government funding (the variable used in the model) but it includes regional governments' funding and EU funding. Regional and local governments supported, on average, from 3% to 8% of innovative enterprises in the years 2004-2014. National government supported from 5.5% to 12% on average. The highest level of financial support received by innovative enterprises in Polish regions was from 16% in the Świętokrzyskie region to 30% in Podlaskie, on average, for the years 2004-2014 (Fig. 3).

Discussion

Innovation cooperation was found to be significant and positively related with both types of innovation activity. This can be interpreted as confirmation of the high importance of cooperation and interaction among the various actors in the RIS concept (Cooke and Morgan 1998, Nauwelaers 2011, Tödtling and Trippl 2011). However, Broekel et al. (2015) warned that inter-regional and non-regional linkages should be balanced, and policy efforts should support both directions of cooperation. Moreover, Świadek et al. (2019) found an interesting relation between the level of technology and the innovation cooperation in the Polish industry. Low technology industries were less involved in innovation cooperation than high-tech ones. Although, low-tech companies cooperate more with suppliers, and high-tech ones more with competitors. Fritsch (2003) discussed that the tendency to cooperate is more a firm-level phenomenon and companies which start any type of cooperation tend to cooperate more with various types of actors. Nevertheless, Iammarino et al. (2012) find out that vertical cooperation (eg. with suppliers, research units, clients) is more significant for increasing the innovativeness of the firms in contrast to horizontal cooperation (eg. with consultant or competitors).
As it was expected, public financial support was also found to be positively related with the in-house R&D activity. However, data shows that EU funding is the predominant form of public financial support. Lewandowska et al. (2019) reported that Polish enterprises were very active in utilising EU funds and other EU economic policy instruments, but there are not so many Polish national government financial instruments available. Although, as Mazzucato and Semieniuk (2017) stressed out, there is a need for "mission-oriented policies", and the development of public financing instruments as part of innovation systems. Public funding is also seen as an instrument complementing private efforts (Spielkamp and Rammer 2009, Kijek et al. 2016) and an important factor reducing the exit from the market by innovative firms (Ebersberger 2011). However, there is evidence (Novosák et al. 2017) that public support, especially Structural Funds, are more effective in already developed regions.

Interestingly, the level of foreign capital engagement in the region (enterprises with foreign capital) was found to be positively related with the in-house R&D activity, which is contradicted with research at the national level, where Polish enterprises are seen more as buyers of already developed technology (Grodzicki and Geodecki 2016, Grodzicki 2018). On the other hand, the positive effect of foreign capital on the in-house R&D activity is in line with Fu's (2008) suggestions that FDI can support both types of innovation activity. It can be assumed that enterprises in the Polish regions are able to use foreign investments as a way to support their own R&D activities. Surprisingly, human capital was found to be insignificant in the model for in-house R&D activity, although this can be due to the indicators used. Human capital can be captured by various indicators (% of population with higher education, % of graduates in specific fields of studies, % of population taking part in life-long-learning), and, in the present research, the indicator most related to the R&D activity was chosen.

Conclusions

In the research, the regional factors of two types of innovation activity – in-house R&D and the acquisition of machinery and software – were analysed. Special attention was paid to the role of cooperation in RISs and innovation activity. Based on econometric models, it was confirmed

that innovation cooperation, public financial support and the level of foreign capital involvement in the region are positively related with in-house R&D activity. However, in 2012-2014, only 12% of innovative enterprises developed innovations in cooperation with national partners, and 2% with international partners. Innovative companies in Polish regions cooperate mostly with national and international suppliers, and with Polish research institutes and universities. Likewise, customers and clients are important partners for innovation cooperation. National financial support was found to be positively related with in-house R&D activity, nevertheless, national public funding was received by up to 19% of innovative enterprises in the years 2012-2014, while EU funds supported up to 46% in the same period. It can be assumed that the EU offers funding which is more adjusted to the needs of innovative enterprises.

The following policy implications can be drawn based on the obtained results. As innovation cooperation was found to be positively related with both types of innovation activity, it can be seen as important factor of introducing innovations, no matter if an innovation is developed based on the in-house R&D activity or based on the acquisition of already existing technology. Therefore, any public incentives for cooperation can play a supportive role for innovative firms to introduce innovations. What can be more relevant is the significance of public financial support, which was found positively related to the in-house R&D activity. Based on the findings from growth literature, signalled in the introduction, it can be suggested that by supporting the R&D activity of companies we indirectly support the economic growth in the region. Therefore, public financial instruments for innovative companies should be mainly aimed at supporting the R&D activity, instead of the acquisition of machinery and software (which is more often observed in the Polish regions).

Acknowledgements

The present research is a part of the project “Socio-economic environment in a region and types of innovation activity of enterprises”, which is financed by the National Science Centre, Poland, grant no. 2016/21/N/HS4/02098.

References

ABRAMOVITZ M. (1956), *Resource and Output Trends in the United States since 1870*, National Bureau of Economic Research, New York.

ACS Z. J., FITZROY F. R., SMITH I. (1998), *Contrasting U.S. Metropolitan Systems of Innovation*, in: de la Mothe J., Paquet G. (eds.), Local and Regional Systems of Innovation, Springer, New York, pp. 111-124.

ASHEIM B. T., ISAKSEN A. (1997), *Location, agglomeration and innovation: Towards regional innovation systems in Norway?*, European Planning Studies 5 (3), 299-330.

ASHEIM B. T., ISAKSEN A. (2002), *Regional Innovation Systems: The Integration of Local ‘Sticky’ and Global ‘Ubiquitous’ Knowledge*, The Journal of Technology Transfer 27, 77-86.

AUTIO E. (1998), *Evaluation of RTD in regional systems of innovation*, European Planning Studies 6 (2), 131-140.

BALTAGI B. H. (2005), *Econometric Analysis of Panel Data*, John Wiley & Sons Ltd, Chichester.

BALTAGI B. H., LI Q. (1991), *A joint test for serial correlation and random individual effects*, Statistics & Probability Letters 11 (3), 277-280.

BALTAGI B. H., LI Q. (1995), *Testing AR(1) against MA(1) disturbances in an error component model*, Journal of Econometrics 68 (1), 133-151.

BECKER G. S., MURPHY K. M., TAMURA R. (1990), *Human Capital, Fertility, and Economic Growth*, Journal of Political Economy 98 (5), 12-37.

BELLMAN L., CRIMMANN A., EVERS K., HUJER R. (2013), *Regional Determinants of*

Establishments' Innovation Activities: A Multi-Level Approach, IZA Discussion Paper 7572, 1-30.

BRACZYK H.-J., COOKE P., HEIDENREICH M. (eds.) (1998), *Regional innovation systems: the role of governances in a globalized world*, Routledge, London.

BREUSCH T. S., PAGAN A. R. (1980), *The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics*, The Review of Economic Studies 47 (1), 239-253.

BROEKEL T., BRENNER T. (2011), *Regional factors and innovativeness: an empirical analysis of four German industries*, The Annals of Regional Science 47, 169-194.

BROEKEL T., BRENNER T., BUERGER M. (2015), *An Investigation of the Relation between Cooperation Intensity and the Innovative Success of German Regions*, Spatial Economic Analysis 10 (1), 52-78.

BUESA M., MARTÍNEZ PELLITERO M., BAUMART T., HEIJS J. (2007), *Novel applications of existing econometric instruments to analyse regional innovation systems: the Spanish case*, in: Suriñach J., Moreno R., Vayá E. (eds.), Knowledge Externalities, Innovation Clusters and Regional Development, Edward Elgar, Cheltenham, pp. 155-174.

CAMAGNI R., CAPELLO R. (2013), *Regional Innovation Patterns and the EU Regional Policy Reform: Toward Smart Innovation Policies*, Growth and Change 44 (2), 355-389.

COOKE P., ASHEIM B., BOSCHMA R., MARTIN R., SCHWARTZ D., TÖDTLING F. (eds.) (2011), *Handbook of regional innovation and growth*, Edward Elgar, Cheltenham.

COOKE P., MORGAN K. (1998), *The associational economy: Firms, regions, and innovation*, Oxford University Press, Oxford.

COOKE P., GOMEZ URANGA M., ETXEBARRIA G. (1997), *Regional innovation systems: Institutional and organisational dimensions*, Research Policy 26 (4-5), 475-491.

COUNCIL ON COMPETITIVENESS (2005), *Measuring regional innovation: a guidebook for conducting regional innovation assessments*, Council on Competitiveness, Retrieved from: www.compete.org.

CRESCENZI R. (2005), *Innovation and regional growth in the enlarged Europe: the role of local innovative capabilities, peripherality, and education*, Growth and Change 36 (4), 471-507.

CRESCENZI R., RODRÍGUEZ-POSE A. (2011), *Innovation and Regional Growth in the European Union*, Springer, Berlin.

CRESCENZI R., RODRÍGUEZ-POSE A. (2013), *R&D, Socio-Economic Conditions, and Regional Innovation in the U.S.*, Growth and Change 44 (2), 287-320.

CROISSANT Y., MILLO G. (2008), *Panel Data Econometrics in R: The plm Package*, Journal of Statistical Software 27 (2), 1-43.

CZUPICH M. (2012), *Uwarunkowania wzrostu innowacyjności w wybranych krajach Europy Środkowo-Wschodniej [Factors of innovation growth in selected Central and Eastern European Countries]*, Zeszyty Naukowe Uniwersytetu Szczecińskiego nr. 725, Ekonomiczne Problemy Usług nr. 98, 205-219.

DAVIDSON C., SEGERSTROM P. (1998), *R&D Subsidies and Economic Growth*, The RAND Journal of Economics 29 (3), 548-577.

DOLOREUX D. (2002), *What we should know about regional systems of innovation*, Technology in Society 24 (3), 243-263.

DOLOREUX D., GOMEZ I. P. (2017), *A review of (almost) 20 years of regional innovation systems research*, European Planning Studies 25 (3), 371-387.

DOLOREUX D., PARTO S. (2004), *Regional innovation systems: a critical synthesis*, UNU-INTECH Discussion Papers, 1-38.

DOLOREUX D., PARTO S. (2005), *Regional innovation systems: Current discourse and unresolved issues*, Technology in Society 27 (2), 133-153.

DZEMYDAITĖ G., DZEMYDA I., GALINIENĖ B. (2016), *The Efficiency of Regional Innovation Systems in New Member States of the European Union: A Nonparametric DEA Approach*, Economics and Business 28 (1), 83-89.

DZIALLAS M., BLIND K. (2019), *Innovation indicators throughout the innovation process: An extensive literature analysis*, Technovation 80-81, 3-29.

EBERSBERGER B. (2011), *Public funding for innovation and the exit of firms*, Journal of Evolutionary Economics 21, 519-543.

EUROPEAN COMMISSION (2010a), *Communication from the Commission: Europe 2020. A strategy for smart, sustainable and inclusive growth*, European Commission, Retrieved from: www.eur-lex.europa.eu.

EUROPEAN COMMISSION (2010b), *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Regional Policy contributing to smart growth in Europe 2020*, European Commission, Retrieved from: www.eur-lex.europa.eu.

EVANGELISTA R., IAMMARINO S., MASTROSTEFANO V., SILVANI A. (2002), *Looking for regional systems of innovation: evidence from the Italian innovation survey*, Regional Studies 36 (2), 173-186.

FAGERBERG J., GODINHO M. M. (2005), *Innovation and catching-up*, in: Fagerberg J., Mowery D. C., Nelson R. R. (eds.), The Oxford Handbook of Innovation, Oxford University Press, Oxford, pp. 514-542.

FLORIO M., PELLEGRIN J., SIRTORI E. (2014), *Research Intensive Clusters and Regional Innovation Systems: A Case Study of Mechatronics in Apulia*, Centre for Industrial Studies: Working Paper Series, 3, 1-35.

FRITSCH M. (2003), *Does R&D-Cooperation Behavior Differ between Regions?*, Industry and Innovation 10 (1), 25-39.

FU X. (2008), *Foreign Direct Investment, Absorptive Capacity and Regional Innovation Capabilities: Evidence from China*, Oxford Development Studies 36 (1), 89-110.

GEODECKI T. (2014), *Leading Factors for Catching-Up by Developing Economies: Conclusions from the crisis*, in: Mamica Ł., Tridico P. (eds.), Economic Policy and the Financial Crisis, Routledge, London, New York, pp. 181-203.

GERSTLBERGER W. (2004), *Regional innovation systems and sustainability—selected examples of international discussion*, Technovation 24 (9), 749-758.

GRIFFITH R., REDDING S., VAN REENEN J. (2004), *Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries*, Review of Economics and Statistics 86 (4), 883-895.

GRODZICKI M. J. (2018), *Konwergencja w warunkach integracji gospodarczej. Grupa Wyszehradzka w globalnych łańcuchach wartości [Convergence in the conditions of economic integration. The Visegrad Group in global value chains]*, Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków.

GRODZICKI M. J., GEODECKI T. (2016), *New Dimensions of Core-Periphery Relations in an Economically Integrated Europe: The Role of Global Value Chains*, Eastern European Economics 54 (5), 377-404.

HÁJKOVÁ V., HÁJEK P. (2010), *Analysis of regional innovation systems by neural networks and cluster analysis*, COMATIA'10: Proceedings of the 2010 international conference on Communication and management in technological innovation and academic globalization, 46-51.

HOWELLS J. (1999), *Regional systems of innovation?*, in: Archibugi D., Howells J., Michie J. (eds.), Innovation Policy in a Global Economy, Cambridge University Press, Cambridge, pp. 67-93.

IAMMARINO S. (2005), *An evolutionary integrated view of regional systems of innovation: Concepts, measures and historical perspectives*, European Planning Studies 13 (4), 497-519.

IAMMARINO S., PIVA M., VIVARELLI M., VON TUNZELMANN N. (2012), *Technological Capabilities and Patterns of Innovative Cooperation of Firms in the UK Regions*, Regional Studies 46 (10), 1283-1301.

INNOVATING REGIONS IN EUROPE (2008), *Innovating Regions in Europe,* ERIS WG

Final Report, Retrieved from: www.wbc-rti.info.

KIJEK T., MATRAS-BOLIBOK A., RYCAJ E. (2016), *Do Public R&D Expenditures Foster Business R&D Investments?*, International Journal of Synergy and Research 5, 147-154.

KOSAŁA M., WACH K. (2011), *Regionalne determinanty rozwoju innowacyjności przedsiębiorstw [Regional determinants of innovation development]*, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie 866, 19-36.

KRAKOWIAK-BAL A., ZIEMIAŃCZYK U. (2017), *Factors Influencing the Level of Regional Innovation — Qualitative Comparative Analysis*, Barometr Regionalny 15 (4), 7-14.

LEWANDOWSKA A., PATER R., CYWIŃSKI Ł. (2019), *Determinants of business innovation in the Regional Innovation System context. Policy implications for a less developed region,* Studia Regionalne i Lokalne 1 (75), 5-27.

LIGENZOWSKA J. (2016), *Regional Innovation Systems in Sweden*, Ekonomia Międzynarodowa 16, 388-405.

LOPEZ-RODRIGUEZ J., MARTINEZ-LOPEZ D. (2017), *Beyond the R&D effects on innovation: The contribution of non-R&D activities to total factor productivity growth in the EU*, Structural Change and Economic Dynamics 40, 37-45.

LUBACHA J. (2019), *Regional innovation systems of Polish regions*, in: Balcerzak A. P., Pietryka I. (eds.), Proceedings of the 10th International Conference on Applied Economics Contemporary Issues in Economy: Economics, pp. 226-235.

MARKOWSKA M. (2012), *Dynamiczna taksonomia innowacyjności regionów [Dynamic taxonomy of regional innovativeness]*, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław.

MARTIN B. R. (2013), *Innovation Studies: An Emerging Agenda*, in: Fagerberg J., Martin B. R., Andersen E. S. (eds.), Innovation Studies: Evolution & Future Challenges, Oxford University Press, Oxford, pp. 168-186.

MAZZUCATO M. (2013), *The Entrepreneurial State: debunking public vs. private sector myths*, Anthem Press, London.

MAZZUCATO M., SEMIENIUK G. (2017), *Public financing of innovation: new questions*, Oxford Review of Economic Policy 33 (1), 24-48.

MILLO G. (2017), *Robust Standard Error Estimators for Panel Models: A Unifying Approach*, Journal of Statistical Software 82 (3), 1-27.

NAUWELAERS C. (2011), *Intermediaries in regional innovation systems: role and challenges for policy*, in: Cooke P., Asheim B., Boschma R., Martin R., Schwartz D., Tödtling F. (eds.), Handbook of regional innovation and growth, Edward Elgar, Cheltenham, pp. 467-481.

NAZ A., NIEBUHR A., PETERS J. C. (2015), *What's behind the disparities in firm innovation rates across regions? Evidence on composition and context effects*, The Annals of Regional Science 55, 131-156.

NIEDZIELSKI P., JAŹWIŃSKI I. (2002), *Absorpcja i dyfuzja innowacji jako czynnik intensyfikujący rozwój regionalny [Absorption and diffusion of innovation as a factor of regional development],* Zeszyty Naukowe WSZ „Oeconomicus" PTE w Szczecinie „Gospodarka-Rozwój i Zmiany" 2.

NÖLKE A., VLIEGENTHART A. (2009), *Enlarging the Varieties of Capitalism: The Emergence of Dependent Market Economies in East Central Europe*, World Politics 61 (4), 670 -702.

NOVOSÁK J., HÁJEK O., NOVOSÁKOVÁ J., LINDNER M. (2017), *Enterprise Support Policy and Territorial Cohesion: The Czech Republic (2007-2013)*, Journal of Urban and Regional Analysis 9 (2), 141 -157.

NOWAKOWSKA A. (2011), *Regionalny wymiar procesów innowacji [The regional dimension of innovation processes]*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź.

OECD, EUROSTAT (2018), *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris/Eurostat, Luxembourg.

PAAS T., TRIIN V. (2012), *Regional Disparities and Innovations in Europe*, 52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia, 1-16.

PANGSY-KANIA S. (ed.) (2007), *Wiedza i innowacje w rozwoju polskich regionów: siły motoryczne i bariery* [Knowledge and innovations in the development of Polish regions: motor forces and barriers], Fundacja Rozwoju Uniwersytetu Grańskiego, Sopot.

PARK S. O. (2015), *Dynamics of economic spaces in the global knowledge-based economy: Theory and East Asian cases*, Routledge, London, New York.

PINO R. M., ORTEGA A. M. (2018), *Regional innovation systems: Systematic literature review and recommendations for future research*, Cogent Business & Management 5 (1), 1463606.

PUTNAM R. D., LEONARDI R., NONETTI R. Y. (1993), *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton.

RADOSEVIC S., KADERABKOVA A. (eds.) (2011), *Challenges for European Innovation Policy: Cohesion and Excellence from a Schumpeterian Perspective*, Edward Elgar, Cheltenham.

R CORE TEAM (2018), *R: A language and environment for statistical computing*, R Foundation for Statistical Computing, Retrieved from: www.R-project.org.

ROMER P. M. (1990), *Endogenous Technological Change*, Journal of Political Economy 98 (5), S71-S102.

SEGERSTROM P. S. (1991), *Innovation, Imitation, and Economic Growth*, Journal of Political Economy 99 (4), 807-827.

SMITH H. L., KEEBLE D., LAWSON C., MOORE B., WILKINSON F. (1998), *Contrasting Regional Innovation Systems in Oxford and Cambridge*, in: de la Mothe J., Paquet G. (eds.), Local and Regional Systems of Innovation, Springer, New York, pp. 125-148.

SOLOW R. M. (1956), *A Contribution to the Theory of Economic Growth*, The Quarterly Journal of Economics 70 (1), 65-94.

SOLOW R. M. (1957), *Technical Change and the Aggregate Production Function*, The Review of Economics and Statistics 39 (3), 312-320.

SPIELKAMP A., RAMMER C. (2009), *Financing of Innovation – Thresholds and Options*, Management & Marketing 4 (2), 3-18.

ŚWIADEK A. (2011), *Regionalne systemy innowacji w Polsce [Regional innovation systems in Poland]*, Difin, Warszawa.

ŚWIADEK A., DZIKOWSKI P., TOMASZEWSKI M., GORĄCZKOWSKA J. (2019), *Sectoral patterns of innovation cooperation in Polish industry*, Equilibrium. Quarterly Journal of Economics and Economic Policy 14 (1), 183-200.

TÖDTLING F., TRIPPL M. (2011), *Regional innovation systems*, in: Cooke P., Asheim B., Boschma R., Martin R., Schwartz D., Tödtling F. (eds.), Handbook of regional innovation and growth, Edward Elgar, Cheltenham, pp. 455-466.

TURA T., HARMAAKORPI V. (2010), *Social capital in building regional innovative capability*, Regional Studies 39 (8), 1111-1125.

VEUGELERS R., MRAK M. (2009), *The Knowledge Economy and Catching-up Member States of the European Union*, Report prepared for Commissioner's Potocnik's Expert Group "Knowledge for Growth", Retrieved from: www.ec.europa.eu.

WERESA M. A. (2012), *Systemy innowacyjne we współczesnej gospodarce światowej [Innovative systems in the contemporary global Economy]*, Wydawnictwo Naukowe PWN, Warszawa.

WERESA M. A. (2013), *Regional Innovation Systems and Innovation Policy: Polish Regions Compared with Other Regions in the EU*, in: Weresa M. A. (ed.), Poland Competitiveness Report 2013: National and Regional Dimensions, Warsaw School of Economics Press, Warsaw, pp. 278-298.

WIIG H., WOOD M. (1995), *What Comprises a Regional Innovation System? An Empirical Study*, STEP, Oslo.

YUAN C., GUO B., LIU H. (2013), *Assessment and classification of China's provincial*

regional innovation system based on grey fixed weight clustering, Grey Systems: Theory and Application 3 (3), 316-337.

Initial submission: 22.02.2020
Revised submission: 27.07.2020
Final acceptance: 01.10.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 35 - 57
https://doi.org/10.37043/JURA.2021.13.1.3

A MULTI-MODEL APPROACH TO ASSESS THE RELATIVE WEIGHTS AND SENSITIVITIES OF THE FACTORS OF REGIONAL COMPETITIVENESS

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Abstract: In order to prioritize the intervention to augment regional competitiveness, it is essential to assess the relative weights and sensitivities related to the factors of competitiveness. The improper assignment of relative weights is prominent in the case when multi-co-linearity exists among independent variables. The paper tests the suitability of multiple models for their capacity of assessing relative weights, and subsequently for forming a competitiveness index. The relative weights of critical components of economic infrastructure have been assessed with Zero-order correlation, Structure coefficient analysis, Beta coefficient analysis, Product measure analysis, Relative weight analysis, and Commonality analysis. Subsequently, regional competitiveness indices have been formed with relative weights as a linear combination. The most suitable technique to form an index has been identified through the Pearson correlation and Spearman rank correlation analyses. The multiple regression analysis assigns the relative weights and consecutively forms the regional competitiveness index, better than other applied techniques. Zero-order correlation and Structural coefficient analysis performed reasonably well. Commonality analysis is a very appropriate technique for the detailed investigation of unique and shared effects among variables. The result shows that the common effects of the critical components of the economic infrastructure are stronger than their unique effects. The sensitivity of competitiveness related to the variables has been assessed through Artificial Neural Network. Regional competitiveness is most sensitive to the variable of rural roads. The results indicate that better connectivity triggers capital and labor drain from the rural areas of the region.

Key Words: *regional competitiveness, economic infrastructure, multi-model approach, artificial neural network*.

Introduction

To augment the regional economy, the assessment and enhancement of regional competitiveness are very crucial (Rahmat and Sen 2016). Better competitiveness is a pre-requisite for economic development (Yaskal et al. 2018), and it enhances the economy of a country (Bhawsar and Chattopadhyay 2015). Geographical competitiveness is essential to attract and maintain firms, and to improve the standard of living of the participants (Storper 1997). Improvement in the level of competitiveness is a continuous process (Somoza Medina 2016). Porter (1990) argues that competitiveness is a dynamic process, and it depends on the ability to improve with time. There are various levels at which competition happens (Simionescu 2016). Region/cities fall between the highest macro-level (country) and lowest micro-level (firm) (Cellini and Soci 2002). Out of the various levels, regions are the crucial source of competition. Porter (1990, 1998) also supports the region as an originating location of competitiveness. The competitiveness of an economy is suppressed due to inequality in the competitive performance of different regions (Staníčková et al. 2012). Regional competitiveness is defined as how firms in a particular region can compete with the firms in other regions (Purwanto et al. 2017). Competitive regions have a better standard of living and a conducive business environment (Birnie et al. 2019). Some common factors are present in each region to influence the competitiveness of all firms (Simionescu 2016). The natural and other resources present in a region enhance the competitiveness of the region (Yaskal et al. 2018).

Two sets of indicators explain the competitiveness of a geographical territory. Firstly, the term 'revealed competitiveness' is the construct that represents the meaning of competitiveness most appropriately. Secondly, 'factors of competitiveness' represent the set of indicators that builds the 'revealed competitiveness' of a geographical territory. Most researchers agree that the term 'revealed competitiveness' is best represented by the notion of 'productivity' (Krugman 1997, Gardiner et al. 2004, Kitson et al. 2004). To measure the 'revealed competitiveness,' per capita GDP is the indicator (Huovari et al. 2002, Huggins 2003, Martin 2003, Kovacs and Lukovics 2006, Porter et al. 2008). Dunning et al. (1998) also observe that per capita GDP is a critical indicator of competitiveness. According to Snieška and Bruneckien (2009), per capita GDP is the most frequently utilized indicator of competitiveness. Other researchers have also discussed the relationship between competitiveness and GDP (Civelek et al. 2015).

Competitiveness is a multidimensional concept (García-Sánchez et al. 2018). There are different categories of the factors of competitiveness (Popescu et al. 2017). An enhanced level of competitiveness is the aggregated effect of these factors (Stanickova 2015). 'Factors of competitiveness' have been explained in literature through various models. Some of the most cited models in literature are the Diamond model (Porter 1990, Castro-Gonzáles et al. 2016), the Pyramid model (Lengyel 2007), the Regional competitiveness hat model (Martin 2003), and the Hierarchical model (Singhal et al. 2013). In all the above-described models, infrastructure is a crucial component of the factors of competitiveness. The regional competitiveness hat model provides a list of determinants of regional competitiveness and it puts infrastructure in the second ring (Martin 2003). The Pyramid model of regional competitiveness puts the infrastructure among the five essential development factors (Lengyel 2007). The World Economic Forum (Schwab 2016), for factor-driven economies (India falls in this stage), assigns higher weights to institutions, infrastructure, and few other factors. Inadequate supply of infrastructure is among the most problematic factors for doing business in India (Schwab 2016, World Bank Group 2016). Infrastructure enhances productivity (Kaur et al. 2016), and the competitiveness of a region (Achour and Belloumi 2016). More specifically, economic infrastructure enhances the productivity of capital and labor (Kumari and Sharma 2017). Fourie (2006) defines economic infrastructure as an infrastructure that supports the economic activities of a region. According to the World Bank (1994), economic infrastructure can be defined as the facilities used in the production process. The present paper analyzes the effect of the selected components of economic infrastructure on the competitiveness of regions.

The above-discussed factors of competitiveness have a different level of presence in a region, and they together enhance the competitiveness of a region. Regions having a lower level of factor endowment show a lower attractiveness for capital and labor and they are less competitive as a result. These regions have few income-generating sources, and they fall into the cycle of a lower level of competitiveness. These regions lose their capital and labor in the favor of regions having a higher level of development (Chase-Dunn 1975, Chen and Partridge 2013). Understanding of relative weights and sensitivities of factors of competitiveness is essential to prioritize the investment in infrastructure within the financial limitations of public institutions (Nagaraj et al. 2000, Cai and Treisman 2005) for better factor endowment. A methodology and a review on the existing methods to assess the relative weights are provided in the subsequent sections.

Methodology

Study area

A region belonging to the fertile plain of northern and eastern India is selected to study the effect of economic infrastructure on regional competitiveness (Fig. 1). The region belongs to the Indo-Gangetic plain (IGP). It was delineated by the application of cluster analysis for the share of six sectors of the economy in the Gross Domestic Products of 531 districts of India (Rahmat and Sen 2016). The region contains 81 agriculture-based districts (thirty-seven

districts of Uttar Pradesh, twenty-eight districts of Bihar, eleven districts of West Bengal, and five districts of Northern Madhya Pradesh).

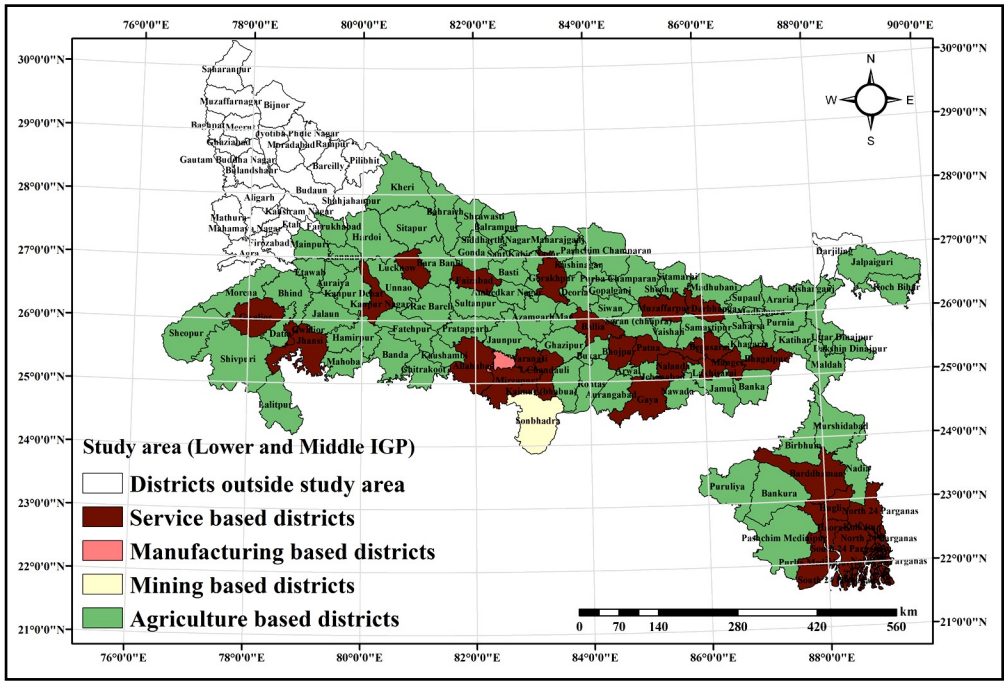

Fig. 1 **– The analysed region with the classification of districts based on the economic structure**

The per capita GDP in the region is lowest for Sheohar of Bihar (105.1 USD) and highest for Jalpaiguri of West Bengal (462.7 USD). The share in per capita GDP of the region is highest for agriculture and allied activities (India's average – 18.9%, region – 39.79%).

Regional competitiveness assessment

In order to prioritize the intervention to augment regional competitiveness, it is crucial to estimate the relative weights and sensitivities of the factors of competitiveness. Firstly, a list of indicators has been prepared for the critical components of economic infrastructure through a review of the literature and an experts'/stakeholders' opinion survey. Zero-order correlation, Structure coefficient analysis, Beta coefficient analysis, Product measure analysis, Relative weight analysis, and Commonality analysis have been applied to estimate the relative weights of the selected critical components of economic infrastructure in the augmentation of regional competitiveness. Each of the methods estimates the relative weights differently and it provides inconsistent results. The possible reason for the inconsistency in the results is the suppression effect. Some of the variables strip other variables of the shared variance and they become more critical. Different techniques assign the shared variance differently; a variable keeps changing its relative importance with other variables. Therefore it becomes necessary to apply multiple techniques to estimate the relative weight and then to test the results obtained from the techniques.

Subsequently, with the relative weights obtained from the above-described analyses, indices have been formed. These indices have been put to Pearson's correlation and Spearman's correlation with the indicator of revealed regional competitiveness. Finally, to analyze the possible changes in regional competitiveness as a result of the changes in the indicators of economic infrastructure, the sensitivity analysis has been performed through the Artificial Neural Network (ANN). The methodology for the paper is presented in Fig. 2.

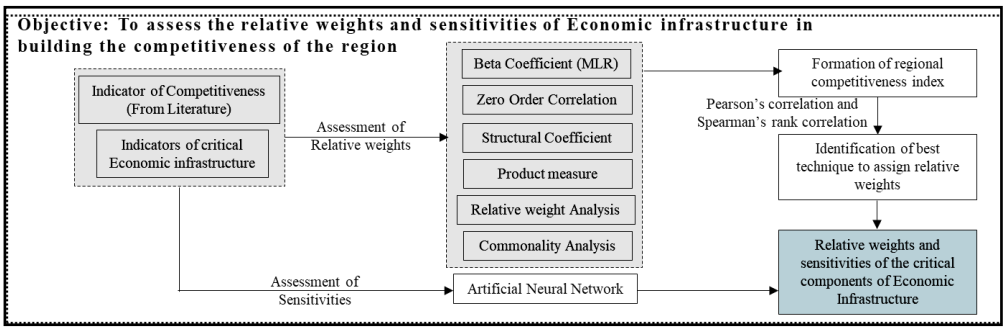

Fig. 2 **– Methodology**

Review of existing methods

The existing literature has applied different techniques to assign relative weights to the indicators and subsequently for the formation of an index. Huoveri et al. (2002) formulated a competitiveness index through the average values of the indicators. Booysen (2002) and Freudenberg (2003) emphasized on the assignment of different weights to the indicators for the precise formation of a competitive index. Two sets of techniques are used in the academic literature for the assessment of relative weights.

In the first set of techniques, the opinion of experts and stakeholders are utilized for the assessment of relative weights (Schwab et al. 2002, Snieška and Bruneckien 2009, Schwab 2016). Kiszova and Nevima (2012) applied the Analytic hierarchy process (pairwise comparison) to the opinion of experts to calculate the relative weights of the factors of competitiveness. Singhal et al. (2013) applied the Delphi technique to collect the opinion of experts for the competitiveness of UK cities. Čučković et al. (2013) asked experts regarding the strengths and weaknesses of the region. OECD (2008) applied the Budget allocation technique based on the public's concerns regarding a few selected issues. Hair et al. (1995) and McDaniel and Gates (1998) utilized a multivariate data analysis technique called the Conjoint analysis. Few researchers used the Multi-criteria decision analysis to choose, rank, and sort alternative priorities (Fernandez et al. 2013). Few researchers utilized AHP for the assessment of regional competitiveness (Kramulová and Jablonský 2016). A Hybrid AHP has been used to evaluate tourism competitiveness (Zhou et al. 2015).

In the second set of techniques, relative weights are estimated on the secondary data of the indicators. Few researchers applied the linear correlation analysis to assess the relative weights of the factors of competitiveness (Lengyel and Lukovics 2006, Barna 2007, Mikuš et al. 2012). Mikuš et al. (2012) analyzed the rural competitiveness of Croatia through the correlation analysis. Few have applied the correlational analysis to form an index (Moseiko et al. 2015). Few have applied the factor analysis based on the Regional competitiveness index (Stanickova 2015). The factor analysis is applied for the dimension reduction of the factors of competitiveness (Barkley and Dudensing 2011). Few of the researchers used the simple linear regression for the estimation of weights (Petrarca and Terzi 2018). Some other researchers

used the multiple regression analysis (MLR) to estimate the relative weights (Wong 2002, Porter et al. 2004, Kovacs and Lukovics 2006). Few studies utilized MLR for the formation of competitiveness index (Bowen and Moesen 2011). MLR was utilized to assess the effect of infrastructure on competitiveness (Palei 2015). Guerrero et al. (2016) used the correlation analysis supplemented by the factor analysis. Ju and Sohn (2014) applied the structural equation modeling (SEM) to form a competitiveness index.

In the present paper, the Beta coefficient, Zero-order correlation, Structure coefficient, Product measure, Relative weight analysis, and Commonality analysis have been applied to assess the relative weights of the selected critical components of economic infrastructure in the augmentation of regional competitiveness. Subsequently, indices have been formed, utilizing the weights obtained from the analyses mentioned above. The indices have been correlated with the indicator of competitiveness through the Pearson correlation analysis and the Spearman rank correlation analysis to identify the most appropriate technique. A brief discussion on the methods of assessment of relative weights utilized in the paper is provided in the subsequent sections.

Selection of indicators

Policies of regional competitiveness have been urban-centric. Whereas, the importance of villages in regional competitiveness is getting critical with time (Schwab 2016). Other researchers also recognized the need for the involvement of rural areas in regional competitiveness (Devereux et al. 2004, Thompson and Ward 2005). Recently, Europe's rural areas have been the focus of competitiveness policies (Schaller et al. 2018). The research has shown that the inclusion of rural infrastructure is essential for the competitiveness of the region, especially if the region is predominantly agriculture-based. Also, in the era of modernization and openness to information and technology, traditional sectors like agriculture need to be understood both from the perspective of demand and supply. These sectors should not be judged only based on the level of their output. The role of local and regional infrastructure differs in the context of regional competitiveness. A case study in the present research has the lowest level of competitiveness in India; hence, only the most critical, regional economic infrastructure has been selected in the research. Local economic infrastructure, like water supply, drainage, and others, is essential and it can be critical in the context of other regions, depending on the requirements of the region. The paper utilizes rural and urban components of infrastructure separately in the analysis of regional competitiveness.

Assessment of relative weight

The multiple linear regression analysis is the standard technique to estimate the relative weights in the case when the dependent and independent variables are known. It is utilized to calculate the relative weights of variables (Nathans et al. 2012). In the multiple regression analysis, researchers commonly use the beta weight for the measurement of relative weights (Zientek et al. 2008, Nimon et al. 2010, Nimon and Reio 2011). The Beta weight is the indicator of the total effect of a variable (LeBreton et al. 2004).

Due to multi-co-linearity among variables, beta weights become unreliable (Courville and Thompson 2001). For example, three independent variables, IV1, IV2, and IV3, share a certain percentage of variance with the dependent variable DV (Fig. 3). Due to the presence of multi-collinearity among the independent variables, variances S12, S13, S23, and S123 are shared by variables (IV1 & IV2), (IV1 & IV3), (IV2 & IV3), and (IV1, IV2 & IV3), respectively. These shared variances are assigned randomly to any of the independent variables. A particular beta weight may receive extra credit for the variance it shares with other independent variables (Pedhazur 1997). An independent variable that shares a small variance with the dependent variable can have a significantly large beta weight. This extra variance can be the shared

portion of the variance assigned to this particular independent variable and it increases its predictive power (Capraro and Capraro 2001). This process is called the 'suppression' effect. To identify the suppressor variables and to estimate the relative weights of the variables more accurately, some of the accepted techniques are followingly mentioned.

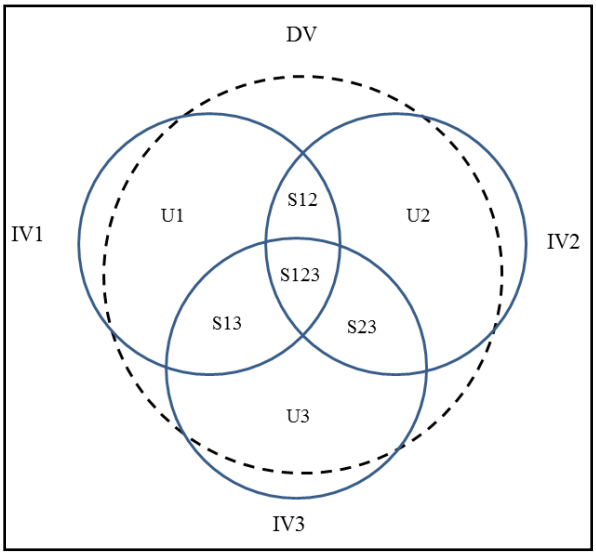

Fig. 3 – **Venn diagram showing the unique and shared variances**

Zero-order correlation

The Zero-order correlation estimates the impact of an independent variable on a dependent variable (LeBreton et al. 2004). The Zero-order correlation is not affected by the presence of other variables in the model (LeBreton et al. 2004). Hence, it remains unaffected by multi-collinearity among the independent variables (Kraha et al. 2012). A variable can have insignificant beta weight but a high zero-order correlation due to the variance it shares with other variables (Nunnally and Bernstein 1994). The variable with a small zero-order correlation and a significantly high beta weight can be a suppressor variable (Nathans et al. 2012). Suppressor variables strip shared variance from other variables in the model (Nathans et al. 2012).

Structure Coefficient

The Structure coefficient is the correlation between an independent variable and an estimated dependent variable (Courville and Thompson 2001). A structure coefficient is the measure of the direct effect of the variables in the model (LeBreton et al. 2004). The structure coefficient is not affected by the multi-collinearity among variables (Courville and Thompson 2001, Ziglari 2017). Structure coefficients are very useful as a measure of relative weight in the presence of multi-collinearity among the variables in the model (Kraha et al. 2012). A variable having insignificant beta weight but having a large squared structure coefficient is the suppressed variable, which loses its shared portion of variance (Nathans et al. 2012). The squared structure coefficient indicates how much variance of R-squared a variable can explain (Zientek and Thompson 2006).

Product Measure

The product measure is assessed through the multiplication between zero-order correlation and its beta weight (Pratt 1987). It reflects both direct and total effects (LeBreton et al. 2004). It partitions the regression effect. R^2 is equal to the sum of product measures of all the predictor variables (Azen and Budescu 2003). In case one of the zero-order correlation or beta weight is less than zero, the product measure gives a negative coefficient for the predictor variables (Darlington 1968). The product measure's significant advantage is to partition the R-squared, even for the correlated variables (Azen and Budescu 2003). The disadvantage of product measure is that it provides negative coefficients if either the zero-order correlation or beta coefficient is negative (Darlington 1968).

Relative weight analysis

The Relative weight analysis minimizes the impact of multi-co-linearity among the variables (Johnson and LeBreton 2004). The relative weight is calculated differently when the independent variables are correlated and when they are uncorrelated. When uncorrelated, the calculation of relative weight is performed with the help of the squared zero-order correlation and R^2 (Johnson 2000). When correlated, the relative weight is calculated with the principal components analysis and a series of regression analyses (Tonidandel and LeBreton 2010). The weights obtained through the relative weight analysis can only be partially affected by the correlation among the variables (Nathans et al. 2012). The relative weight analysis is utilized to analyze the contribution of each of the independent variables in the model rather than to rank the variables (Johnson 2000). Few other researchers also utilized the Relative weight analysis for the calculation of the weights of multiple variables (Tonidandel and LeBreton 2015).

Commonality Coefficients

The Commonality analysis partitions R^2 in unique and shared components (Rowell 1996). The Commonality analysis partitions the total effect in parts that do not overlap (Nathans et al. 2012). For example, if we predict the effects of IV1, IV2, and IV3 on DV. The Commonality analysis calculates the variance in DV that is predicted by unique variances of U1, U2, and U3; and by shared variances of (S1 & S2), (S1 & S3), (S2 & S3), and (S1, S2, & S3). The number of commonality coefficients increases rapidly with the count of variables (Mood 1971). The number of coefficients is 7, 15, and 31, with three, four, or five independent variables, respectively (Nathans et al. 2012). The major disadvantage of commonality analysis is that, with the increase in the number of variables, the number of commonality coefficients increases exponentially (Mood 1971). It can provide the effects of targeting more than one variable (Nathans et al. 2012). Commonality analysis can identify the suppressor variables and the suppression effect (Nathans et al. 2012).

The above-discussed techniques have been applied to estimate the relative weights of the selected critical components of economic infrastructure in the paper.

Assessment of sensitivity

The Sensitivity analysis has been performed with the Artificial Neural Network (ANN) to analyze the possible changes in the value of regional competitiveness with the changes in economic infrastructure. ANN mimics the human brain to estimate the relationship between inputs and outputs (Zhou et al. 2009). A trained ANN can predict a relationship for a new input data-set (Heravi and Eslamdoost 2015). ANN is utilized for training and the consecutively estimation of an output for an input (Toghyani et al. 2016). The Neural Network predicts the output for a set of given inputs (Olden and Jackson 2002). Few researchers have applied this

property of ANN for estimating sensitivity (Olden and Jackson 2002). Sensitivity provides the relative importance of the variables (Nasseri et al. 2008). In the analysis, the values of each of the variables are increased, one by one (Olden and Jackson 2002). For the analysis, data is normalized in the interval of (0, 1) (Zhou et al. 2009). The multilayer feed-forward neural networks are the most frequently applied ANN (Tam et al. 2002). Early stopping and Bayesian regularization are used to reduce over-fitting and for the improvement of generalization (Heravi and Eslamdoost 2015).

Pre-processing of data

The data had been pre-processed before the estimation of relative weights. The tests of normality and multi-co-linearity have been performed in this phase of analysis.

Test of Normality

The indicators for the critical components of economic infrastructure have been selected through an extensive literature survey (Table 1). The normality of variables has been tested in IBM SPSS 22. Standardized (z) values of skewness and kurtosis have been calculated by dividing their statistics by their standard error, respectively (Hopkins and Weeks 1990, Kim 2013). Outliers have been identified with box-plots. Few of the variables (HWY, ELU, ELR, INU, TPU, TPR, LRL, and LRR) are non-normally distributed (absolute z-value for either skew-ness or kurtosis or both are larger than 1.96). Winsorizing is the standard method of eliminating outliers (Yaffee 2002, Ghosh and Vogt 2012). In Winsorization, the outlier's value is replaced by a suitable value (Watson 1990, Ghosh and Vogt 2012). Outliers have been replaced by the 5th and 95th percentile values of the respective variable. After replacing outliers, the z-values of skewness and kurtosis of each variable came within the acceptable limit.

Table 1

Critical components of economic infrastructure and their indicators

Sl. No.	Construct	Indicator	Abbreviation
1	Regional Road Infrastructure	Length of Highways per 1000 sq. km of area	HWY
2	Electricity Infrastructure	Percentage of urban households having access to electricity	ELU
3	Electricity Infrastructure	Percentage of rural households having access to electricity	ELR
4	Mobile Phone Infrastructure	Percentage of urban households having mobile phones	MPU
5	Mobile Phone Infrastructure	Percentage of rural households having mobile phones	MPR
6	Internet Infrastructure	Percentage of urban households having a computer/laptop with internet	INU
7	Internet Infrastructure	Percentage of rural households having a computer/laptop with internet	INR
8	Road Infrastructure	Total Length of road per thousand sq. km.	TLR
9	Landline Infrastructure	Percentage of urban households having a landline telephone	TPU
10	Landline Infrastructure	Percentage of rural households having a landline telephone	TPR
11	Railway Infrastructure	Length of Railway lines per 1000 sq. km of area	LRL
12	Rural Road Infrastructure	Total Length of Rural road per thousand sq. km. of rural area	LRR

Exploration of Multi-collinearity

Multi-co-linearity is the presence of a high correlation among the variables (Disatnik and Sivan 2016). Variance Inflation Factor (VIF)>4 indicates a very high level of multi-co-linearity (O'Brien 2007). Six variables in the study have VIF>4. Multi-co-linearity in the data justifies the underlying assumption of the paper and it explains the requirement of a detailed investigation.

Results

All the six techniques, viz., beta coefficient, zero-order correlation, structure coefficient analysis, product measure analysis, relative weight analysis, and commonality coefficient analysis, have been performed. These analyses have been performed to assess the relative weights of selected factors of competitiveness (critical components of economic infrastructure) as independent variables and the indicator of revealed competitiveness (per capita GDP) as a dependent variable.

LRR (rural road), ELR (rural electricity) and TLR (rural landline) are the most critical and LRL (railway infrastructure), INU (urban internet), and TPU (urban landline) are the least essential components of economic infrastructure according to the zero-order correlation. The parameter estimation of zero-order correlation shows negative coefficients for eight variables. According to the zero-order correlation, rural infrastructure is more important than urban infrastructure for the competitiveness of the region (Table 2).

Table 2

Values of the coefficients

Indicator	Zero-order correlation	Structure coefficient	Beta coefficient	Product measure	Relative weight	Unique effect	Common effect	Total effect
HWY	-0.476	-0.574	-0.176	0.084	0.123	0.021	0.205	0.226
ELU	0.492	0.593	-0.018	-0.009	0.254	0.000	0.242	0.242
ELR	0.609	0.734	0.386	0.235	0.380	0.050	0.321	0.371
MPU	-0.233	-0.281	0.063	-0.015	0.062	0.001	0.054	0.054
MPR	-0.437	-0.526	-0.291	0.127	0.054	0.008	0.182	0.191
INU	0.112	0.135	0.063	0.007	0.022	0.001	0.011	0.013
INR	-0.303	-0.366	-0.298	0.090	0.039	0.013	0.079	0.092
TLR	-0.542	-0.654	-0.103	0.056	0.234	0.003	0.291	0.294
TPU	-0.037	-0.045	0.009	0.000	0.014	0.000	0.001	0.001
TPR	-0.228	-0.275	0.452	-0.103	0.024	0.026	0.026	0.052
LRL	0.159	0.192	0.089	0.014	0.027	0.006	0.020	0.025
LRR	-0.644	-0.776	-0.313	0.202	0.155	0.023	0.391	0.414

The rank order estimated by the structure coefficient analysis is similar to the rank order estimated by the zero-order correlation analysis, with slightly higher values of coefficients. The parameter estimation of the structure coefficient analysis also shows negative coefficients for eight variables. In the analysis, rural infrastructure is more critical than urban infrastructure for the competitiveness of the region.

The parameter estimation of the beta coefficient demonstrates that, in the multivariate framework, the variables explain 68.8% of the variance (R-square=0.688, Adjusted R-square=0.633). ANOVA is significant at 0.00 levels. The null hypothesis has been rejected for

the slope of the regression line is zero. TPR (rural landline), ELR (rural electricity), and LRR (rural road) are the most critical and MPU (urban mobile phone), ELU (urban electricity), and TPU (urban landline) are the least significant components of economic infrastructure. Six indicators of economic infrastructure are negatively associated with the per capita GDP. The analysis also shows that rural infrastructure is more critical than urban infrastructure.

ELR (rural electricity), LRR (rural road), and MPR (rural mobile phone) are the most critical and ELU (urban electricity), INU (urban internet), and TPU (urban landline) are the least significant components of economic infrastructure according to the product measure analysis. The rank-ordering obtained from the Product measure analysis is very different from the zero-order correlation, the structure coefficient, and the beta coefficient. The analysis shows mixed importance for urban and rural infrastructures. The parameter estimate of product measure analysis shows negative coefficients for three variables and, hence, it cannot be used as a measure of variable importance in the present case because of the improper partitioning of R-square.

According to the relative weight analysis ELR (rural electricity), ELU (urban electricity), and TLR (rural landline) are the most critical and TPR (rural landline), INU (urban internet), and TPU (urban landline) are the least significant components of economic infrastructure for the region. In this analysis, rural infrastructure is more critical than the urban infrastructure. The relative weight analysis provides different results from the earlier described analyses.

The commonality analysis has been performed with the syntax provided by Nimon (2010). LRR (rural road), ELR (rural electricity), and TLR (rural landline) are the most essential and LRL (railway), INU (urban internet), and TPU (urban landline) are the least significant components of economic infrastructure according to the total effect of commonality analysis. The rank order obtained from the analysis is precisely similar to the zero-order correlation and the structure coefficient analysis. According to the commonality analysis, rural infrastructure is more critical than urban infrastructure. For all the variables, a larger share of the total effect is contributed by the common effect than the unique effect, which these variables share with other variables. The result implies that the policy of jointly targeting the components of infrastructure is the most appropriate for the region.

The commonality analysis provides a detailed list of unique and shared coefficients and the shared variances. In the present case, it provides a total of 4095 numbers of such coefficients. For example, the variable ELR (rural electricity) uniquely shares 7.29% variance, {variables TLR (rural telephone) and LRR (rural road)} jointly share 7.16% variance, {variables ELU (urban electricity) and ELR (rural electricity)} jointly share 6.49% variance and variables {HWY (highway density), ELU (urban electricity), and ELR (rural electricity)} jointly share 5.56% variance with the dependent variable. Out of the total of 4095 coefficients, the 22 most critical coefficients share 79.0% of the total extracted variance (Table 3).

Python with Pandas data frame and Mat-plot-lib was utilized to automate the process of visualization of the distribution of the cumulative coefficient and the cumulative percentage value of the commonality matrix arranged in the decreasing order of percentage share (Fig. 4). For up to 286 number of coefficients, the curve shows an increasing trend (value of coefficients>0). Afterward, it becomes parallel to the x-axis (value of coefficients=0). After 2411 number of coefficients, the curve bends downwards (value of coefficients<0). Negative commonality coefficients are explained in literature in different ways. Pedhazur (1997) explains it as the result of the suppression effect or the effect of predictors in the opposite direction. According to Frederick (1999), a negative value of the commonality coefficient can be treated as zero.

Table 3

Partial commonality matrix

Rank	Indicator (Abbreviation)	Coefficient	Percent
1	Unique to ELR	0.0502	7.2946
2	Common to TLR & LRR	0.0493	7.1616
3	Common to ELU & ELR	0.0447	6.4989
4	Common to HWY, ELU & ELR	0.0383	5.5689
5	Common to LRR & ELR	0.0368	5.3543
6	Common to TLR, HWY, LRR, ELU & ELR	0.0265	3.8506
7	Unique to TPR	0.0256	3.7150
8	Common to TLR, LRR, MPR, INR, ELU & ELR	0.0242	3.5215
9	Unique to LRR	0.0231	3.3577
10	Common to TLR, LRR & ELR	0.0224	3.2617
11	Unique to HWY	0.0213	3.0932
12	Common to TLR, LRR, TPR, MPU, MPR & INR	0.0192	2.7842
13	Common to TLR, HWY, LRR, TPR, MPU, MPR & INR	0.0180	2.6111
14	Common to TLR, HWY, LRR, MPR, ELU & ELR	0.0172	2.4985
15	Common to TLR, HWY, LRR, TPR, MPR, INR, ELU & LER	0.0172	2.4940
16	Common to TPR, ELU & ELR	0.0169	2.4507
17	Common to LRR, MPU, ELU & ELR	0.0165	2.4029
18	Common to TLR, LRR, MPR, ELU & ELR	0.0160	2.3218
19	Common to LRR, MPR, ELU & ELR	0.0159	2.3119
20	Common to LRR & MPR	0.0158	2.2955
21	Common to TLR, LRR & MPR	0.0144	2.0877
22	Common to TLR, HWY & LRR	0.0142	2.0707
	Total		**79.0072**

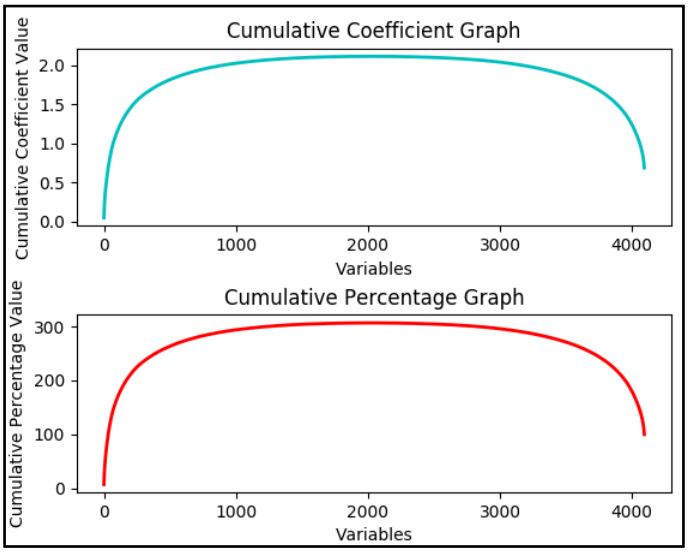

Fig. 4 **- Cumulative coefficient and its percentage share in the commonality matrix**

Inconsistency in the results

The relative weights and ranking of all variables are inconsistent among all applied techniques. For example, variable LRR (rural road) shifted from the most critical independent variable in the zero-order correlation, the structure coefficient analysis, and the total effect of commonality analysis to the third position in MLR, the second position in product measure, and the fourth position in relative weight analysis. The unique effect of LRR is very low (rank twelfth). This variable has a large common effect, and it strips the common variance from other variables and it becomes one of the most critical variables in a few of the analyses.

Variable TPR shows a relatively lower (0.228) zero-order correlation but a higher value (0.452) of the beta coefficient. The TPR reveals the characteristics of a suppressor variable. Comparing the squared structure coefficient with a beta coefficient gives an idea of the variable which shares the variance with other variables. Variables TLR, HWY, LRR, ELU, and ELR have an insignificantly small beta weight but they show a substantial value of the squared structure coefficient. These variables share the variance with other variables.

The possible reason for the inconsistency in the results is the suppression effect. Some of the variables strip other variables of the shared variance and they become the more important variable in a particular technique. Since different techniques assign the shared variance differently, a variable keeps changing its relative importance.

Formation of regional competitiveness index

Regional competitiveness indices have been formed as the linear combination utilizing the relative weights obtained from the analyses mentioned above. The Pearson correlation analysis and the Spearman rank correlation analysis have been performed between the indices formed and the indicator of revealed competitiveness (per capita GDP, Table 4).

Table 4

Pearson correlation and Spearman's rho between the indices and competitiveness

Technique		Pearson Correlation	Spearman's rho
Zero-order correlation	Correlation	.753**	.604**
	Sig. (2-tailed)	.000	.000
Structural coefficient	Correlation	.753**	.604**
	Sig. (2-tailed)	.000	.000
Beta coefficient	Correlation	.829**	.757**
	Sig. (2-tailed)	.000	.000
Product measure	Correlation	-.314**	-.223*
	Sig. (2-tailed)	.004	.045
Relative weight	Correlation	-.033	.151
	Sig. (2-tailed)	.772	.179
Commonality analysis	Correlation	.784**	.659**
	Sig. (2-tailed)	.000	.000

***. Significant at the 0.01 level (2-tailed)*
**. Significant at the 0.05 level (2-tailed)*

The Product measure and Relative weight techniques failed to demonstrate a positive correlation between the per capita GDP and the formed indices. The Beta coefficient (MLR) is the best among all the applied techniques for forming an index, as it is highly correlated (Pearson correlation=0.829), and it best represents the ranks of the districts of the region

(Spearman's rho=0.757). The Commonality analysis also shows a significant Pearson correlation and Spearman's rho. This technique provides a detailed investigation of unique and shared effects among the independent variables. The Zero-order correlation and the Structure coefficient performed reasonably well in both tests.

Assessment of sensitivity

The sensitivity analysis has been performed with ANN in MATLAB to analyze the possible changes in regional competitiveness with changes in the critical components of economic infrastructure.

Scheme of ANN

The ANN applied in this research is a multilayer feed-forward network. It contains neurons arranged into the output and a single hidden layer. The network uses a gradient descent method. The Bayesian network has been used to reduce the potential for over-fitting. Fig. 5 presents the schematic diagram of the ANN.

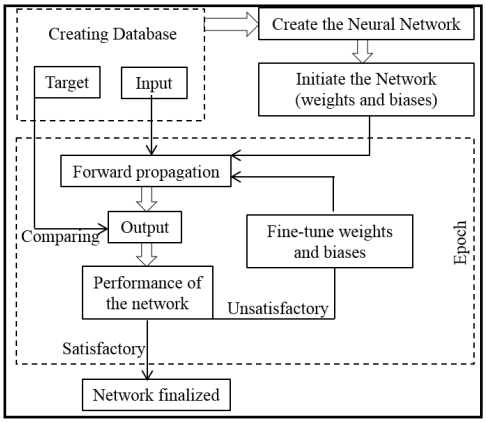

Fig. 5 – **Scheme of ANN**

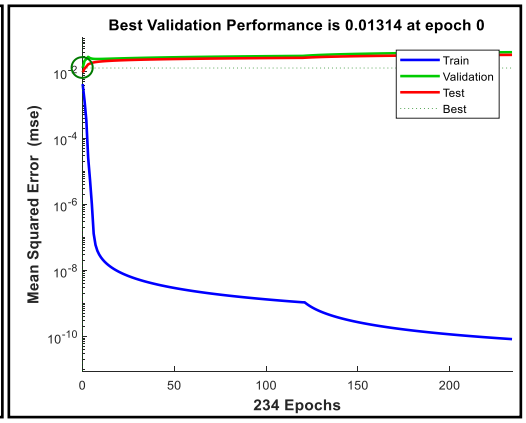

Fig. 6 – **Validation performance of ANN**

The input data-set consists of the variables of the critical components of economic infrastructure, and the target data-set consists of the per capita GDP for the 81 districts of the study area. Data has been normalized within a range [0, 1] using the min-max method. Out of the 81 samples, 70% of samples are randomly selected by the nn-tool for training the neural network, 15% of samples have been used for validation and, 15% are used for testing. No significant over-fitting has been observed (Fig. 6).

The network was permitted to train for no more than 10,000 epochs; at this point, the optimization task should stop. The maximum fail was set at 60,0000, as training parameters. The training procedure forecasts result through an iterative process of adjusting the weights and biases of the neurons. Training stopped at 234 iterations (Fig. 7).

All the fit is within an acceptable range. The correlation coefficient (R) between the target and the output is 0.969 for training data-set, 0.903 for validation data, 0.949 for test data, and 0.953 for overall data-set (Fig. 8).

The input variables were changed by 1% and 10%, one at a time. Accordingly, the sensitivities in the competitiveness related to the variables are estimated. The relative weights and sensitivities are plotted in Fig. 9.

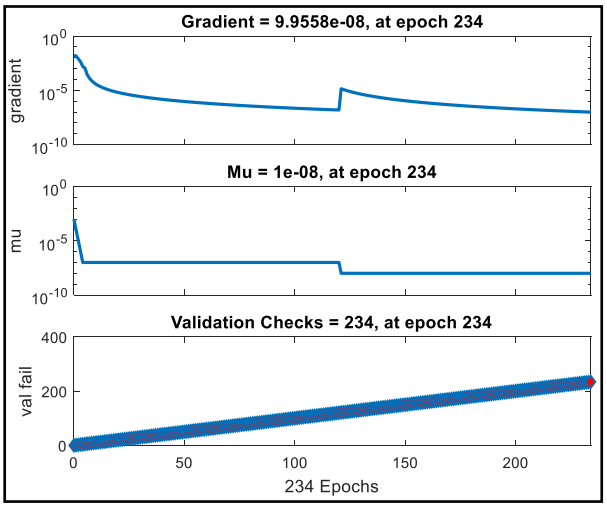

Fig. 7 – **Gradient, Mu and validation checks of the Neural Network**

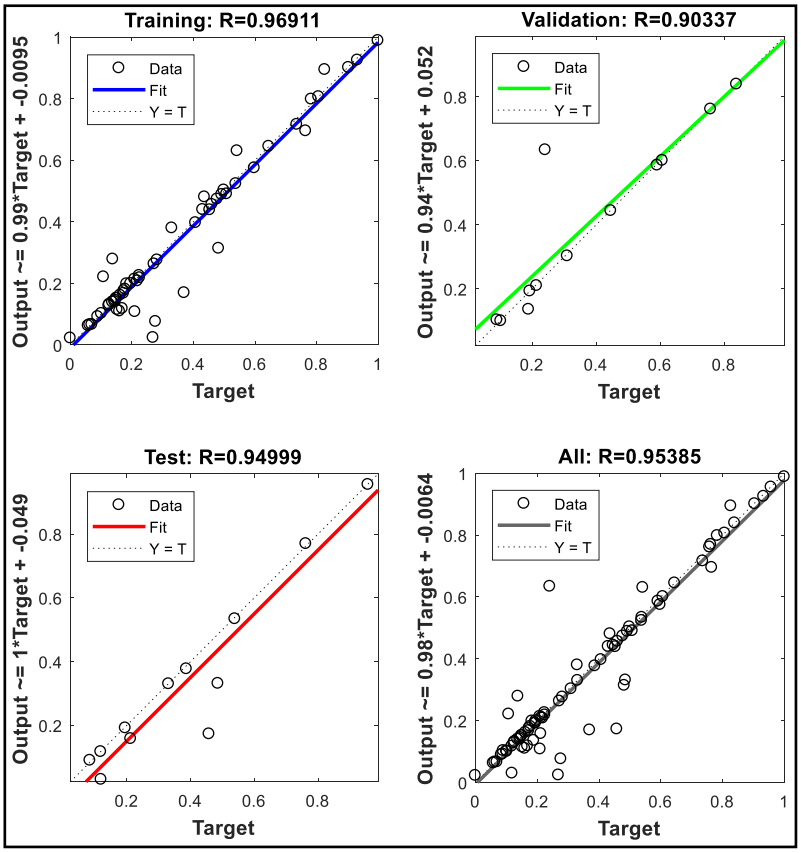

Fig. 8 – **Results of regression in ANN**

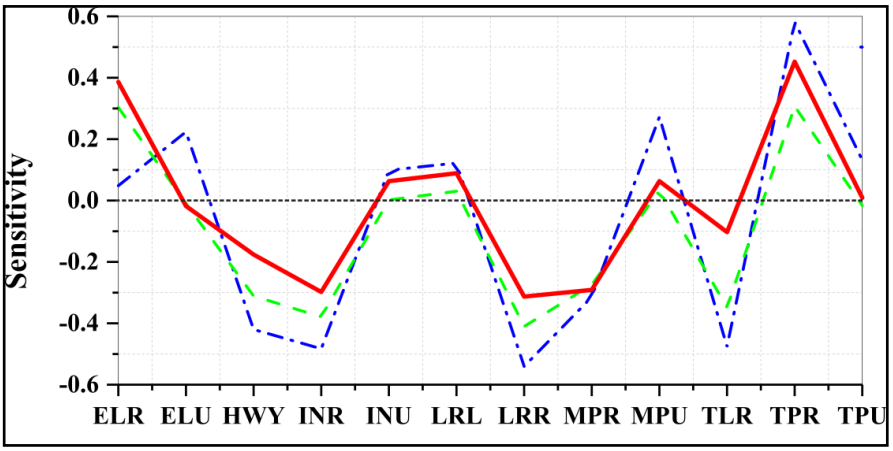

Fig. 9 **– Sensitivities of the variables**

Discussion

The level of infrastructure is highly correlated with economic growth (Fan and Zhang 2004). The better stock of public capital can improve investment (Bronzini and Piselli 2009). Infrastructure in the surrounding regions also improves productivity (Bronzini and Piselli 2009). The availability of transportation infrastructure improves the competitive advantage (Purwanto et al. 2017). The road has a positive association with the level of productivity of developed economies, like Italy (Bronzini and Piselli 2009). A negative association is found between transport infrastructure and GDP (Melo et al. 2013). In the present study, out of four components of transportation infrastructure, three components, i.e., highway, roads, and rural roads, show a reverse association and negative sensitivity with regional competitiveness. Out of the three mentioned transportation infrastructure, the reverse association (negative beta coefficient) is strongest for rural roads. The results indicate that better connectivity triggers capital and labor drain from the rural areas of the region. The phenomenon is also evident in the negative sensitivity related to all the three above mentioned transportation infrastructure. With the improvement in the stock of rural roads to 10 percent, the negative effect becomes more intense. The literature describes the negative association between transportation infrastructure and GDP caused by the out-migration from the region (Melo et al. 2013). Singh et al. (2011) observe massive labor out-migration from the Indo-Gangetic plain, especially from the rural areas of the region. Some transportation infrastructure can enhance the economic output, and others result only into the reallocation of output (Melo et al. 2013). In the present case, transportation infrastructure results in the reallocation of output, i.e., competitiveness, by the means of relocation of a major input, i.e., labor.

The marginal effect of transportation infrastructure decreases with the increase in its stock (Melo et al. 2013). A similar phenomenon is also observed in the study. In the present case, railway infrastructure shows a relatively smaller but positive association and sensitivity. Transportation infrastructure shows a marginal increase in the sensitivity with the 10 percent increase in the stock of the infrastructure. The cause of the different output sensitivity related to different sectors of the economy is the intensity of the use of transportation infrastructure (Melo et al. 2013). Since the region is predominantly rural and agriculture-based, railway infrastructure might not be utilized so intensely for the transportation of goods. This is reflected by the low beta value and the low sensitivity related to the railway infrastructure in the region.

ICT is crucial for the competitiveness of emerging economies (Kowal and Paliwoda-Pękosz 2017). A positive relationship between broadband and GDP is observed by Koutroumpis (2009). Due to the economy of scale, more urbanized countries get more benefits from the broadband infrastructure (Koutroumpis 2009). A positive association between urban internet infrastructure and regional competitiveness has been observed in the present study. From the positive association, it can be inferred that the competitiveness of the study area is getting benefited through internet infrastructure in urban areas. The positive effects of IT infrastructure can be observed when the stock increases substantially (Indjikian and Siegel 2005). There exists a demand for a large stock of broadband infrastructure (Koutroumpis 2009). Similarly, in this study also, sensitivity related to urban internet infrastructure moves from negative to positive when the stock of infrastructure is improved substantially (improved by 10 percent). A negative association and a negative sensitivity are observed between the rural internet infrastructure and the competitiveness of the region. The reason behind the negative relationship can be explained as the information obtained from the improvement in the internet infrastructure is utilized for draining the capital and labor from the rural areas of the region. The negative sensitivity related to rural internet infrastructure gets stronger with the improvement in the stock of infrastructure by 10 percent.

Recently, the mobile infrastructure has played a critical role in global economic development (Lam and Shiu 2010). There are evidences that the growth in GDP is positively related to telecommunication infrastructure (Lam and Shiu 2010). Mobile infrastructure is more critical than landline for economic development (Ward and Zheng 2016). In the present study, both the landline and mobile phone infrastructure for urban areas show a positive association with regional competitiveness. The association is stronger for mobile phones. The positive association implies that the development of telecommunication infrastructure has a positive impact on the competitiveness of the region. The impact of mobile phone infrastructure is stronger than landline. For rural areas, the association is negative for mobile phones and positive for landline infrastructure. For developing countries, a 10% growth in mobile phone infrastructure produces a 0.6% growth in GDP (Waverman et al. 2005). In the present study, the improvement of 10% in urban and rural mobile phone infrastructure produces 0.27% and -0.31% increase in regional competitiveness, respectively. When the stock of rural mobile phone infrastructure increases by 10%, the sensitivity becomes more negative. The association implies that in rural areas mobile phone is mostly utilized for gathering information related to work opportunities at distant locations.

For Central America, a 1% improvement in energy usage is related to 0.28% increases in GDP (Apergis and Payne 2009). Lee (2005) observed the elasticity of GDP for energy usage of eighteen developing countries as <0.5%. Lee and Chang (2008) observe the elasticity of energy usage for the GDP of sixteen Asian countries as 0.32%. The elasticity of energy usage with GDP is greater than 0.25% for 22 OECD countries (Lee et al. 2008) and 0.12% for G7 nations (Narayan and Smyth 2008). In the present study, rural electricity infrastructure is positively related to regional competitiveness. The sensitivity for rural and urban electricity infrastructure is 0.3 and 0.01, respectively.

Conclusions

In the present paper, multiple techniques have been tested for their performance in the assessment of relative weights and, consequently, for forming an index. The results obtained from the Product measure analysis and the relative weight analysis failed to demonstrate a positive correlation with competitiveness. The Zero-order correlation and the Structural coefficient analysis performed reasonably well. The beta coefficient is the best among all applied techniques for the assessment of relative weight and consecutively for forming an index. The Commonality analysis shows significantly high values of Spearman correlation and

Pearson's rho. It is a very appropriate technique for the detailed investigation of unique and shared effects among variables. The result shows that the common effects of the critical components of the economic infrastructure are stronger than their unique effects. For example, variables TLR (rural telephone) and LRR (rural road) jointly share a 7.16% variance with the dependent variable. It implies that the competitiveness is better augmented when both the physical and digital connectivity is enhanced simultaneously in the rural areas of the region. The businesses in rural areas grow when the entrepreneurs get the ease of transport goods and, at the same time, they are able to collect information from various distant sources. It can be concluded that Infrastructure should be targeted jointly rather than individually to augment the competitiveness of the region.

Results from the perspective of both relative weights and sensitivities are utilized to analyze the situation better. Out of the four components of transportation infrastructure, three components, i.e., highway, roads, and rural roads, show a reverse association and negative sensitivity with regional competitiveness. The reverse association is strongest for rural roads. The results indicate that better connectivity triggers capital and labor drain from the rural areas of the region. Since the region is predominantly rural and agriculture-based, railway infrastructure might not be utilized so intensely for the transportation of goods. Low sensitivity related to railway infrastructure is evident in the results. A positive association between urban internet infrastructure and regional competitiveness is present. It can be inferred that regional competitiveness is getting benefited through internet infrastructure in urban areas. The reason behind the negative relationship between rural internet infrastructure and competitiveness can be explained as the information obtained from the improvement in the internet infrastructure is utilized for draining the capital and labor from the rural areas of the region. The negative association between rural mobile phone infrastructure and competitiveness can be explained similarly. Rural electricity infrastructure has a positive impact on regional competitiveness.

The present paper explores the solution for the problem of assignment of relative weights through a multi-model approach, in the case when multi-collinearity is present among the independent variables. Finally, the proposed methodology can be utilized in any domain of research to explore the relationship between the variables and, consecutively, for forming an index. The paper also discusses the importance of sensitivity along-with relative weights to prioritize the investment in order to augment the competitiveness of a region.

The authors came across certain limitations while performing research on regional competitiveness. The significant limitations related to data availability need to be highlighted. Since the region includes different administrative states, data availability in a similar format has been a significant constraint. Due to the same constraint of data availability, a time series analysis on regional competitiveness analysis is impossible.

For future research, the significant opportunity is that it is possible to generate multiple samples with the available data-set and to analyze the behavior of formed indices. It is suggested that the effects of 'factors of competitiveness' other than economic infrastructure on regional competitiveness need to be analyzed. Subsequently, the interaction of the effects of other factors of competitiveness and economic infrastructure on regional competitiveness can be additionally explored. Accordingly, a similar set of analyses can be carried out for the regions in a different river valley of the world, and the results can be compared to advance a good research vocabulary of regional development planning.

References

ACHOUR H., BELLOUMI M. (2016), *Investigating the causal relationship between transport infrastructure, transport energy consumption and economic growth in Tunisia*, Renewable and Sustainable Energy Reviews 56, 988-998.

APERGIS N., PAYNE J. E. (2009), *Energy consumption and economic growth in Central America: Evidence from a panel cointegration and error correction model*, Energy Economics 31 (2), 211-216.

AZEN R., BUDESCU D. V. (2003), *The dominance analysis approach for comparing predictors in multiple regression*, Psychological Methods 8 (2), 129-148.

BARKLEY D. L., DUDENSING R. M. (2011), *Industrial legacy matters: Implications for the development and use of indices of regional competitiveness*, Economic Development Quarterly 25 (2), 130-142.

BARNA K. (2007), *Measuring regional competitiveness*, Journal of Central European Agriculture 8 (3), 343-356.

BHAWSAR P., CHATTOPADHYAY U. (2015), *Competitiveness: Review, Reflections and Directions*, Global Business Review 16 (4), 665-679.

BIRNIE E., JOHNSTON R., HEERY L., RAMSEY E. (2019), *A critical review of competitiveness measurement in Northern Ireland*, Regional Studies 53 (10), 1494-1504.

BOOYSEN F. (2002), *An overview and evaluation of composite indices of development*, Social Indicators Research 59, 115-151.

BOWEN H. P., MOESEN W. (2011), *Composite competitiveness indicators with endogenous versus predetermined weights: An application to the World Economic Forum's global competitiveness index*, Competitiveness Review 21 (2), 129-151.

BRONZINI R., PISELLI P. (2009), *Determinants of long-run regional productivity with geographical spillovers: The role of R&D, human capital and public infrastructure*, Regional Science and Urban Economics 39 (2), 187-199.

CAI H., TREISMAN D. (2005), *Does Competition for Capital Discipline Governments? Decentralization, Globalization, and Public Policy*, American Economic Review 95 (3), 817-830.

CAPRARO R. M., CAPRARO M. M. (2001), *Commonality analysis: Understanding variance contributions to overall canonical correlation effects of attitude toward mathematics on geometry achievement*, Multiple Linear Regression Viewpoints 27 (2), 16-23.

CASTRO-GONZÁLES S., PEÑA-VINCES J. C., GUILLEN J. (2016), *The competitiveness of Latin-American economies: Consolidation of the double diamond theory*, Economic Systems 40 (3), 373-386.

CELLINI R., SOCI A. (2002), *Pop competitiveness*, PSL Quarterly Review 55 (220), 71-101.

CHASE-DUNN C. (1975), *The Effects of International Economic Dependence on Development and Inequality: A Cross-National Study*, American Sociological Review 40 (6), 720-738.

CHEN A., PARTRIDGE M. D. (2013), *When Are Cities Engines of Growth in China? Spread and Backwash Effects across the Urban Hierarchy*, Regional Studies 47 (8), 1313-1331.

CIVELEK M. E., UCA N., CEMBERCI M. (2015), *The mediator effect of logistics performance index on the relation between global competitiveness index and gross domestic product*, European Scientific Journal 11 (13), 368-375.

COURVILLE T., THOMPSON B. (2001), *Use of structure coefficients in published multiple regression articles: ß is not enough*, Educational and Psychological Measurement 61 (2), 229-248.

ČUČKOVIĆ N., JURLIN K., VUČKOVIĆ V. (2013), *Measuring regional competitiveness: the case of Croatia*, Southeast European and Black Sea Studies 13 (4), 503-523.

DARLINGTON R. B. (1968), *Multiple regression in psychological research and practice*, Psychological Bulletin 69 (3), 161-182.

DEVEREUX M. P., GRIFFITH R., SIMPSON H. (2004), *The geographic distribution of production activity in the UK*, Regional Science and Urban Economics 34 (5), 533-564.

DISATNIK D., SIVAN L. (2016), *The multicollinearity illusion in moderated regression analysis*, Marketing Letters 27, 403-408.

DUNNING J. H., BANNERMAN E., LUNDAN S. M. (1998), *Competitiveness and Industrial Policy in Northern Ireland*, Northern Ireland Economic Council, Belfast.

FAN S., ZHANG X. (2004), *Infrastructure and regional economic development in rural China*, China Economic Review 15 (2), 203-214.

FERNANDEZ E., NAVARRO J., DUARTE A., IBARRA G. (2013), *Core: a decision support system for regional competitiveness analysis based on multi-criteria sorting*, Decision Support Systems 54 (3), 1417-1426.

FOURIE J. (2006), *Economic infrastructure: a review of definitions, theory and empirics*, South African Journal of Economics 74 (3), 530-556.

FREDERICK B. N. (1999), *Partitioning variance in the multivariate case: A step-by-step guide to canonical commonality analysis*, Advances in Social Science Methodology 5, 305-318.

FREUDENBERG M. (2003), *Composite indicators of country performance: a critical assessment*, OECD Science, Technology and Industry Working Papers 2003/16, OECD Publishing, Paris.

GARCÍA-SÁNCHEZ A., SILES D., VÁZQUEZ-MÉNDEZ M. D. M. (2018), *Innovation, Competitiveness and Prosperity: A Factor Analysis of Innovation Indicators in Spain*, Management Studies 6 (5), 375-383.

GARDINER B., MARTIN R., TYLER P. (2004), *Competitiveness, productivity and economic growth across the European regions*, Regional Studies 38 (9), 1045-1067.

GHOSH D., VOGT A. (2012), *Outliers: An evaluation of methodologies*, Joint Statistical Meetings, 3455-3460.

GUERRERO M., URBANO D., FAYOLLE A. (2016), *Entrepreneurial activity and regional competitiveness: evidence from European entrepreneurial universities*, The Journal of Technology Transfer 41 (1), 105-131.

HAIR J. F., ANDERSON R. E., TATHAM R. L., BLACK W. C. (1995), *Multivariate data analysis: with readings*, Prentice Hall, Englewood Cliffs, NJ.

HERAVI G., ESLAMDOOST E. (2015), *Applying Artificial Neural Networks for Measuring and Predicting Construction-Labor Productivity*, Journal of Construction Engineering and Management 141 (10), 1-11.

HOPKINS K. D., WEEKS D. L. (1990), *Tests for normality and measures of skewness and kurtosis: Their place in research reporting*, Educational and Psychological Measurement 50 (4), 717-729.

HUGGINS R. (2003), *Creating a UK Competitiveness Index: Regional and Local Benchmarking*, Regional Studies 37 (1), 89-96.

HUOVARI J., KANGASHARJU A., ALANEN A. (2002), *Constructing an Index for Regional Competitiveness*, in: Acs Z. J., de Groot H. L. F., Nijkamp P. (eds.), The Emergence of the Knowledge Economy. Advances in Spatial Science, Springer, Berlin, pp. 121-138.

INDJIKIAN R., SIEGEL D. S. (2005), *The impact of investment in IT on economic performance: Implications for developing countries*, World Development 33 (5), 681-700.

JOHNSON J. W. (2000), *A heuristic method for estimating the relative weight of predictor variables in multiple regression*, Multivariate Behavioral Research 35 (1), 1-19.

JOHNSON J. W., LEBRETON J. M. (2004), *History and use of relative importance indices in organizational research*, Organizational Research Methods 7 (3), 238-257.

JU Y., SOHN S. Y. (2014), *Development of a national competitiveness index based on a structural equation model*, Technology Analysis & Strategic Management 26 (5), 565-579.

KAUR M., KHATUA A., YADAV S. S. (2016), *Infrastructure Development and FDI Inflow to Developing Economies: Evidence from India*, Thunderbird International Business Review 58 (6), 555-563.

KIM H.-Y. (2013), *Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis*, Restorative Dentistry & Endodontics 38 (1), 52-54.

KISZOVA Z., NEVIMA J. (2012), *Usage of analytic hierarchy process for evaluating of regional competitiveness in case of the Czech Republic*, Proceedings of 30th International Conference Mathematical Methods in Economics, 402-407.

KITSON M., MARTIN R., TYLER P. (2004), *Regional competitiveness: an elusive yet key concept?*, Regional Studies 38 (9), 991-999.

KOUTROUMPIS P. (2009), *The economic impact of broadband on growth: A*

simultaneous approach, Telecommunications Policy 33 (9), 471-485.

KOVACS P., LUKOVICS M. (2006), *Classifying Hungarian Sub-regions by their Competitiveness*, The 25th SCORUS Conference on Regional and Urban Statistics and Research: Globalization Impact on Regional and Urban Statistics, 1-12.

KOWAL J., PALIWODA-PĘKOSZ G. (2017), *ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies*, Information Systems Management 34 (4), 304-307.

KRAHA A., TURNER H., NIMON K., ZIENTEK L. R., HENSON R. K. (2012), *Tools to support interpreting multiple regression in the face of multicollinearity*, Frontiers in Psychology 3 (44), 1-16.

KRAMULOVÁ J., JABLONSKÝ J. (2016), *AHP model for competitiveness analysis of selected countries*, Central European Journal of Operations Research 24, 335-351.

KRUGMAN P. (1997), *The age of diminished expectations: U.S. economic policy in the 1990s*, The MIT Press, Cambridge, MA.

KUMARI A., SHARMA A. K. (2017), *Physical & social infrastructure in India & its relationship with economic development*, World Development Perspectives 5, 30-33.

LAM P.-L., SHIU A. (2010), *Economic growth, telecommunications development and productivity growth of the telecommunications sector: Evidence around the world*, Telecommunications Policy 34 (4), 185-199.

LEBRETON J. M., PLOYHART R. E., LADD R. T. (2004), *A Monte Carlo comparison of relative importance methodologies*, Organizational Research Methods 7 (3), 258-282.

LEE C.-C. (2005), *Energy consumption and GDP in developing countries: a cointegrated panel analysis*, Energy Economics 27 (3), 415-427.

LEE C.-C., CHANG C.-P. (2008), *Energy consumption and economic growth in Asian economies: A more comprehensive analysis using panel data*, Resource and Energy Economics 30 (1), 50-65.

LEE C.-C., CHANG C.-P., CHEN P.-F. (2008), *Energy-income causality in OECD countries revisited: The key role of capital stock*, Energy Economics 30 (5), 2359-2373.

LENGYEL I. (2007), *Economic growth and competitiveness of Hungarian regions (Economic development strategies for different types of regions)*, 2nd Central European Conference in Regional Science – CERS, 587-608.

LENGYEL I., LUKOVICS M. (2006), *An Attempt for the Measurement of Regional Competitiveness in Hungary*, "Enlargement, Southern Europe and the Mediterranean" 46th Congress of the European Regional Science Association, 1-29.

MARTIN R. L. (2003), *A study on the factors of regional competitiveness*, A draft final report for the European Commission Directorate-General Regional Policy, Retrieved from: www.ec.europa.eu.

MCDANIEL C., GATES R. (1998), *Contemporary Marketing Research*, South-Western Publishing, Cincinnati, OH.

MELO P. C., GRAHAM D. J., BRAGE-ARDAO R. (2013), *The productivity of transport infrastructure investment: A meta-analysis of empirical evidence*, Regional Science and Urban Economics 43 (5), 695-706.

MIKUŠ O., FRANIĆ R., GRGIĆ I. (2012), *The evaluation of rural competitiveness in creating a policy of rural development in Croatia*, Journal of Food, Agriculture & Environment 10 (2), 962-969.

MOOD A. M. (1971), *Partitioning variance in multiple regression analyses as a tool for developing learning models*, American Educational Research Journal 8 (2), 191-202.

MOSEIKO V. O., KOROBOV S. A., FROLOV D. P. (2015), *Socio-Economic Systems' Competitiveness Assessment Method*, Asian Social Science 11 (20), 1-8.

NAGARAJ R., VAROUDAKIS A., VÉGANZONÈS M.□A. (2000), *Long-run growth trends and convergence across Indian States*, Journal of International Development 12 (1), 45-70.

NARAYAN P. K., SMYTH R. (2008), *Energy consumption and real GDP in G7 countries: New evidence from panel cointegration with structural breaks*, Energy Economics 30 (5), 2331-2341.

NASSERI M., ASGHARI K., ABEDINI M. J. (2008), *Optimized scenario for rainfall forecasting using genetic algorithm coupled with artificial neural network*, Expert Systems with Applications 35 (3), 1415-1421.

NATHANS L. L., OSWALD F. L., NIMON K. (2012), *Interpreting Multiple Linear Regression: A Guidebook of Variable Importance*, Practical Assessment, Research & Evaluation 17 (9), 1-19.

NIMON K. (2010), *Regression commonality analysis: Demonstration of an SPSS solution*, Multiple Linear Regression Viewpoints 36 (1), 10-17.

NIMON K., GAVRILOVA M., ROBERTS J. K. (2010), *Regression results in human resource development research: Are we reporting enough?*, in: Graham C., Dirani K. (eds.), Proceedings of the Human Resource Development 2010 International Conference, AHRD, Knoxville, TN, pp. 803-812.

NIMON K., REIO T. G. (2011), *Regression Commonality Analysis: A Technique for Quantitative Theory Building*, Human Resource Development Review 10 (3), 329-340.

NUNNALLY J. C., BERNSTEIN I. H. (1994), *Psychometric theory (3rd ed.)*, McGraw-Hill, Inc., New York.

O'BRIEN R. M. (2007), *A caution regarding rules of thumb for variance inflation factors*, Quality & Quantity 41, 673-690.

OECD (2008), *Handbook on constructing composite indicators: methodology and user guide*, OECD Publishing, Paris.

OLDEN J. D., JACKSON D. A. (2002), *Illuminating the "black box": A randomization approach for understanding variable contributions in artificial neural networks*, Ecological Modelling 154 (1-2), 135-150.

PALEI T. (2015), *Assessing the Impact of Infrastructure on Economic Growth and Global Competitiveness*, Procedia Economics and Finance 23, 168-175.

PEDHAZUR E. J. (1997), *Multiple regression in behavioral research: explanation and prediction*, Wadsworth, Belmont.

PETRARCA F., TERZI S. (2018), *The Global Competitiveness Index: an alternative measure with endogenously derived weights*, Quality & Quantity 52, 2197-2219.

POPESCU G. H., SIMA V., NICA E., GHEORGHE I. G. (2017), *Measuring Sustainable Competitiveness in Contemporary Economies — Insights from European Economy*, Sustainability 9, 1230.

PORTER M. E. (1990), *The Competitive Advantage of Nations*, Macmillan, Basingstoke.

PORTER M. E. (1998), *On Competition*, Harvard Business Review Press, Boston.

PORTER M. E., DELGADO M., KETELS C., STERN S. (2008), *Moving to a New Global Competitiveness Index*, in: Porter M. E., Schwab K. (eds.), The global competitiveness report 2008-2009, World Economic Forum, Geneva, pp. 43-63.

PORTER M. E., KETELS C. H. M., MILLER K., BRYDEN R. T. (2004), *Competitiveness in rural U.S. regions: Learning and research agenda*, Harvard Business School, Retrieved from: www.hbs.edu.

PRATT J. W. (1987), *Dividing the indivisible: Using simple symmetry to partition variance explained*, in: Pukkila T., Puntanen S. (eds.), Proceedings of the 2nd International Tampere Conference in Statistics, 245-260.

PURWANTO A. J., HEYNDRICKX C., KIEL J., BETANCOR O., SOCORRO M. P., HERNANDEZ A., EUGENIO-MARTIN J. L., PAWLOWSKA B., BORKOWSKI P., FIEDLER R. (2017), *Impact of Transport Infrastructure on International Competitiveness of Europe*, Transportation Research Procedia 25, 2877-2888.

RAHMAT S., SEN J. (2016), *Cluster analysis based approach to delineate homogeneous regions for the assessment of regional competitiveness: a case of districts of India*, Journal of Multidisciplinary Engineering Science Studies 2 (1), 173-180.

ROWELL R. K. (1996), *Partitioning predicted variance into constituent parts: How to conduct commonality analysis*, Advances in Social Science Methodology 4, 33-43.

SCHALLER L., TARGETTI S., VILLANUEVA A. J., ZASADA I., KANTELHARDT J.,

ARRIAZA M., BAL T., BOSSI FEDRIGOTTI V., HANDAN GIRAY F., HÄFNER K., MAJEWSKI E., MALAK-RAWLIKOWSKA A., NIKOLOV D., PAOLI J.-C., PIORR A., RODRÍGUEZ-ENTRENA M., UNGARO F., VERBURG P. H., VAN ZANTEN B., VIAGGI D. (2018), *Agricultural landscapes, ecosystem services and regional competitiveness—Assessing drivers and mechanisms in nine European case study areas*, Land Use Policy 76, 735-745.

SCHWAB K. (ed.) (2016), *The Global Competitiveness Report 2016-2017*, World Economic Forum, Geneva.

SCHWAB K., PORTER M. E., SACHS J. D. (2002), *The Global Competitiveness Report 2001-2002*, Oxford University Press, New York.

SIMIONESCU M. (2016), *Competitiveness and Economic Growth in Romanian Regions*, Journal of Competitiveness 8 (4), 46-60.

SINGH N. P., SINGH R. P., KUMAR R., PADARIA R. N., SINGH A., VARGHESE N. (2011), *Labour Migration in Indo-Gangetic Plains: Determinants and Impacts on Socio-economic Welfare*, Agricultural Economics Research Review 24, 449-458.

SINGHAL S., MCGREAL S., BERRY J. (2013), *An evaluative model for city competitiveness: Application to UK cities*, Land Use Policy 30 (1), 214-222.

SNIEŠKA V., BRUNECKIEN J. (2009), *Measurement of Lithuanian Regions by Regional Competitiveness Index*, Engineering Economics 1 (61), 45-57.

SOMOZA MEDINA X. (2016), *Governance, Urban Competitiveness and Crisis in Spain*, Journal of Urban and Regional Analysis 8 (1), 47-60.

STANICKOVA M. (2015), *Classifying The EU Competitiveness Factors using Multivariate Statistical Methods*, Procedia Economics and Finance 23, 313-320.

STANÍČKOVÁ M., MELECKÝ L. (2012), *Assessment of efficiency in Visegrad countries and regions using DEA models*, Ekonomická revue – Central European Review of Economic Issues 15, 145-156.

STORPER M. (1997), *The Regional World: Territorial Development in a Global Economy*, Guilford Press, New York.

TAM C. M., TONG T. K. L., TSE S. L. (2002), *Artificial neural networks model for predicting excavator productivity*, Engineering Construction and Architectural Management 9 (5 -6), 446-452.

THOMPSON N., WARD N. (2005), *Rural areas and regional competitiveness*, Centre for Rural Economy, New Castle University, Retrieved from: www.ncl.ac.uk.

TOGHYANI S., AHMADI M. H., KASAEIAN A., MOHAMMADI A. H. (2016), *Artificial neural network, ANN-PSO and ANN-ICA for modelling the Stirling engine*, International Journal of Ambient Energy 37 (5), 456-468.

TONIDANDEL S., LEBRETON J. M. (2010), *Determining the relative importance of predictors in logistic regression: An extension of relative weight analysis*, Organizational Research Methods 13 (4), 767-781.

TONIDANDEL S., LEBRETON J. M. (2015), *RWA Web: A Free, Comprehensive, Web-Based, and User-Friendly Tool for Relative Weight Analyses*, Journal of Business and Psychology 30, 207-216.

WARD M. R., ZHENG S. (2016), *Mobile telecommunications service and economic growth: Evidence from China*, Telecommunications Policy 40 (2-3), 89-101.

WATSON C. J. (1990), *Multivariate distributional properties, outliers, and transformation of financial ratios*, The Accounting Review 65 (3), 682-695.

WAVERMAN L., MESCHI M., FUSS M. (2005), *The Impact of Telecoms on Economic Growth in Developing Countries*, The Vodafone Policy Paper Series 2 (3), 10-23.

WONG C. (2002), *Developing indicators to inform local economic development in England*, Urban Studies 39 (10), 1833-1863.

WORLD BANK (1994), *World development report 1994: Infrastructure for development*, Oxford University Press, New York.

WORLD BANK GROUP (2016), *Global Economic Prospects: Divergences and Risks*, The World Bank, Washington, D.C.

YAFFEE R. A. (2002), *Robust regression analysis: some popular statistical package options*, IPAC Caltech, Retrieved from: www.ipac.caltech.edu.

YASKAL I., MAHA L.-G., PETRASHCHAK O. (2018), *Spatial distribution of economic activities and internal economic integration in Romania*, Journal of Urban and Regional Analysis 10 (2), 217-240.

ZHOU C.-C., YIN G.-F., HU X.-B. (2009), *Multi-objective optimization of material selection for sustainable products: Artificial neural networks and genetic algorithm approach*, Materials & Design 30 (4), 1209-1215.

ZHOU Y., MAUMBE K., DENG J., SELIN S. W. (2015), *Resource-based destination competitiveness evaluation using a hybrid analytic hierarchy process (AHP): The case study of West Virginia*, Tourism Management Perspectives 15, 72-80.

ZIENTEK L. R., CAPRARO M. M., CAPRARO R. M. (2008), *Reporting practices in quantitative teacher education research: One look at the evidence cited in the AERA panel report*, Educational Researcher 37 (4), 208-216.

ZIENTEK L. R., THOMPSON B. (2006), *Commonality analysis: Partitioning variance to facilitate better understanding of data*, Journal of Early Intervention 28 (4), 299-307.

ZIGLARI L. (2017), *Interpreting Multiple Regression Results: β Weights and Structure Coefficients*, General Linear Model Journal 43 (2), 13-22.

Initial submission: 13.02.2020
Revised submission: 28.07.2020
Final acceptance: 26.08.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 59 - 75
https://doi.org/10.37043/JURA.2021.13.1.4

APPLICATION OF A FUZZY SYSTEM TO THE ANALYSIS OF ENTREPRENEURIAL INTENTION IN COLOMBIA

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Abstract: The incidence of diverse factors on the intention to create enterprises (EI) motivates the calculation of a multidimensional indicator that groups the initial endowments of the individual and the characteristics of the environment. Thus, the research introduces a new way of measuring business intent based on the mathematical support of the theory of fuzzy sets; thus, employing a sample of MBA students in Colombia, a Multidimensional Index of Enterprise Intent (MIEI) was calculated for 14 cities, segmented by gender, age, and area of studies. The results of the document expose heterogeneity in Colombian cities in terms of EI, with greater development in spatial units with facilities to do business. Particularly, the results denote the presence of an EI cycle in the age range between 30 and 40 years and they confirm Bogotá, D.C., as the city with the highest EI in Colombia. Meanwhile, the findings confirm minor entrepreneurial development in students with vocation for agricultural science.

Key Words: *fuzzy sets, entrepreneurship, business intent, entrepreneurial intention, entrepreneurship index.*

Introduction

Within the current context, according to the Global Entrepreneurship Monitor Colombia (2019), entrepreneurship has become a basic tool for job creation and wealth generation (Barba-Sánchez and Atienza-Sahuquillo 2017); likewise, empirical evaluations have shown that economic growth and development are linked to business spirit (Oosterbeek et al. 2010). Thus, entrepreneurship, as research theme, gains importance in understanding a field of action that permits potentiating opportunities of regional development to promote technological progress, generate jobs, increase added value, and enhance local economies, among other aspects (Ferreira et al. 2019). Nevertheless, for Colombia, less empirical evidence exists in relation to the transmission mechanism exerted by environmental factors on the development of entrepreneurial initiatives in cases applied in students.

Considering the aforementioned, understanding learning processes, innovation, and business spirit are at the core of economic analysis. Nevertheless, the multiplicity of variables that influence EI hinders its parameterization. Thus, the transversality that encompasses the EI concept, added to the pertinence of grouping it into a multidimensional indicator, configure the central object of this research. In this sense, a fuzzy inference system is proposed as mathematical support to construct a Multidimensional Index of Entrepreneurial Intention (MIEI) in MBA students in Colombia. Particularly, in the EI study, the theory of fuzzy sets is pertinent and appropriate, given that it relaxes the weighting of objective and subjective characteristics.

In spite of its relevance, few works truly define what EI is; however, some authors, like Thompson (2009), assume that EI is a self-recognized conviction by an individual who seeks to create a business and undertakes a conscious planning process to reach the said purpose at some point in life. Additionally, for Peng et al. (2012), EI is the mental orientation, desire, and hope that intervene in the election of a specific entrepreneurial initiative. Bird (1988) assumes

that EI concerns a necessary and prior process carried out before conducting a given enterprise action; a definition complemented by Baum et al. (2007), who go a bit further when considering that enterprise creation is the result of an intentional behavior.

Consequently, this document contributes to the literature on entrepreneurial spirit from two settings. In the first place, the study supports the empirical evidence in relation with regional heterogeneity and the difference in EI for the case of Colombian cities. Secondly, the proposed empirical strategy captures the effect of the environment through institutional and macroeconomic characteristics on EI in the group of students. In this case, the social and institutional environment is a key component in the development of EI (Kallas 2019). Finally, the research provides empirical evidence on the regional differences in EI in Colombia.

With the aforementioned idea exposed, the use of the theory of fuzzy sets in the field of study of entrepreneurship is brief; nevertheless, as of 2013, there has been increased applied research with empirical strategy based on the mathematical support provided by the fuzzy logic; among them, Cheng et al. (2013), Covin et al. (2016), Kraus et al. (2016), and Kraus et al. (2018). For this purpose, an empirical study was conducted among 477 students distributed in 16 MBA programs in Colombia, in 14 cities. Particularly, a multidimensional index was designed for different characteristics of the population and cities. As mentioned, the index is based on the concepts of fuzzy logic. Thus, the study results permit the establishing of three conclusions. First, according to the level of student privation in reference with the considered attributes, the family and institutional dimensions have greater relevance in estimating the index; second, the cities of Bogotá D.C. and Popayán report the highest EI. Finally, in the analysis by gender and age, the MIEI exposes a higher value for the male students and in the group between 30 and 40 years of age.

Internationally, some indices exist to measure certain aspects related with entrepreneurship, among them: the Global Entrepreneurship Monitor Colombia (2019) by the Babson College, Doing Business (DB) by the World Bank, the Flash Eurobarometer Survey on Entrepreneurship by the European Commission, the Global University Entrepreneurial Spirit Students' Survey (GUESSS) by the University of Saint Gallen in Switzerland, the International Observatory of Entrepreneurial Intentions of University Students (OI2E2) by University Pierre Mendès France in France, the Global Entrepreneurship and Development Index (GEDI) from the Global Institute on Entrepreneurship and Development, the Index of Systemic Conditions for Dynamic Entrepreneurship (ISCDE), and the Index of Systemic Conditions for Entrepreneurship in Cities (ICEC) by the Entrepreneur Development Program (PRODEM, Argentina), and the AEI Index by Universidad Andina Simón Bolívar in Ecuador.

The Global Entrepreneurship Monitor Colombia studies the behavior of individuals at the start up and management of a business. Its objective is to measure the differences in entrepreneurship among the participating nations, to determine the key aspects that generate better levels of enterprise activity, and to suggest public policies that improve the entrepreneur initiative of countries. Doing Business, by the World Bank, carried out initially in 2002, has the main goal of providing objective information that permits analyzing, understanding, and improving the norms that regulate the enterprise activity to propose reforms that improve the environment for doing business.

The Flash Eurobarometer Survey on Entrepreneurship is a research published since 2000 and it is funded by the European Commission. Its principal aim is to support policy makers in the European Union to understand the problems and to propose feasible solutions. It has coverage over the Member States of the region, besides other nations, like the United States, Norway, Iceland, Brazil, Israel, India, and Russia, among others. With this focus, the GUESSS and the OI2E2 seek to understand the principal aspects of EI and of the enterprise activity of university students from distinct countries, which allows their comparing time and place among different

universities with different approaches.

The GEDI was created to generate a more complete comprehension of economic development by capturing valuable information from the context related with the formation, expansion, and growth of enterprises. It is an annual index that measures the health of entrepreneurship ecosystems in each of the 137 countries where it is developed. The Entrepreneur Development Program (PRODEM) by Universidad General Sarmiento in Argentina makes two measurements, namely, the Index of Systemic Conditions for Dynamic Entrepreneurship (ISCDE-PRODEM) and the Index of Systemic Conditions for Entrepreneurship in Cities (ICEC-PRODEM). The ISCDE-PRODEM, in the first place, is a tool that permits identifying the most important conditions for the emergence and development of entrepreneurs and dynamic enterprises in a given country. Currently, this index is applied in 60 countries around the world of which 15 are from Latin America.

In the second place, the PRODEM developed the ICEC-PRODEM, which analyzes ecosystems at sub-national level and it compares with similar cities or others of greater development. This index has special application in several Argentine cities (Kantis et al. 2017) and it works with 11 dimensions grouped into four axes that encompass distinct cultural, social, economic, political, and regulatory factors that determine the entrepreneurial potential of a given city. Finally, the Index of Alliance for Entrepreneurship and Innovation (AEI) uses 60 indicators classified into seven groups that have been used by diverse authors to study the entrepreneurial ecosystem, which are, namely: human talent, policy and regulatory framework, market, innovation, support and advisory, culture and funding.

In spite of the varied range of institutions that create entrepreneurship indices in different countries globally, it is evidenced that these analyze nations and cities, but no index has been found that permits examining individuals. The objective of this work was precisely to fill this gap that exists in the specialized literature to construct a multidimensional indicator that groups the individual's initial endowments and the characteristics of the environment.

Considering the aforementioned, although a broad set of indicators exists, as well as methodological approaches to measure EI, some gaps still remain from the empirical and theoretical point of view on the role played by institutional and macroeconomic elements over EI. Additionally, for the Colombian case, the empirical evidence on the differences at city level in terms of the elements influencing upon EI are scarce. In this sense, according to Bird and Jelinek (1989), there are two general determinants of EI, the individual and the context, and EI is the bridge between these two elements.

First, regarding the impact of the enterprise capacity perceived in EI, it is indicated that it is enhanced when there is a greater degree of regional social legitimacy. This implies that a local cultural environment that supports the entrepreneurial spirit results particularly relevant to strengthen an individual's perception of feeling capable of creating a successful business. According to Kallas (2019), a higher satisfaction with the external environment and a high level of preparation lead to greater EI; however, high levels of regional social legitimacy for enterprise initiative do not always promote the transformation of EI into concrete actions (Kibler et al. 2014).

Thus, when the regions show high levels of regional product, high growth of such, a high proportion of people between 25 and 44 years of age, and low levels of enterprise activity, the positive impact of EI is weakened because the entrepreneurial behavior enjoys a high degree of regional social legitimacy. The high costs of opportunity of the enterprise initiative seem to undermine the positive effects of the high regional social legitimacy (Kibler et al. 2014). Furthermore, culture, as one of the conditioners of subjective norms, is closely related with the pressures generated by the social, economic, and political environment of each region (Dos

Santos Souza and Silveira 2018).

Hence, from the empirical evidence emerges consensus in relation with the gender role in developing the entrepreneurial intention. In the available literature, men consistently exhibit more favorable EI than women (Tarapuez et al. 2018b, López-Delgado et al. 2019, Nowiński et al. 2019).

Ahmed et al. (2017) conclude that women, in particular, persist to a lesser extent against entrepreneurial training programs; this is more consistent in women without work experience. To complement, Maes et al. (2014) assume that gender differences find their explanation in cognitive, personal, and contextual discrepancies.

Regarding work experience, research is coherent in the definition of an orientation toward the enterprise initiative of those individuals with background in some enterprise activity. For Fatoki (2014) and Solimano (2014), work experience is one of the demographic factors that support the explanation of EI. According to Tarapuez-Chamorro et al. (2018), people with an entrepreneurial friend or relative and with over 10 years of work experience show higher probabilities of developing EI. Prior experience, whether employed or as entrepreneur, represents a significant source of entrepreneurial self-efficacy (Dehghanpour Farashah 2015).

Similarly, the research by Yi (2018) concludes that the peculiarities of prior work of individuals can improve the entrepreneurial convenience and viability and, in turn, trigger their EI. The findings of other studies show a positive relation of the work experience of individuals with their plans of creating a business (Azanza Martínez De Luco and Campos Granados 2014, Martínez 2016, Tarapuez et al. 2018a). Further, some studies find a statistically significant relation between work experience and the entrepreneurial intention of people (Miranda et al. 2017, Hossain et al. 2019).

In general, empirical findings demonstrate that exposure to a role model (entrepreneurial friends and relatives) represents a significant source of entrepreneurial self-efficacy and perceived behavioral control that promotes the desire of young individuals to create new productive units (Nesse and Bhatta 2017, Loi 2018, Tarapuez-Chamorro et al. 2018, Tarapuez et al. 2018b), which also impacts upon the development of greater EI (Tarapuez et al. 2018a) and on the plans to initiate a new business in the following two to three years (Popescu et al. 2014). Specifically, for Kilonzo and Nyambegera (2014), the social norms related with the approval by friends to create a business constitute the substantial relation of EI.

Different studies agree that the role of entrepreneurial parents or self-employed parents or having entrepreneurial relatives or having a role model are factors linked to the expectation of an entrepreneurial career (Mayhew et al. 2016, Tarapuez et al. 2018a, Palmer et al. 2019). In this sense, according to Kibler et al. (2014), when individuals get approval and support for the enterprise activity from their close social environment, they consider it less necessary to seek approval from the local environment to develop their EI; in this situation, the influence of the regional social legitimacy tends to be insignificant.

The family, then, acts as a fundamental institution that promotes the business spirit by providing resources, social capital, and the promotion of positive attitudes (Campopiano et al. 2016, Liguori et al. 2018). Likewise, the available literature indicates that the presence of entrepreneurs within the family impacts remarkably on the EI of the individuals (Campopiano et al. 2016, Haddad 2017, Echeverri-Sánchez et al. 2018, Escolar-Llamazares et al. 2019).

Generally, Meoli et al. (2020) conclude that the immediate context, that is, the influence of relevant people in the lives of the individuals is related with the creation of new ventures. More

specifically, Wang et al. (2018) found that the economic rewards perceived by the parents have a positive relation with EI and that it is partially involved with business self-efficacy. For their part, Morales-Alonso et al. (2016) evidenced that entrepreneurial parents promote EI and the attitudes of entrepreneurs in their children. Similarly, Criaco et al. (2017) also found that parental support for their descendants drives IE, but – additionally – said support improves the perceived business convenience and viability, although reducing the desirability by the descendants.

Methodology

Empirical strategy

According to Da Motta Jafelice et al. (2012), the Fuzzy theory can be expressed through a fuzzy subset, A, from a universe, *X,* composed by students, x_i, with $i = 1, \dots, n,$ which have a vector of *j* attributes or characteristics so that $j = 1, \dots, n,$. Following Bedoya Ospina and Galvis Ciro (2015), that fuzzy subset, A, is defined in terms of a membership function, μ_A, which can take values in the interval [0,1]. Thus, A can be expressed as:

$$A = \{[\mu_A(x), x]/x \in X\} \quad (1)$$

Equation (1) indicates that x_i has 100% membership to the set if $\mu_A(x_{ij}) = 1$. In this case, it is confirmed that individual i has no privation from attribute j. On the contrary, if $\mu_A(x_{ij}) = 0$, it is stated that individual i is totally deprived from attribute j or has 0% degree of membership. Intermediate values must comply with $\mu_A(x_{ij}) \in (0,1)$; in this case, individual i is partially deprived from attribute j. Regarding EI, the fuzzy system leads each MBA student to have a propensity for entrepreneurship, which is located in a degree between [0, 1]. Based on the proposal by Cheli and Lemmi (1995), the membership function is expressed in equation (2):

(2)

$$\mu_A(x_{ij}) = \mu_A\left(x_j^{(k)}\right) = \begin{cases} 0 \; if \; x_{ij} = x_j^k; k = 1 \\ \mu_A\left(x_j^{(k-1)}\right) + \frac{F(x_j^k) - F\left(x_j^{(k-1)}\right)}{1 - F(x_j^k)} \; if \; x_{ij} = x_j^k; k > 1 \\ 1 \; if \; x_{ij} = x_j^k; k = K \end{cases}$$

Where $k = 1, \dots, K$, refers to each dimension of attribute j and – in turn – represents the risk of privation in each of the categories of variable j; with the aforementioned, in the EI analysis, K denotes the best situation with respect to the attribute. By following Cheli and Lemmi (1995), $F(x_j)$ represents the accumulated distribution of attribute j classified according to k.

In turn, according to Gómez et al. (2015), the assignment of the weight of each variable is defined in equation 3:

$$W_j = ln\left[\frac{1}{\frac{1}{n}\sum_{i=1}^{n}\mu_A(x_{ij})}\right] \quad (3)$$

Where $\sum_{i=1}^{n}\mu_A(x_{ij})$ denotes the fuzzy proportion of students with EI in reference with attribute j. Finally, for the MBA students, given the weights, W_j, of each variable j, the MIEI is given in equation 4, where T indicates the total of dimensions included in the index:

$$MIEI_i = \frac{\sum_{j=1}^{T}\mu_A(x_{ij})w_j}{\sum_{j=1}^{T}w_j} * 100 \quad (4)$$

To obtain a higher level of generality in calculating the MIEI, the following exposes a simulation for eight individuals from the consideration of four attributes related with EI. In particular, the attributes and their respective categorization are shown in Table 1.

Table 1

Definition of attributes and categories

	Attribute	1	2	3	4
1	**Entrepreneurial Intention**	No, never	Yes, vaguely	Yes, seriously	I already have a business
2	**Work experience**	>30 years	21-30 years	<10 years	10-20 years
3	**Doing Business**	Low	Medium	High	
4	**Tax burden**	High	Medium	Low	

Source: *elaborated by the authors*

According with the simulation exercise, students revealing higher EI are represented in those who already have a business, have work experience between 10 and 20 years, live in a city with high ease of doing business, and where the tax burden is low. In this case, according to Table 2, student number 6 gathers the ideal characteristics and because of this, the MIEI value is 100.

Data

The database used to run the estimations is a cross-sectional type and it was constructed from primary information and complemented with competitiveness indicators from the Private Competitiveness Council of Colombia. Thus, the construction of the MIEI analyzed students from attendance to programs of the Master's in Business Administration in Colombia; from a total of 54 Master's programs located in 15 cities in the country in 2016, information was obtained from students in 36 programs distributed in 14 cities. The information was collected during the first semester of 2016.

Particularly, data on competiveness, institutions, and fiscal burden from Table 3 are drawn from the Departmental Competitiveness Index (DCI) elaborated by Colombia's Private Competitiveness Council (PCC). It describes the dimensions and variables included in the

MIEI. However, the microeconomic variables of the individual are taken from the instrument previously validated by Tarapuez Chamorro (2015).

Table 2

MIEI simulation

	Attribute				Membership				Weights				MIEI
ID	1	2	3	4	$\mu_A(1)$	$\mu_A(2)$	$\mu_A(3)$	$\mu_A(4)$	$W(1)$	$W(2)$	$W(3)$	$W(4)$	$MIEI_i$
1	2	3	2	1	0.416	0.538	0.4	0	0.693	0.619	0.51	0.60	34.02
2	2	3	1	2	0.416	0.538	0	0.454	0.693	0.619	0.51	0.60	36.95
3	1	2	3	1	0	0.153	1	0	0.693	0.619	0.51	0.60	24.94
4	3	4	1	2	0.75	1	0	0.454	0.693	0.619	0.51	0.60	58.22
5	4	1	2	3	1	0	0.4	1	0.693	0.619	0.51	0.60	61.89
6	4	4	3	3	1	1	1	1	0.693	0.619	0.51	0.60	100
7	2	3	3	3	0.416	0.538	1	1	0.693	0.619	0.51	0.60	71.59
8	1	3	3	2	0	0.538	1	0.454	0.693	0.619	0.51	0.60	46.09

Source: *elaborated by the authors, based on Gómez et al. (2015)*

Table 3

MIEI Dimensions and variables

Dimension	Variable	Source
Entrepreneurial Intention	Entrepreneurial Intention	Tarapuez Chamorro (2015)
Socio-demographic conditions	Work experience	Tarapuez Chamorro (2015)
	Marital status	Tarapuez Chamorro (2015)
Family aspects	Father's formation	Tarapuez Chamorro (2015)
	Mother's formation	Tarapuez Chamorro (2015)
	Father's occupation	Tarapuez Chamorro (2015)
	Mother's occupation	Tarapuez Chamorro (2015)
Institutional or environmental conditions	Ease of doing business	PCC*
	Tax burden	PCC*
	Size of internal market	PCC*
	Unemployment rate	DANE**
	Number of tax payments per year	PCC*
Socioeconomic conditions	Economic strata (social class)	Tarapuez Chamorro (2015)

** Private Competitiveness Council of Colombia*
*** National Administrative Department on Statistics of Colombia*
Source: *elaborated by the authors*

Results

Given the weight of the dimensions included in the MIEI calculation, those related with family aspects and institutional or environmental conditions reflect higher importance in the index. In this respect, the literature on EI supports these estimations; in particular, a statistically significant relationship has been documented between the influence of the family and EI

(Nesse and Bhatta 2017, Tarapuez-Chamorro et al. 2018, Tarapuez et al. 2018b). Likewise, regarding the second dimension in relevance, Kallas (2019) presents empirical evidence on the influence of the environment on business initiatives.

In turn, in the analysis by variable, the tax burden, the unemployment rate, and aspects related with the father's and mother's occupation report the major weighing in the estimations. According to the methodology of fuzzy indicators, this fact implies that, in relation with these variables, a higher density of students are in a situation of privation of the attribute; that is, in general, MBA students are undertaking their graduate studies in cities with a high tax burden, as well as an important density of individuals are in cities with unemployment rates above the national median. In consideration, 45% of the students reside in cities with unemployment rates above 9.21% (median of the 14 cities analyzed).

By virtue of the results of the MIEI and according to that illustrated in Table 4, it is inferred that MBA students in Colombia have – on average – relatively moderate MIEI, with a median of 58.36 from a total of 100 possible points. In the analysis of the behavior of the index, it is interesting to note that in the range of the data, the maximum value estimated is 89.16. The standard deviation denotes a low dispersion of the analyzed dataset. In this logic, Fig. 1 presents a normalized distribution, which evidences a significant number of students with medium levels in the MIEI; in contrast, few observations are noticed in the tails of the distribution.

Table 4

MIEI descriptive statistics

Variable	Observations	Median	Standard deviation	Minimum	Maximum
MIEI	477	58.36	12.61	23.81	89.16

Source: *elaborated by the authors*

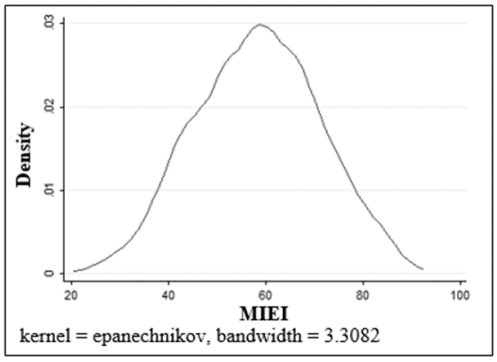

Fig. 1 – **MIEI distribution**
Source: elaborated by the authors

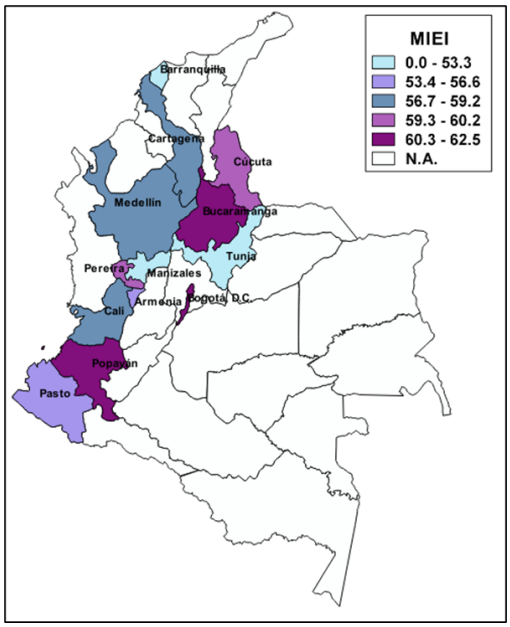

Fig. 2 – **MIEI by cities**
Source: elaborated by the authors

In addition, the MIEI calculation is intervened by institutional arrangements specific to the environment or the city. Particularly, this is due to the characteristics of the labor market or to its structure and size. With this in mind, the MIEI decomposition among the 14 cities analyzed permits evidencing, from an exploratory analysis, spatial heterogeneity in the index (Fig. 2), with Bogotá, D.C., Popayán, and Bucaramanga being the cities with the highest median rates of EI, unlike Tunja, which lags behind in the indicator.

The research results are consistent with the Global Entrepreneurship Monitor Colombia (2019) study in which the capital city has a rate of enterprise activity (REA) higher than that of the country. Added to this, Bogotá, D.C., is the zone with the country's highest GDP per capita and, in this regard, it may be inferred that entrepreneurship in this city is of higher quality than in the rest of Colombia. For Popayán (Cauca), the EI index is explained by the fiscal structure that contemplates the number of tax payments per year compared with the rest of the studied cities.

The effect of taxes on EI has the appropriate result from the empirical evidence, given that a high tax structure indicates a reduced enterprise initiative. Entrepreneurs face national taxes that excise the utilities of companies, which – for our case – reach 33%, with possibilities of lowering according to the dynamics of the tributary reform. In case of not invoicing due to not generating income from the operation, the presumptive income tax is applied, which rises to 3.5% of the legally constituted assets. Furthermore, and according to the company's city of operation, the local Industry, Commerce, and Tourism tax must be paid, which can be in the range from 5 to 10 per thousand of the total sales. Once the business is formally registered, the costs associated with the tax scheme are incorporated onto the general structure of costs, with which the entrepreneur is obligated to increase the level of income to compensate the expected benefit. That is a critical situation during a consolidation phase of the business initiative. Regions with a higher tax burden will have lower indices of business initiative. In contrast, the city of Tunja (Boyacá) occupies the last place in Colombia in reference to the ease of creating businesses, a situation that explains its lowest MIEI.

Moreover, the results show a small difference in the MIEI of men and women, that is, male MBA students may have a greater probability for entrepreneurship than the females. Various investigations related with the theme also found positive differences toward the males (Azanza Martínez De Luco and Campos Granados 2014, Bergmann et al. 2018, Lechner et al. 2018, Thornton and Klyver 2019). The cause for this situation may lie in the difference of individual characteristics and in the specific peculiarities of each country that favor the development of male ventures, particularly (Afandi and Kermani 2015, Ilman et al. 2020). This situation can be explained by the presence of implicit barriers to EI development in the female population (Miranda et al. 2017), which is why women might show a lower propensity for business creation (Muñoz-Fernández et al. 2016, Van Dijk 2020) within a context whose peculiarities can be based on the paternalist structure prevalent in some societies (Tarapuez-Chamorro et al. 2018). According to the results of this study, men have a higher index by six points than women.

In this sense, it is fitting to mention that gender differences constitute the most-frequent research theme in the study of EI. On the matter, the initial findings are preserved about men having higher EI than women (Liñán and Fayolle 2015), although explicative/descriptive approaches or conventional quantitative methods have been adopted, which limit comprehending gender specificities and the complexity of women's entrepreneurial barriers (Wu et al. 2019).

Additionally, age (Fig. 3) constitutes a poorly explored area in entrepreneurial research; however, pioneering studies about its relation with EI were conducted in the 1980s; these

indicate that the said variable is an important factor to determine the propensity of individuals to starting a company (Brockhaus 1982). Currently, the findings are not conclusive, given that distinct results are found about EI throughout the vital cycle. On the one hand, some works evidence a direct relationship between age and EI (Tarapuez et al. 2018a), while others estimate an inverse relationship (Tsai et al. 2016; Bohlmann et al. 2017). On the other hand, Halvorsen and Morrow-Howell (2017) show that older adults have a higher rate of self-employment than younger adults. In similar findings, Thorgren et al. (2016) report that the effect of age on starting a business, indicates an inverted U relationship. In this line, Minola et al. (2016) evidence that some values that can influence EI increase during adulthood, show a maximum during middle adult age, and diminish notably during late adulthood.

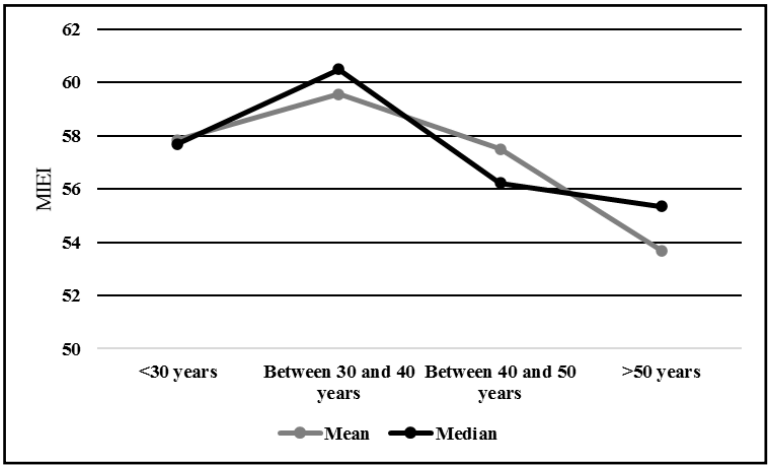

Fig. 3 – **MIEI by age range**
Source: elaborated by the authors

Within this context, a higher MIEI value is observed for ages between 30 and 40 years; a decreasing trend is noted as of 40 years of age and on. On the discussion of the results, Tsai et al. (2016), Bohlmann et al. (2017), and Gielnik et al. (2018), among others, show that age is related negatively with the enterprise activity. Contrary ideas are documented in Halvorsen and Morrow-Howell (2017), who evidence that older adults have higher rates of self-employment than their younger counterparts; this logic is also reported by Tarapuez et al. (2018a). In addition, the minimum difference between the mean and the median reflects symmetry in the data, which is evident in Fig. 3 and it corroborates the normalized distribution from Fig. 1.

By area of studies, the faculties of engineering and health sciences occupy the first places in relation to MIEI (Fig. 4). Economic sciences and agricultural sciences were in the lowest places of EI during the analysis period. Similar results are documented by Azanza Martínez De Luco and Campos Granados (2014), who found greater EI in the faculties of engineering and law in a case applied for Universidad de Deusto in Spain. Likewise, recent international evidence was found in the work by Krauss-Delorme et al. (2018), who found no statistically significant evidence in EI among the students from health sciences and the rest of the faculties, for the Uruguayan case.

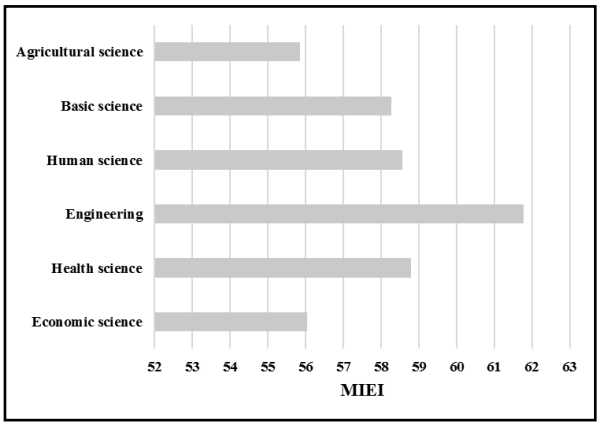

Fig. 4 – **MIEI by study area**
Source: *elaborated by the authors*

Discussion

The empirical evidence exposed in this paper in relation to heterogeneity in EI in Colombian students has been documented in various related studies. Thus, Adamson and Varela (2016), using a model with panel data, document the regional differences in EI for 52 countries. Gumbau Albert (2017) documents regional heterogeneity in EI among Spanish regions, attributing to it the disparities in economic growth. Similar findings are presented by Shacheendran and Mathew (2017), who – in a case applied for Hindu regions – conclude that upon the same institutions, the EI process does not emerge uniformly.

Some works conclude that individuals from certain university careers have superior EI. For Azanza Martínez De Luco and Campos Granados (2014), people who study engineering and law have higher EI levels, while for Van Dijk (2020), individuals studying business, economics, and law have greater EI. For Birdthistle (2006), entrepreneurs emerge more from areas of engineering, sciences, and other technical disciplines than from studies in commerce and business. Ruiz Navarro et al. (2008) conclude that students from the area of economy and enterprise show more EI. In spite of these findings, other studies, like that by Ramos et al. (2020), do not provide satisfactory results to permit confirming the influence of professional formation on the individuals' entrepreneurial plans.

With other results, Stuetzer et al. (2018) – from an approach based on causal relations – capture clusters of metropolitan areas around EI and the dynamics of the labor market; thus, evidencing the spatial groupings of regions with better employment indices and a higher EI. In this line of findings, Espinoza et al. (2019) suggest, for the Chilean case, that regions with higher levels of business culture tend to have a greater employment growth. For Fleck et al. (2020), the statistical analyses reveal sound correlations among various business concepts and national cultural indices in an intra-regional study for 400 universities distributed in 70 countries.

The document introduces and validates a methodology supported by the fuzzy logic sets as strategy to measure EI. Thus, the indicator proposed is flexible in considering variables from different levels that impact upon entrepreneurial decisions. Thereby, in light of the findings, the

research results will guide public policy makers whose objective is entrepreneurship stimulus with regional focus. Thus, the design of public policies to promote the entrepreneur spirit implies the recognition of cultural, economic, and family contexts; moreover, strategies must be based on comprehensive, permanent, and articulated policies.
Furthermore, although the research results are robust in relation with other indices used in the literature to measure entrepreneurial capacity, the number of observations used constitutes a sensitive point of the document, although it was possible to cover an important number of cities in Colombia. Consequently, new research should emerge under the optics of fuzzy sets, incorporating different analysis units and annexing a higher number of variables that capture the institutional and economic performance of the regions to document intra-regional heterogeneity in terms of entrepreneurial capacity.

Conclusions

As a result of the information presented, it is feasible to state that EI studies in Colombia require more precise and sensitive indicators that account for the conditions of the environment beyond the differences in the individuals' endowments. With this gap in the literature, this document analyzes EI through a multidimensional fuzzy indicator applied to MBA students in Colombia, comparing the results by cities, gender, age, and study area.

From the obtained results, additional elements are identified to understand the nature of EI in Colombia. It is emphasized that – on average – EI is moderate, while no big gender differences are observed. To continue, the MIEI is higher for students between 30 and 40 years of age and whose undergraduate academic formation corresponds to the area of engineering, which agrees with the expectations with respect to these variables. The second key element is how multidimensionality in evaluating MIEI permits identifying EI matrices among cities. In that sense, the most significant variable in the institutional context is the tax burden; this is based on a more robust assessment of the environment's influence on the students' business initiatives. With this in mind, it is concluded that contextual factors can discourage individuals with high levels of EI.

Third, the results also highlight the existence of a cycle in which MBA students between 30 and 40 years of age show a higher EI. The MIEI seems to increase from 20 to 40 years of age to then diminish. By extrapolating these findings, the prior results imply that, on average, more adult individuals reveal lower probabilities of developing EI. The explanation for these findings may be related with the phenomenon that upon entering the job market at an early age, students have low knowledge and business skills; thus, as age accumulates, entrepreneurial plans increase, reaching a peak at middle adult age.

In addition, it is preponderant to highlight that, in the analysis by study area, the highest MIEI is obtained in the area of engineering. The aforementioned permits conjecturing that soon we may foresee the creation of new technologically based enterprises, necessary to promote economic convergence and employment. Finally, although the results of the fuzzy logic-based methodology is robust in the sense that it includes factors that control fixed effects specific to each city, future research should include new institutional arrangements that modify incentives to undertake entrepreneurial activity. Furthermore, it is pertinent to extrapolate the methodology to different population segments to guarantee the validity of the estimations.

References

ADAMSON M., VARELA F. (2016), *Revisitando a Schumpeter y al emprendedor: Consideraciones para Costa Rica*, Universidad de Costa Rica, San José, C.R.

AFANDI E., KERMANI M. (2015), *Bridging the Gender Gap in Entrepreneurship: An*

Empirical Analysis, Journal of Developmental Entrepreneurship 20 (2), 1550008.

AHMED T., CHANDRAN V. G. R., KLOBAS J. E. (2017), *Demographic differences in learner response to entrepreneurial education programmes in Pakistan*, Educational Studies 43 (4), 464-483.

AZANZA MARTÍNEZ DE LUCO G., CAMPOS GRANADOS J. A. (2014), *La intención emprendedora en estudiantes universitarios: el caso de la Universidad de Deusto*, Boletín de Estudios Económicos 69 (211), 151-172.

BARBA-SÁNCHEZ V., ATIENZA-SAHUQUILLO C. (2017), *Entrepreneurial intention among engineering students: The role of entrepreneurship education*, European Research on Management and Business Economics 24 (1), 53-61.

BAUM J. R., FRESE M., BARON R. A., KATZ J. A. (2007), *Entrepreneurship as an Area of Psychology Study: An Introduction*, in: Baum J. R., Frese M., Baron R. A. (eds.), The Psychology of Entrepreneurship, Psychology Press, New York, pp. 1-18.

BEDOYA OSPINA J. G., GALVIS CIRO J. C. (2015), *Una aplicación de la teoría fuzzy al análisis de la pobreza en Antioquia*, Ensayos de Economía 25 (47), 127-150.

BERGMANN H., GEISSLER M., HUNDT C., GRAVE B. (2018), *The climate for entrepreneurship at higher education institutions*, Research Policy 47 (4), 700-716.

BIRD B. (1988), *Implementing entrepreneurial ideas: the case for intention*, The Academy of Management Review 13 (3), 442-453.

BIRD B., JELINEK M. (1989), *The Operation of Entrepreneurial Intentions*, Entrepreneurship Theory and Practice 13 (2), 21-30.

BIRDTHISTLE N. (2006), *Profiling the entrepreneur: an examination of entrepreneurs in the mid-west region of Ireland*, Journal of Economics and Organisation of Enterprise 7 (678), 74-83.

BOHLMANN C., RAUCH A., ZACHER H. (2017), *A lifespan perspective on entrepreneurship: Perceived opportunities and skills explain the negative association between age and entrepreneurial activity*, Frontiers in Psychology 8, 2015.

BROCKHAUS R. (1982), *The Psychology of Entrepreneurship*, in: Kent C. A., Sexton D. L., Vesper K. H. (eds.), Encyclopedia of Entrepreneurship, Prentice-Hall, Englewood Cliffs, NJ.

CAMPOPIANO G., MINOLA T., SAINAGHI R. (2016), *Students climbing the entrepreneurial ladder: Family social capital and environment-related motives in hospitality and tourism*, International Journal of Contemporary Hospitality Management 28 (6), 1115-1136.

CHELI B., LEMMI A. (1995), *A "totally" fuzzy and relative approach to the multidimensional analysis of poverty*, Economic Notes 24 (1), 115-134.

CHENG C.-F., CHANG M.-L., LI C.-S. (2013), *Configural paths to successful product innovation*, Journal of Business Research 66 (12), 2561-2573.

COVIN J. G., EGGERS F., KRAUS S., CHENG C.-F., CHANG M.-L. (2016), *Marketing-related resources and radical innovativeness in family and non-family firms: A configurational approach*, Journal of Business Research 69 (12), 5620-5627.

CRIACO G., SIEGER P., WENNBERG K., CHIRICO F., MINOLA T. (2017), *Parents' performance in entrepreneurship as a "double-edged sword" for the intergenerational transmission of entrepreneurship,* Small Business Economics 49, 841-864.

DA MOTTA JAFELICE R. S., CARVALHO DE BARROS L., BASSANEZI R. C. (2012), *Teoria dos Conjuntos Fuzzy com Aplicações*, Sociedade Brasileira de Matemática Aplicada e Computacional, São Carlos, SP.

DEHGHANPOUR FARASHAH A. (2015), *The effects of demographic, cognitive and institutional factors on development of entrepreneurial intention: Toward a socio-cognitive model of entrepreneurial career*, Journal of International Entrepreneurship 13, 452-476.

DOS SANTOS SOUZA R., SILVEIRA A. (2018), *Intención emprendedora en contexto universitario brasileño*, Revista Gestão Universitária na América Latina – GUAL 11 (2), 297-318.

ECHEVERRI-SÁNCHEZ L., VALENCIA-ARIAS A., BENJUMEA-ARIAS M., BARRERA-DEL TORO A. (2018), *Factores que inciden en la intención emprendedora del estudiantado*

universitario: Un análisis cualitativo, Revista Electrónica Educare 22 (2), 1-19.

ESCOLAR-LLAMAZARES M. C., LUIS-RICO I., DE LA TORRE-CRUZ T., HERRERO Á., JIMÉNEZ A., PALMERO-CÁMARA C., JIMÉNEZ-EGUIZÁBAL A. (2019), *The Socio-educational, Psychological and Family-Related Antecedents of Entrepreneurial Intentions among Spanish Youth*, Sustainability 11 (5), 1252.

ESPINOZA C., MARDONES C., SÁEZ K., CATALÁN P. (2019), *Entrepreneurship and regional dynamics: the case of Chile*, Entrepreneurship & Regional Development 31 (9-10), 755 -767.

FATOKI O. (2014), *The entrepreneurial intention of undergraduate students in South Africa: the influences of entrepreneurship education and previous work experience*, Mediterranean Journal of Social Sciences 5 (7), 294-299.

FERREIRA J. J. M., FERNANDES C. I., KRAUS S. (2019), *Entrepreneurship research: mapping intellectual structures and research trends*, Review of Managerial Science 13, 181-205.

FLECK E., KAKOURIS A., WINKEL D. (2020), *Cultural traits of entrepreneurship education: a cross-national study*, Journal of Entrepreneurship in Emerging Economies, ahead-of-print.

GIELNIK M. M., ZACHER H., WANG M. (2018), *Age in the entrepreneurial process: The role of future time perspective and prior entrepreneurial experience*, Journal of Applied Psychology 103 (10), 1067-1085.

GLOBAL ENTREPRENEURSHIP MONITOR COLOMBIA (2019), *GEM COLOMBIA: Estudio de la actividad empresarial en 2017*, Editorial Universidad del Norte, Barranquilla.

GÓMEZ M. S., GALVIS-APONTE L. A., ROYUELA V. (2015), *Calidad de vida laboral en Colombia: un índice multidimensional difuso*, Banco de la República. Centro de Estudios Económicos Regionales, Cartagena.

GUMBAU ALBERT M. (2017), *Entrepreneurship, innovation and regional performance: application for the Spanish regions*, Entrepreneurship & Regional Development 29 (3-4), 271-291.

HADDAD G. J. (2017), *Understanding women entrepreneurial motivations: Does age matter?*, in: Bassil Sleilati E. (ed.), Lebanon: Social, Political and Economic Issues, Nova, New York, pp. 65-84.

HALVORSEN C. J., MORROW-HOWELL N. (2017), *A conceptual framework on self-employment in later life: toward a research agenda*, Work, Aging and Retirement 3 (4), 313-324.

HOSSAIN U., AL ASHEQ A., ARIFUZZAMAN S. M. (2019), *Entrepreneurial intention of Bangladeshi students: impact of individual and contextual factors*, Problems and Perspectives in Management 17 (4), 493-503.

ILMAN A. H., ANANDA N. A., POHAN A. S. (2020), *Entrepreneurial Education and University Environment toward Students Entrepreneurial Intention*, International Journal of Innovative Science and Research Technology 5 (1), 1271-1278.

KALLAS E. (2019), *Environment-Readiness Entrepreneurship Intention Model: The Case of Estonians and the Russian-Speaking Minority in Estonia*, SAGE Open 9 (1), 1-15.

KANTIS H., FEDERICO J., MENÉNDEZ C., IBARRA S. (2017), *Ciudades para emprender: Estudio diagnóstico de las condiciones de partida del programa – Línea de base cohorte 2016*, e Ministerio de Producción de la Nación, Buenos Aires.

KIBLER E., KAUTONEN T., FINK M. (2014), *Regional social legitimacy of entrepreneurship: Implications for entrepreneurial intention and start-up behaviour*, Regional Studies 48 (6), 995-1015.

KILONZO P. M., NYAMBEGERA S. M. (2014), *Determinants of entrepreneurial intention among university business students in Kenya: Lessons from Kenyatta University*, International Journal of Entrepreneurship and Small Business 22 (2), 231-250.

KRAUS S., MENSCHING H., CALABRÒ A., CHENG-FENG C., FILSER M. (2016), *Family firm internationalization: A configurational approach*, Journal of Business Research 69

(11), 5473-5478.

KRAUS S., RIBEIRO-SORIANO D., SCHÜSSLER M. (2018), *Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research – the rise of a method*, International Entrepreneurship and Management Journal 14, 15-33.

KRAUSS-DELORME C., BONOMO-ODIZZIO A., VOLFOVICZ-LEÓN R. (2018), *Modelo predictivo de la intención emprendedora universitaria en Latinoamérica*, Journal of Technology Management & Innovation 13 (4), 84-93.

LECHNER C. M., SORTHEIX F. M., OBSCHONKA M., SALMELA-ARO K. (2018), *What drives future business leaders? How work values and gender shape young adults' entrepreneurial and leadership aspirations*, Journal of Vocational Behavior 107, 57-70.

LIGUORI E. W., BENDICKSON J. S., MCDOWELL W. C. (2018), *Revisiting entrepreneurial intentions: a social cognitive career theory approach*, International Entrepreneurship and Management Journal 14, 67-78.

LIÑÁN F., FAYOLLE A. (2015), *A systematic literature review on entrepreneurial intentions: citation, thematic analyses, and research agenda*, International Entrepreneurship and Management Journal 11, 907-933.

LOI M. (2018), *Dynamics of Entrepreneurship Education: How Human and Social Capital Interact with Learning*, in: Zakaria N., Kaushal L. A. (eds.), Global Entrepreneurship and New Venture Creation in the Sharing Economy, IGI Global, Hershey, PA, pp. 37-53.

LÓPEZ-DELGADO P., IGLESIAS-SÁNCHEZ P. P., JAMBRINO-MALDONADO C. (2019), *Gender and university degree: a new analysis of entrepreneurial intention*, Education + Training 61 (7-8), 797-814.

MAES J., LEROY H., SELS L. (2014), *Gender differences in entrepreneurial intentions: A TPB multi-group analysis at factor and indicator level*, European Management Journal 32 (5), 784-794.

MARTÍNEZ A. (2016), *Factores socio-culturales asociados al emprendedor: evidencia empírica para América Latina*, Revista Venezolana de Gerencia 21 (74), 312-330.

MAYHEW M. J., SIMONOFF J. S., BAUMOL W. J., SELZNICK B. S., VASSALLO S. J. (2016), *Cultivating Innovative Entrepreneurs for the Twenty-First Century: A Study of U.S. and German Students*, The Journal of Higher Education 87 (3), 420-455.

MEOLI A., FINI R., SOBRERO M., WIKLUND J. (2020), *How entrepreneurial intentions influence entrepreneurial career choices: The moderating influence of social context*, Journal of Business Venturing 35 (3), 105982.

MINOLA T., CRIACO G., OBSCHONKA M. (2016), *Age, culture, and self-employment motivation*, Small Business Economics 46, 187-213.

MIRANDA F. J., CHAMORRO-MERA A., RUBIO S. (2017), *Academic entrepreneurship in Spanish universities: An analysis of the determinants of entrepreneurial intention*, European Research on Management and Business Economics 23 (2), 113-122.

MORALES-ALONSO G., PABLO-LERCHUNDI I., VARGAS-PEREZ A. M. (2016), *An Empirical Study on the Antecedents of Knowledge Intensive Entrepreneurship*, International Journal of Innovation and Technology Management 13 (5), 1640011.

MUÑOZ-FERNÁNDEZ G. A., RODRÍGUEZ-GUTIÉRREZ P., SANTOS-ROLDÁN L. (2016), *Entrepreneurship in higher education in tourism, gender issue?*, Electronic Journal of Research in Educational Psychology 14 (38), 45-66.

NESSE J. G., BHATTA B. P. (2017), *The influence of local entrepreneurial environment and role models in motivating youths to create a new enterprise*, International Journal of Entrepreneurship and Economic Issues 1 (1), 53-70.

NOWIŃSKI W., YACINE HADDOUD M., LANČARIČ D., EGEROVÁ D., CZEGLÉDI C. (2019), *The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries*, Studies in Higher Education 44 (2), 361-379.

OOSTERBEEK H., VAN PRAAG M., IJSSELSTEIN A. (2010), *The impact of entrepreneurship education on entrepreneurship skills and motivation*, European Economic Review 54 (3), 442-454.

PALMER C., FASBENDER U., KRAUS S., BIRKNER S., KAILER N. (2019), *A chip off the old block? The role of dominance and parental entrepreneurship for entrepreneurial intention*, Review of Managerial Science, 1-21.

PENG Z., LU G., KANG H. (2012), *Entrepreneurial Intentions and Its Influencing Factors: A Survey of the University Students in Xi'an China*, Scientific Research 3 (8B), 95-100.

POPESCU C. C., MAXIM A., DIACONU (MAXIM) L. (2014), *Determinants of entrepreneurial intentions among Romanian students*, Transformations in Business & Economics 13 (3C), 370-388.

RAMOS D., MADEIRA M. J., DUARTE F. A. P. (2020), *Entrepreneurship Education and Entrepreneurial Intention: The Case of Portugal*, Economy of Region 16 (1), 157-170.

RUIZ NAVARRO J., ROJAS VÁZQUEZ A., SUÁREZ LLORENS A. (2008), *Actitudes de los estudiantes universitarios de Andalucía ante la creación de empresas*, Universidad de Cádiz, Cádiz.

SHACHEENDRAN V., MATHEW T. (2017), *Regional differences in growth of entrepreneurship among SC/STs IN MSMEs: a study with reference to northern and southern regions of Kerala*, International Journal of Research in Commerce & Management 8 (5), 35-38.

SOLIMANO A. (2014), *Entrepreneurship, the Middle Class, and Social Mobility: An Overview of Literature*, in: Lora E., Castellani F. (eds.), Entrepreneurship in Latin America: A Step up the Social Ladder?, The Inter-American Development Bank, The World Bank, Washington, D.C., pp. 17-50.

STUETZER M., AUDRETSCH D. B., OBSCHONKA M., GOSLING S. D., RENTFROW P. J., POTTER J. (2018), *Entrepreneurship culture, knowledge spillovers and the growth of regions*, Regional Studies 52 (5), 608-618.

TARAPUEZ E., GARCÍA M. D., CASTELLANO N. (2018a), *Aspectos socioeconómicos e intención emprendedora en estudiantes universitarios del Quindío (Colombia)*, Innovar 28 (67), 123-135.

TARAPUEZ E., GUZMÁN DÍAZ B. E., PARRA HERNÁNDEZ R. (2018b), *Intención emprendedora y aspectos sociodemográficos en Colombia*, Espacios 39 (28), 19-36.

TARAPUEZ CHAMORRO E. (2015), *Factores que influyen en las intenciones de creación de empresas de los estudiantes universitarios del Departamento del Quindío (Colombia)*, Universidad Nacional de Córdoba, Retrieved from: www.rdu.unc.edu.ar.

TARAPUEZ-CHAMORRO E., ARISTIZÁBAL-TAMAYO J. M., MONARD-BLANDÓN C. (2018), *Aspectos sociodemográficos y familiares e intención empresarial en estudiantes de Maestría en Administración en Colombia*, Estudios Gerenciales 34 (149), 422-434.

THOMPSON E. R. (2009), *Individual entrepreneurial intent: Construct clarification and development of an internationally reliable metric*, Entrepreneurship Theory and Practice 33 (3), 669-694.

THORGREN S., SIRÉN C., NORDSTRÖM C., WINCENT J. (2016), *Hybrid entrepreneurs' second-step choice: The nonlinear relationship between age and intention to enter full-time entrepreneurship*, Journal of Business Venturing Insights 5, 14-18.

THORNTON P. H., KLYVER K. (2019), *Who is More Likely to Walk the Talk? The Symbolic Management of Entrepreneurial Intentions by Gender and Work Status*, Innovation 21 (1), 102-127.

TSAI K.-H., CHANG H.-C., PENG C.-Y. (2016), *Refining the linkage between perceived capability and entrepreneurial intention: roles of perceived opportunity, fear of failure, and gender*, International Entrepreneurship and Management Journal 12, 1127-1145.

VAN DIJK C. (2020), *Entrepreneurial Intention of University Students in The Netherlands*, Wageningen University & Research, Retrieved from: www.library.wur.nl.

WANG D., WANG L., CHEN L. (2018), *Unlocking the influence of family business exposure on entrepreneurial intentions*, International Entrepreneurship and Management Journal 14, 951-974.

WU J., LI Y., ZHANG D. (2019), *Identifying women's entrepreneurial barriers and empowering female entrepreneurship worldwide: a fuzzy-set QCA approach*, International

Entrepreneurship and Management Journal 15, 905-928.

YI G. (2018), *Impact of internship quality on entrepreneurial intentions among graduating engineering students of research universities in China*, International Entrepreneurship and Management Journal 14, 1071-1087.

Initial submission: 07.04.2020
Revised submission: 21.10.2020
Final acceptance: 01.12.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 77 - 91
https://doi.org/10.37043/JURA.2021.13.1.5

DISCOURSES ON SPAIN'S HOUSING CRISIS: A TYPOLOGICAL PROPOSAL

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Abstract: The recent economic crisis has had serious consequences on the housing system, making it necessary to rethink housing in our society from a multidisciplinary and multi-methodological point of view. Purely quantitative studies are insufficient to analyse the structural and social aspects of housing: it is necessary to define concepts, extent approaches and to understand that residential studies should also resort to qualitative analyses to achieve a further understanding of the situation. This paper is based on the analysis of 35 focused interviews about Spain's housing crisis. The results show that there are only two discursive types: a critical discourse and a conservative discourse. In the dialectical confrontation of both views, some key factors for understanding the housing market are left out, which may lead to a new crisis scenario.

Key Words: *housing, crisis, discourses, Spain.*

Introduction

Currently, in Spain, housing and the construction of urban centres absorb the capitalist surplus and they stabilize the economy. The former, our core research interest, has become a global phenomenon that has depended on new institutions and financial devices to organize the necessary credit to sustain it, such as the securitization and serialization of local mortgages. These have dispersed the risk and created a fund of easily accessible surplus savings for the housing demand, they lowered the global interest rates and they generated wealth for the intermediaries: "The lack of control over risk assessment led to a double crisis: the subprime and the value of real estate assets" (Harvey 2008: 30). According to Nel-Lo (2019), this situation has produced a global change in social relations, reducing them to commercial criteria, with private profit being the element that regulates the production and distribution of goods and services. Furthermore, it has generated a new urban system in which large cities become nodes of the international system with more suburbanization, metropolitanisation, impoverishment and greater social, economic and spatial inequalities (Sassen 1999, Castells 2004, Sassen 2004).

This neoliberalisation and financialisation of housing provision were promoted by international financial institutions like the World Bank (Van Waeyenberge 2018). The main aim was to encourage home ownership and financial asset-based welfare. However, this political economy did not regulate high-risk lending, fuelling both an unsustainable housing boom and a toxic asset bubble of housing-backed financial instruments such as subprime mortgage (Fields and Hodkinson 2018). According to Aalbers (2015), this lack of regulation is one of the main causes behind the global financial crisis (GFC) and its global repercussions after the collapse of Lehman Brothers in 2007 (Etxezarreta Etxarrri et al. 2012) and the crisis of the subprime mortgage in the United States that cut off the easy, abundant and cheap bank financing to the real estate sector (Burriel de Orueta 2016). As Martin (2011: 587) states, this shift from a "locally originate, locally-hold" model of mortgage provision to a securitized "locally originate, globally distribute" model meant that when local subprime mortgage markets collapsed in the United States, the repercussions were felt globally.

From an international perspective, housing crises are a consistent element of a capitalist political economy based on private property, market exchange, and the accumulation of capital (Fields and Hodkinson 2018). The GFC casts serious doubt on the ability of national authorities to manage the protection of investors and households (Martin 2011). According to Aalbers (2015), capitalism has become increasingly dependent on the growth of finance. The post-2007 housing crisis has been the first global housing crisis in the sense that never before have so many countries faced a housing crisis at the same time.

Therefore, the role of housing in global capitalist economies and societies needs to be closely considered (Ferrari 2015). Housing has different dimensions that are fundamental for our society. On the one hand, it has a social dimension considered as a basic need and a right. On the other hand, it has an economic dimension, as it is also an investment asset. As such, it is vulnerable not only to changes in the financial market, but also to the models of social regulation and to the crises of capital accumulation. In this sense, housing is regarded as part of the families' assets and as an investment opportunity (Leal Maldonado and Cortés Alcalá 1995), capitalizing family incomes by its transmission through inheritance and by its economic value.

Housing system and crisis in Spain

The depth of the last Spanish housing crisis is reflected in the collapse of the construction field and in the number of housing and land stocks (Burriel de Orueta 2016), but with some peculiarities. The Spanish expansive cycle was longer than the rest of the European Union because Spain had an economic model based on the real estate sector (García Montalvo 2009, Naredo 2010, López and Rodriguez 2013). According to Módenes and López-Colás (2014), this can be related with a Spanish familialist welfare state (Esping-Andersen 1990) characterised by a high commodification of goods and basic services such as housing; a relatively high social stratification; and by a system of provision in which the family has a dominant position. In relation to housing policies, Bermejo Latre (2010) indicates that since 1939 the legal and financial state policies have focused on building a proprietary middle class, strongly stimulating house ownership (Gaja I Díaz 2013). In this sense, housing has not evolved like other basic rights, such as education and health, but it has been instituted as an inheritable asset that should be transmitted within the family, creating a system that is based on the property as an axis key. This logic has generated a model that depends more on economic issues than on the population's needs. Thus, there has been a deterioration in the housing culture "where the concept of housing as a commodity prevails to the detriment of its consideration as a need and use value" (Cortés Alcalá 1997: 57).

Spain's joining the EEC in 1986 and the adoption of the euro as a common currency in 1999 had an effect on the creation of the 2007 real estate crisis (Rodríguez López 2013). In 1998, the end of the previous crisis was confirmed, mainly driven by the introduction of the euro. There were improvements in financing and the home purchase effort for families fell from 48% in 1995 to 27% in 1999. It is estimated that, between 1999 and 2002, an overvaluation of house prices of around 28% occurred. It is considered that 13% was an effect of the adoption of the euro and 15% is attributed to the expectations of revaluation of housing prices (García Montalvo 2003).

In the context of these commercial and socio-cultural values, in the first years of the 21st century, a remarkably intense economic growth took place in Spain. It was dependant on speculation in the house building sector between 2005 and 2008, when more than four and a half million new houses were built (Fig. 1). In this sense, the creation of the real estate bubble was the consequence of financing conditions, monetary policy and policies to promote home purchases. The conditions of interest rates, repayment terms and the loan/value ratio pushed prices beyond justification (García Montalvo 2006, García Montalvo 2007). The relationship between the construction and banking industries created a speculative structure between 1997

and 2007 (Naredo 2010), which has led to the most expansive cycle in the last forty years (Miguel 2009, Naredo and Montiel Márquez 2011), resulting, in turn, in an increase in prices, forcing households to get into debt (Miguel 2009, Naredo 2010, Naredo and Montiel Márquez 2011). Moreover, it imposed a vision of the city as a business (Somoza Medina 2016).

Between 2008 and 2013, the GFC caused the end of the housing boom in Spain and it generated a troubling crisis of public debt and liquidity in the banking system (Fernández Durán 2006). This fact has had several consequences. It caused an extraordinary rise in unemployment, which reached its peak (26.1% of the active population) in 2013, gradually decreasing since then. The evolution of unemployment in large cities and medium-sized cities for the period 2006-2012 is an example of the impact caused by the bursting of the financial and real estate bubble and by the neoliberal policies of fiscal austerity applied in the European Union (Méndez Gutiérrez Del Valle 2013). This had a direct impact on local labour markets, population income and quality of life. This is linked to the indebtedness of families, companies, financial entities and public administrations, reducing consumption and increasing the risk of late payment (Romero 2010), which meant an increase in the evictions in Spain, rising from 26,000 to almost 94,000 cases between 2007 and 2010 (Etxezarreta Etxarrri et al. 2012).

Another consequence of the crisis is the shortage of affordable housing for existing wages. No fiscal measures were adopted to curb the real estate development or to regulate prices in order to adapt them to the purchasing power of the population (Pareja Eastway 2010, Rodríguez López 2010). This situation and the level of housing construction generated a huge number of empty and secondary residences while new construction reached its unprecedented peak in Spain. There was an increase in the secondary residence purchase, mainly in tourist areas, related with the foreign investment in housing. According to the census data of the INE (Spanish acronym for the National Institute of Statistics), the proportion of secondary residences, in relation to those registered as main ones in the mid-20th century, was of 3.01 secondary residences for every 100 main dwellings, while at the beginning of the 21st century this number was 22.78. Moreover, in 1991, there were 5,399,254 empty houses, increasing to 7,124,935 in 2011, which represents a growth of more than 30% of this type of housing. This model generated inequalities and numerous problems for the local people. Some research highlights the existence of greater implications of the crisis for certain population groups that are more vulnerable, such as the young people, the elderly and the migrants (Melo Vieira and Miret Gamundi 2010). The problems of access to housing are incompatible with the existence of these levels of secondary and empty housing, which can be described as a violation of the right to housing.

In the light of the abovementioned information and data, a better understanding of the housing reality is necessary in order to improve access to housing for the population. To this end, the main objective of this paper is to expand and to deepen the understanding of the Spanish housing crisis through a qualitative methodology. Through the analysis of the existing discourses, the limitation of ideas and the lack of alternatives to solve Spanish residential problems become obvious, which explains the perpetuation of a housing system in continuous crisis. In order to understand this scenario, the difficult position of housing in the welfare state due to its peculiar nature has to be born in mind. So as to have a clearer view of the situation, the knowledge of those who work directly with the residential system must be taken into account. According to Allen (2009) and his idea of a housing study freed from the limits of science, the scientific researcher bears no more truth than the knowledge and experience provided by the involved people. For these reasons, this paper focuses on identifying the different stakeholder's discourses on the Spain's housing crisis and their limitations. The results have been based on focused interviews with experts and actors involved in the residential system (Calo 2015). The main issues arising in the interviews are reflections on how to deal with the complexity of a housing system in crisis, viewed through the Spanish context and from various professional perspectives.

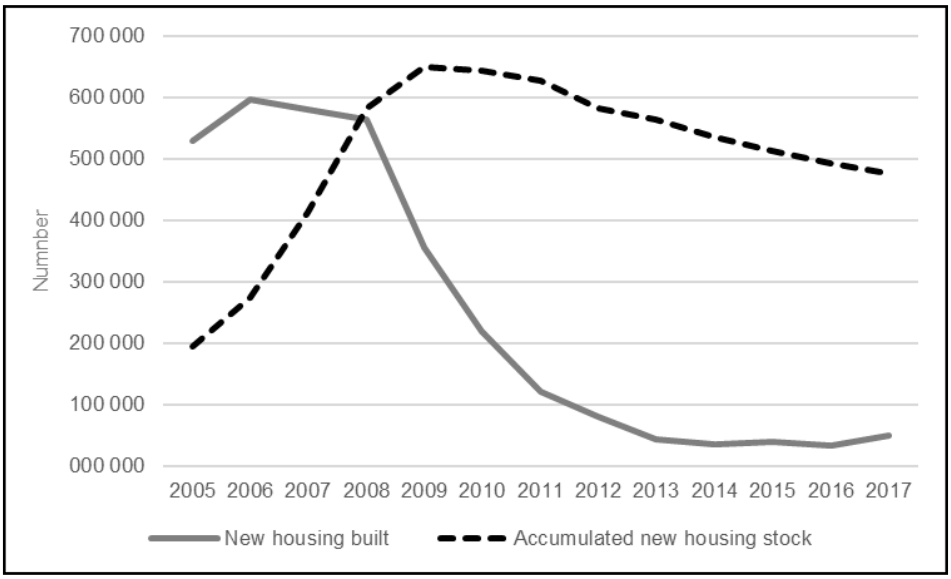

Fig. 1 – **Comparison between the number of new housing built and its stock (2005-2017)**
Source: *Ministry of Development (2018)*

The first part of this paper offers the framework on which lies the importance of qualitative studies as a methodology for the residential study. Subsequently, the results are organised in three sections: causes of the crisis, consequences of the crisis and possible solutions. Two types of discourses have been identified within these themes: on the one hand, the conservative discourse; on the other hand, the critical one. Through this analysis, the relevance of the discourses is questioned as they replicate ideas that seem out-dated regarding the solution of the housing problem. In order to demonstrate the absence of innovation, the issues that were not raised in the interviews are present in the article. Finally, several conclusions are offered in the form of a summary of the analysed information related to those new policies that seem to make the same mistakes of the past and to those measures that appear to be insufficient.

Methodology

The importance of discourse analysis in housing studies

Fairclough (1992) suggests that discourse analysis as a research method is needed to understand social reality. From the theoretical point of view, this method recognises the social structures that are related to social action. Methodologically, discourses are an evidence of the roots of structures, relationships and social phenomena. In addition, there are historical reasons which explain why texts are barometers of social processes, movements, and diversity. Moreover, the textual analysis can provide good indicators of social change. Finally, and from a political perspective, texts are evidence of control and domination. In addition, and according to Kemeny (2002), they also show how social problems are built through the state power discourses.

The way of defining social problems is constructed and it causes an empirical reality that limits the concepts that social scientists use to understand it (Kemeny 1992). Through the meta-narrative, social problems are raised and defined, and particular policies are developed to solve them (Clapham 2009). The housing policy is therefore the result of the competition of interest

groups seeking to impose their definition of what a housing problem means and how it should be solved. In order to understand this process, housing studies must be an important part of the qualitative methodology, independently of the quantitative work that can be done, and they must pay attention to the social and cultural context (Kemeny and Lowe 1998).

This kind of studies is quite common in the international literature (Gurstein and Small 2005, Ferrari 2015, Rollwagen 2015, Yust et al. 2015, Manzi and Richardson 2017, Troy et al. 2017, Carder et al. 2018). However, the discourse analysis focused on the study of actors related to Spain's housing crisis is scarce (Fuster et al. 2019). During the crisis, research in Spain was based on quantitative methods (García Montalvo 2007, Leal Maldonado and Domínguez Pérez 2009, Miguel 2009, Naredo and Montiel Márquez 2011, Rodríguez López 2013, López and Rodríguez 2013). For this reason, it is necessary to develop studies like this one that will help to improve the knowledge of the residential situation in Spain through the different existing discourses.

There are different types of discourse analysis; in this paper, the thematic analysis was employed. This type of technique seeks to clarify the corpus of research texts by segmenting them into homogeneous issues until we achieve a topic tree. It aims to identify structures that respond to a specific research question by getting a more in-depth analysis of reality (Braun and Clarke 2006). This method allows us to answer questions on which are the people's concerns on a particular topic. An example of this type of research is the study of Manzi and Richardson (2017) who investigated how the notions of professionalism in housing are being changed by the reduction of the welfare state.

This article offers the thematic analysis of 35 interviews conducted between 2013 and 2015. Stories from different professional profiles have been collected (Fig. 2). These categories have been chosen according to the categorization carried out by Calo (2015), and based on Cortés Alcalá (1995), who presents different dimensions of the housing system: social, economic and political. Professional categories are representative of each dimension:

- Social: researchers dedicated to the housing analysis from different disciplines by taking social variables such as demographic and social needs into account, and activists focused on the defence of the housing right.
- Economic: people related to different parts of the housing market – real estate agents, developers/builders who own companies dedicated to the housing construction and bank workers.
- Political: politicians and technicians related to the housing sector.

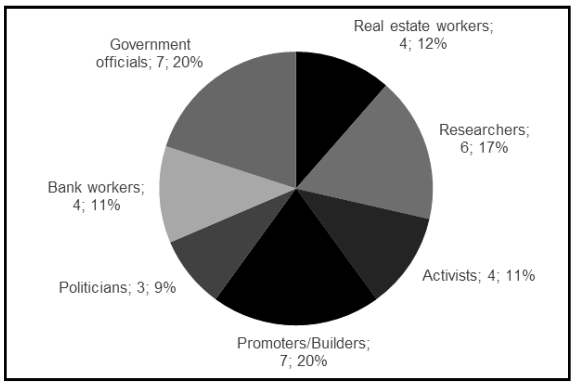

Fig. 2 – **Occupation sector of the interviewees**
Source: *authors' own work*

Results

In order to better understand the Spanish housing crisis, this paper has analysed the discursive structures that are related to the research question. According to the classification of Braun and Clarke (2006) on the possibilities of the thematic analysis, we have opted for a deductive-theoretical analysis to check the underlying conceptualisation and ideas that have finally been organised within the framework of two ideal types of discourse: the conservative and the critical ones. In doing so, we confront the theoretical background that deals with the causes, consequences and the possible solutions to the housing problems in Spain (Table 1) with the collected data obtained in our interviews.

Table 1

Thematic Discourses on Spain's Housing Crises

	Causes of the housing crisis	***Consequences of the crisis***	***Solutions***
CONSERVATIVE DISCOURSE	Lack of control of the mortgage system	Decrease in housing prices	More comprehensive regulation of the mortgage market
	Cyclical crises of capitalism	Drastic reduction in housing sales	Increase of people's purchasing power
	Construction as an economic monoculture	Huge unemployment growth	Diversifying Spain's productivity model
CRITICAL DISCOURSE	Mercantilist vision of housing	Rise in evictions	Enforcement of the right to housing
	Residential system dependent on bank financing	Structural problems of access to housing	Promoting rental housing
	Lack of social and effective housing policies	Bankruptcy of the right to housing	Direct and personal subsidies

Source: *authors' own work*

Causes of the Housing Crisis

Many authors prefer to avoid the concept of crisis, choosing instead to refer to a long stage of overbuilding or to a real estate bubble (López and Rodríguez 2013). Construction is one of the driving forces for the economy due to its contribution to economic growth, to the GDP and to employment. Moreover, it is an influential sector (García Montalvo 2003, Martín García and González Arias 2011) that absorbs the capital surplus and it stabilizes the economy (Harvey 2008, Lois González et al. 2016). Most of the existing studies indicate that this bubble was a consequence of monetary policy and financial conditions (García Montalvo 2003). As mentioned earlier, while it is true that this situation originated in the United States as a result of the subprime mortgage crisis, the Spanish case has its own features, such as the largest accumulation of housing stock in comparison with other countries, due to an excess of credit with very low interest rates given to builders (García Montalvo 2009, Miguel 2009, Naredo 2010, López and Rodríguez 2013).

Below are outlined the main causes of the crisis as mentioned in the interviews, categorised

within the conservative and critical types of discourse. According to the conservative discourse, the lack of control of the mortgage and banking system is cited as the main cause of the crisis because of the easy, abundant and cheap bank financing (Burriel de Orueta 2016). This led to an excess of liquidity, which caused unlimited housing investment and resulted in overpricing. When asked about the causes, the most common answers referred to:

> *The excessive liquidity the bank had meant that they lent around 100% and 110% (...). The bank allowed me to take the total amount that I had been given the first day* (Promoter/Builder).

> *The increase in financing for supply and demand with the lowering of interest rates and lengthening of payments* (Researcher).

As for the functioning of the economic system in Spain, the construction sector as monoculture, that is, as an almost exclusive driving force for the economy, is mentioned as a cause of the crisis. As it was already stated, Spain had developed an economic model based on the real estate sector (García Montalvo 2009, Naredo 2010, López and Rodriguez 2013). It should be pointed out that, in the early 20th century, the housing market in Spain represented 4% or 5% of GDP and 10% of employment. This implies a short-term financing and planning vision of the economic model for urban growth.

> *We have an economic model only based on brick* (Government Official).

According to the critical discourse, the causes of the crisis are defined in other terms. The exclusive promotion of housing as an economic commodity and investment is profusely mentioned. This is related to the idea of encouraging home ownership through financial instruments (Fields and Hodkinson 2018) and reducing social needs to commercial criteria (Nel -Lo 2019).

> *The system is based on housing as the capital asset* (Researcher).

> *Housing stopped being a social fixed asset. It is now a business; it went from having a social function to a mercantile function with which to speculate* (Activist).

The fact that the economic dimension of housing is promoted implies that the housing system depends solely on banking and on its mortgage or credit financing systems, which is also understood as one of the causes of the crisis by which the social dimension of housing is relegated to the background.

> *The system is designed by commercial operators (...), by the developers and banks with the support of technicians, and so no new projects are accepted in order to defend the social function of housing* (Politician).

Lack of effective policies to defend the social dimension of housing is added to the almost exclusive control of the economic housing sector that depends on banking, so that there were no regulations to stop the crisis (Aalbers 2015).

> *The policies have been limited to promoting construction. I would not call that a housing policy but a policy of promoting the economic activity of construction* (Real state worker).

Consequences of the crisis

People's problematic access to housing and the serious economic situation that many households suffer is presented in the housing analysis as one of the most pressing consequences of the housing crisis (García Montalvo 2003). This situation is mainly due to the unequal distribution of wealth created by the rise of unemployment, the lack of market control, a broad lack of liquidity and an increase in debt (García Montalvo 2003, Trilla 2010, Méndez Gutiérrez Del Valle 2013). With this crisis, the households' purchasing power has been severely reduced, which has consequences on the payment of mortgages and on vital processes such as residential independence. With regard to the market level, the most serious consequence is the mismatch between supply and demand, which has led to the decline in prices and housing sales (Rodríguez López 2013), although there is a recovery taking place.
The conservative discourse is focused on the consequences that the housing market suffers, such as the decrease of prices and the reduction of sales. When asked about the consequences of the crisis, some answers pointed to:

> *The price differences are huge, which shows how inflated they were before, and how much money promoters earned* (Government Official).
>
> *The lowering of prices and the bankruptcy of the banks because of the crisis* (Promoter/Builder).
>
> *The reduction in sales, the increase of the rents because of uncertainty and the loss of confidence in the system* (Promoter/Builder).

From a conservative point of view, it is also said that unemployment is one of the most important consequences of the crisis with devastating effects on the system and on population, which is stated by some authors such as Méndez Gutiérrez Del Valle (2013).

> *There were many unemployed people and a lot of construction-related companies closed* (Bank worker).
>
> *People lost their wages and their jobs, people became unemployed* (Real estate worker).

The critical discourse is focused on the consequences for the population in relation to housing, e.g. evictions and the effects they have on the affected families. In this sense, it is important to point out that, in 2007, the number of foreclosures was fewer than 26,000, while, in 2010, they were around 94,000 (Etxezarreta Etxarrri et al. 2012), and, in 2013, this number increased to more than 215,000 (Parreño Castellano et al. 2019).

> *People are evicted without any consideration; they are losing their house* (Promoter/Builder).
>
> *People are losing their homes, and not because they have miscalculated, they have been fired (...). People are becoming homeless and in debt* (Government Official).

Apart from the eviction-related problems mentioned above, another serious consequence is the widespread difficulty for the population to access housing, mainly for some population groups such as the young, the elder and the migrants (Melo Vieira and Miret Gamundi 2010).

> *The access problems generated by intermediaries have increased, more and*

> *more people are struggling to find a home* (Researcher).
>
> *Access is the problem. We have to help those who cannot access housing because the situation is unsustainable for many people* (Government Official).

Everything described above implies a weakening in the right to housing. The fact that the economic dimension of housing has prevailed has meant that the social dimension of housing as a fundamental basic need and right has been pushed into the background.

> *The right to property is more important than the right to housing. We must redesign the model, re-naturalize and implement the right to housing* (Researcher).

Solutions

Etxezarreta Etxarrri et al. (2012) indicate that institutional responses in Europe can be divided in relation to the type of welfare state. The social democrats such as Denmark and Sweden, and the corporatists such as the Netherlands and France opted for a higher degree of protection for income and rental housing. In liberal states like the United Kingdom and the southern states, Spain and Italy, this level of protection was not developed, causing a greater problem of late payments and evictions. In Spain, it is worth highlighting the reform enforced to speed up evictions in the rental housing market and the application of a Code of Good Practices for financial entities, with the aim of protecting mortgage debtors without resources (Etxezarreta Etxarrri et al. 2012).

According to some authors, the solutions to housing problems must imply introducing innovations in housing policies that are adapted to new circumstances through rent and rehabilitation (Trilla 2010). Other policies have an impact on soil legislation and the re-conceptualisation of the home dweller's relationship with housing (García Montalvo 2003) or protected housing, which must be considered mainly for rent. Measures are also proposed to ensure an affordable housing price (Clavell Nadal 2007), a greater efficiency through more personal aid and a change in fiscal policies (Fernández Carbajal 2004).
It should be noted that when interviewees were asked for solutions during the in-depth interviews, the response was homogeneous: the difficulty of the issue requires individual actions rather than definitive solutions.

From a conservative perspective, the need to take different actions to correct the market arises. On the one hand, a better regulation of the credit system will in turn increase people's purchasing power. A more realistic system that facilitates credit with greater control of conditions, and one that improves the user's liquidity so that they can access the purchase of a house, must be put in place.

> *Credit must be facilitated, but with more control and limits, so that the same thing does not happen again* (Real estate worker).
>
> *We must seek stable control measures of the credit system to promote the market with less institutional interference and to achieve a consequent private initiative* (Researcher).

On the other hand, it seems necessary to change the model of economic growth to enhance employment. This shift would also avoid the "monoculture" of the construction industry and improve other more productive nature industrial sectors. In this way, the labour market would not be so dependent on construction, and, in times of crisis in this sector, the effects on

unemployment will be lower.

> *It is necessary to obtain a change of the economic model, to obtain a model of development less based on construction and on tourism* (Activist).

The critical discourse is more oriented towards measures referring to the need for a change in housing policies. The first one is the real implementation of the right to housing with global and stable policies. The right to housing is recognised, but not enforced on many levels. For this reason, it was essential for many of those interviewed to make a change in the policies that directly take this right into account and to defend the social function of housing as a basic need, through issues such as the promotion of rent as well as protected rents, and the rehabilitation of real estate. Housing protection should be more oriented to renting than to owning in order to generate a stock of public housing that actually fulfils its social function at any given time.

> *It is necessary to obtain a professionalised rental market with public, semi-public or private entities, and to expand measures for restoration* (Promoter/Builder).

> *There is a very good solution for Spain's housing stock: that banks themselves generate a rental real estate agency, and not simply wanting to give them [houses] away as they are giving them away. Public rental and private rental companies must be encouraged through legislation* (Government Official).

Direct and personal subsidies, together with more fiscal control measures, are also understood as necessary. In order to make the use of subsidies effective, they should come from a personal and direct nature. Thus, the tax system must be modified.

> *Subsidies must be given to those who need them and for the length of time they need them, together with a list of home seekers* (Politician).

Discussion

Nothing new on the horizon

At this point, it can be noticed that what has been said in the interviews is not especially new. The conservative discourse focuses on the economic dimension of the housing while the critical one seems to favour the social dimension. Nevertheless, the ideas expressed do not offer innovations. Because of this, it has been decided to describe a number of topics that have not been discussed before or which have not been dealt with in the interviews. However, they have been raised in the research on housing and they seem to be of vital importance for the future of the housing system. A possible explanation for these absences is that these issues have not become part of the social policy (Jacobs and Manzi 1996) yet, which indicates that the interviewees' discourse is aligned with the institutional discourses.

In the outlined discourses, there is no mention of sustainability. On the one hand, the environmental and unsustainable consequences, such as the uncontrolled soil occupation, together with wide material, energy and land exploitation, have not been mentioned (Naredo and Montiel Márquez 2011). On the other hand, when the interviews were conducted (2013-2015), the construction of new housing was on the rise again. In this sense, the so-called "de-growth" thesis postulates a reduction in the activity of some traditional industrial sectors where construction is found (Taibo 2009). The aim is not to stop building, but to reorient the construction activity towards more sustainable processes such as building rehabilitation, urban regeneration and the updating of homes to convert them into "lower energy consumption and lower greenhouse gas emission spaces" (Cuchí and Sweatman 2011: 6). By renewing and taking advantage of the space built with eco-efficient and environmentally friendly criteria, we

could reduce the consumption of soil, materials, energy, waste and pollution emissions.

Another issue that has not been raised in the interviews is the alternative to housing access, which has been gaining prominence in the last few years (López-Bahut 2016, Sala 2018). Spain's housing policy has generated a system that is based almost exclusively on the freehold property. Rental and subsidised housing are the other existing alternatives (Calo 2014). There seems to be nothing beyond the pairing owning/renting or freehold/subsidised. However, other processes that do not seem to be significant have appeared or increased during the crisis.

For example, the collective processes for housing access are increasing. Bottom-up participatory processes caused by the change in the social context are being generated and they embrace several different aspects, from politics to city life. The inhabitants stop playing a passive role and take an active part on different levels of participation in the architectural definition, design, construction or management (Morales Soler et al. 2012). Within these collective models, co-housing, which seeks a cooperative assembly and democratic process, stands out together with squatting, based on the occupation of empty houses (López-Bahut 2016).

After the last crisis, which has been temporarily placed between 2008 and 2013 in this paper, and after its global effects on housing, it is necessary to rethink its role in society through multidisciplinary and multi-methodological studies. In housing studies, qualitative methods should be taken into account to broaden concepts and to better understand the social context in which they are built (Kemeny 1992, Kemeny and Lowe 1998). In order to fulfil this premise, this paper was based on the discourse analysis to understand the crisis from a more rational point of view (Kemeny 2002), to recognize power relations (Jacobs and Manzi 1996) and to broaden the approach of the analysis of Spain's housing crisis.

Conclusions

The thematic discourse analysis of 35 focused interviews has been employed, and the text corpus has been divided into three homogeneous thematic blocks: the main causes of the housing crisis, the main consequences of it and possible solutions. Moreover, different discursive structures have been identified and categorised into two ideal types of discourses: the conservative discourse and the critical one.

The conservative discourse has a more traditional approach, closer to the dominant discourse. It assumes that crises are cyclical, finding the biggest problem of the last one in the rupture of the existing system, the mismatch between supply and demand and the lowering of prices. Although it is understood that the responsibility for this situation is shared, the financial sector is more specifically singled out because it does not control financing. The solutions to this situation must involve improving the regulation of the credit system that facilitates lending, increasing the purchasing power, changing the model of economic growth and improving employment to facilitate the access to housing.

The critical discourse offers a deeper analysis of the current housing system. It describes the functioning of the housing system as dependent on the economic one, which implies imbalance and instability in the people's housing access. In this sense, public administrations should monitor the functioning of the system and protect the right to housing. From the point of view of this discourse, the main problem of housing access is the absence of policies that are socially effective, and the dependence on banking. The solution to this situation is that it must inevitably go through a structural change, focusing on the real implementation of the right to housing with global and stable policies, and on socially oriented subsidies and fiscal measures with greater control.

A number of topics not mentioned in the interviews have also been introduced: sustainability, "de-growth" and collective housing access processes. These absences during the interviews may have been due to the fact that these issues are still not part of the collective imaginary, as they are currently side topics, although they are likely to become part of the most critical social discourse in the future. The latest Spanish Housing Act (2018-2021) is a representation of this lack of innovation. The measures in this program maintain historical action lines: help for mortgages and help for rents and rehabilitation. On the one hand, subsidies for evicted people represent a necessary measure to correct the effects of the crisis. On the other hand, measures aimed at sustainability and energy efficiency seem to be the most innovative orientation.

To sum up, in 2015 – when the fieldwork was completed – the existing discourse on Spain's housing crisis could be categorised into two types. On the one hand, the conservative discourse that is focused on the economic dimension of housing as merchandise aims to correct the system and it seems to be more coordinated with the institutional discourse. On the other hand, the more critical discourse is oriented towards the social dimension of housing as a fundamental right, and it is likely to advance. Notwithstanding, what is clear is that a change should be achieved in order to correct what seems a cyclical crisis. The ideas in the common imaginary are mainly those that the stakeholder elaborates. Even the critical discourses have no new proposals. The "de-growth", collective housing access processes or bottom-up processes, such as co-housing, are increasing, but not enough to change the existing discourses during Spain's housing crisis.

References

AALBERS M. B. (2015), *The Great Moderation, the Great Excess and the global housing crisis,* International Journal of Housing Policy 15 (1), 43-60.

ALLEN C. (2009), *The fallacy of "housing studies": philosophical problems of knowledge and understanding in housing research*, Housing, Theory and Society 26 (1), 53-79.

BERMEJO LATRE J. L. (2010), *La evolución de las políticas de vivienda en la España del siglo XX,* in: López Ramón F. (ed.), Construyendo el Derecho a la Vivienda, Marcial Pons, Madrid, pp. 165-196.

BRAUN V., CLARKE V. (2006), *Using thematic analysis in psychology*, Qualitative Research in Psychology 3 (2), 77-101.

BURRIEL DE ORUETA E. L. (2016), *Empty urbanism: the bursting of the Spanish housing bubble*, Urban Research & Practice 9 (2), 158-180.

CALO E. (2014), *Vivienda y territorio en España*, in: Lamela C., Cardesín Diaz J. M., García Docampo M. (eds.), Dinámicas territoriales en España: problemas y tendencias en la estructura y ordenación del territorio*,* Biblioteca Nueva, Madrid, pp. 171-200.

CALO E. (2015), *El sistema residencial en España: componentes, funcionamiento y necesidades de vivienda*, Universidade da Coruña, Retrieved from: www.ruc.udc.es.

CARDER P. C., KOHON J., LIMBURG A., BECKER E. (2018), *Waiting for housing assistance: characteristics and narrative accounts of low-income older persons*, Housing and Society 45 (2), 63-80.

CASTELLS M. (2004), *La cuestión urbana*, Siglo XXI, Madrid.

CLAPHAM D. (2009), *Introduction to the special issue – a theory of housing: problems and potential*, Housing, Theory and Society 26 (1), 1-9.

CLAVELL NADAL D. (2007), *Una política de vivienda innovadora: la experiencia de Cataluña,* ACE: Arquitectura, Ciudad y Entorno 2 (5), 497-506.

CORTÉS ALCALÁ L. (ed.) (1995), *Pensar la vivienda*, Talasa, Madrid.

CORTÉS ALCALÁ L. (1997), *Hablando sobre la exclusión residencial*, Cáritas, Madrid.

CUCHÍ A., SWEATMAN P. (2011), *Una visión-país para el sector de la edificación en España: hoja de ruta para un nuevo sector de la vivienda*, GBCE, Fundación Conama, Madrid.

ESPING-ANDERSEN G. (1990), *The three worlds of welfare capitalism*, Princeton University Press, New Jersey.

ETXEZARRETA ETXARRRI A., HOEKSTRA J., DOL K., CANO FUENTES G. (2012), *De la burbuja inmobiliaria a las ejecuciones hipotecarias*, Ciudad y Territorio. Estudios Territoriales (CyTET) 44 (174), 597-613.

FAIRCLOUGH N. (1992), *Discourse and text: linguistic and intertextual analysis within discourse analysis*, Discourse & Society 3 (2), 193-217.

FERNÁNDEZ CARBAJAL A. (2004), *Veinticinco años de política de vivienda en España (1976-2001): una visión panorámica*, Información Comercial Española 816, 145-161.

FERNÁNDEZ DURÁN R. (2006), *El Tsunami urbanizador español y mundial: Sobre sus causas y repercusiones devastadoras, y la necesidad de prepararse para el previsible estallido de la burbuja inmobiliaria*, Virus, Barcelona.

FERRARI E. (2015), *The social value of housing in straitened times: the view from England,* Housing Studies 30 (4), 514-534.

FIELDS D. J., HODKINSON S. N. (2018), *Housing Policy in Crisis: An international perspective,* Housing Policy Debate 28 (1), 1-5.

FUSTER N., ARUNDEL R., SUSINO J. (2019), *From a culture of homeownership to generation rent: housing discourses of young adults in Spain*, Journal of Youth Studies 22 (5), 585-603.

GAJA I DÍAZ F. (2013), *Tras el tsunami inmobiliario. Salir del atolladero*, in: Observatorio Metropolitano de Madrid (eds.), Paisajes devastados. Después del ciclo inmobiliario: impactos regionales y urbanos de la crisis, Traficantes de Sueños, Madrid, pp. 313-353.

GARCÍA MONTALVO J. (2003), *La vivienda en España: desgravación, burbujas y otras* historias, Perspectivas del Sistema Financiero 78, 1-43.

GARCÍA MONTALVO J. (2006), *Deconstruyendo la burbuja: expectativas de revalorización y precios de la vivienda en España*, Papeles de Economía Española 109, 44-75.

GARCÍA MONTALVO J. (2007), *Algunas consideraciones sobre el problema de la vivienda en España*, Papeles de Economía Española 113, 138-153.

GARCÍA MONTALVO J. (2009), *Financiación inmobiliaria, burbuja crediticia y crisis financiera: lecciones a partir de la recesión 2008-2009*, Papeles de Economía Española 122, 66-85.

GURSTEIN P., SMALL D. (2005), *From housing to home: reflexive management for those deemed hard to house*, Housing Studies 20 (5), 717-735.

HARVEY D. (2008), *The right to the city*, New Left Review 53, 23-40.

JACOBS K., MANZI T. (1996), *Discourse and policy change: the significance of language for housing research*, Housing Studies 11 (4), 543-560.

KEMENY J. (1992), *Housing and social theory*, Routledge, London and New York.

KEMENY J. (2002), *Society versus the state*, Housing, Theory and Society 19 (3-4), 185 -195.

KEMENY J., LOWE S. (1998), *Schools of comparative housing research: from convergence to divergence*, Housing Studies 13 (2), 161-176.

LEAL MALDONADO J., CORTÉS ALCALÁ L. (1995), *La Dimensión de la Ciudad*, CIS, Madrid.

LEAL MALDONADO J., DOMÍNGUEZ PÉREZ M. (2009), *Pasado y futuro del parque de viviendas de Madrid: despejando incertidumbres*, Urban 14, 80-91.

LOIS GONZÁLEZ R. L., PIÑEIRA MANTIÑAN M. J., VIVES MIRÓ S. (2016), *The urban bubble process in Spain: an interpretation from the theory of the circuits of capital*, Journal of Urban and Regional Analysis 8 (1), 5-20.

LÓPEZ-BAHUT E. (2016), *Alternativas en la vivienda colectiva desde la autogestión de la ciudadanía. Diferentes casos de estudio en España*, II Congreso Internacional de Habitaçao Colectiva Sustentável, 718-723.

LÓPEZ I., RODRÍGUEZ E. (2013), *Competitividad territorial y circuito secundario de*

acumulación. El paroxismo de un caso: el ciclo español de 1995-2007, Observatorio Metropolitano de Madrid (eds.), Paisajes devastados después del ciclo inmobiliario: impactos regionales y urbanos de la crisis, Traficantes de Sueños, Madrid, pp. 25-75.

MANZI T., RICHARDSON J. (2017), *Rethinking professional practice: the logic of competition and the crisis of identity in housing practice*, Housing Studies 32 (2), 209-224.

MARTIN R. (2011), *The local geographies of the financial crisis: from the housing bubble to economic recession and beyond*, Journal of Economic Geography 11 (4), 587-618.

MARTÍN GARCÍA R., GONZÁLEZ ARIAS J. (2011), *Análisis estratégico de la industria de la construcción en España*, Cuadernos de Gestión 11 (1), 141-161.

MELO VIEIRA J., MIRET GAMUNDI P. (2010), *Transición a la vida adulta en España: una comparación en el tiempo y en el territorio utilizando el análisis de entropía*, Revista Española de Investigaciones Sociológicas 131, 75-107.

MÉNDEZ GUTIÉRREZ DEL VALLE R. (2013), *Crisis económica, vulnerabilidad urbana y desempleo en España*, Ciudad y Territorio. Estudios Territoriales (CyTET) 45 (178), 649-667.

MIGUEL M. (2009), *La crisis inmobiliaria*, Economistas 27 (119), 256-264.

MÓDENES J. A., LÓPEZ-COLÁS J. (2014), *Cambio demográfico reciente y vivienda en España: ¿hacia un nuevo sistema residencial?*, Revista Española de Investigaciones Sociológicas 148, 103-134.

MORALES SOLER E., ALONSO MALLÉN R., MORENO CRUZ E. (2012), *La vivienda como proceso. Estrategias de flexibilidad*, Hábitat y Sociedad 4, 33-54.

NAREDO J. M. (2010), *El modelo inmobiliario español y sus consecuencias*, Boletín CF+S 44, 13-27.

NAREDO J. M., MONTIEL MÁRQUEZ A. (2011), *El modelo inmobiliario español y su culminación en el caso valenciano*, Licaria Antrazyt, Barcelona.

NEL-LO O. (2019), *Los retos de la ciudad contemporánea*, Posición 2, 1-10.

PAREJA EASTWAY M. (2010), *El régimen de tenencia de la vivienda en España*, in: Leal Maldonado J. (ed.), La política de vivienda en España, Pablo Iglesias, Madrid, pp. 129-166.

PARREÑO CASTELLANO J. M., DOMÍNGUEZ MUJICA J., ARMENGOL MARTÍN M. T., BOLDÚ HERNÁNDEZ J., PÉREZ GARCÍA T. (2019), *Real estate dispossession and evictions in Spain: a theoretical geographical approach*, Boletín de la Asociación de Geógrafos Españoles 80, 2602, 1-25.

RODRÍGUEZ LÓPEZ J. (2010), *La oferta de vivienda en España*, in: Leal Maldonado L. (ed.), La política de vivienda en España, Pablo Iglesias, Madrid, pp. 75-100.

RODRÍGUEZ LÓPEZ J. (2013), *La vivienda. De los ajustes al Banco Malo*, Economistas 31 (135), 227-237.

ROLLWAGEN H. (2015), *Constructing renters as a threat to neighbourhood safety*, Housing Studies 30 (1), 1-21.

ROMERO J. (2010), *Construcción residencial y gobierno del territorio en España. De la burbuja especulativa a la recesión. Causas y consecuencias*, Cuadernos Geográficos 47 (2), 17-46.

SALA E. (2018), *Crisis de la vivienda, movimientos sociales y empoderamiento: una revisión sistemática de la literatura*, Documents d´Anàlisi Geogràfica 64 (1), 99-126.

SASSEN S. (1999), *La ciudad global: Nueva York, Londres, Tokio*, Eudeba, Buenos Aires.

SASSEN S. (2004), *Los espectros de la globalización*, Fondo de Cultura Económica, Buenos Aires.

SOMOZA MEDINA X. (2016), *Governance, urban competitiveness and crisis in Spain*, Journal of Urban and Regional Analysis 8 (1), 47-60.

TAIBO C. (2009), *Decrecimiento, crisis, capitalismo*, Universidad del País Vasco, Bilbao.

TRILLA C. (2010), *Una reflexión sobre el modelo español de política de vivienda*, in: Leal Maldonado J. (ed.), La política de vivienda en España, Pablo Iglesias, Madrid, pp. 129-

166.

TROY L., EASTHOPE H., RANDOLPH B., PINNEGAR S. (2017), *'It depends what you mean by the term rights': strata termination and housing rights*, Housing Studies 32 (1), 1-16.

VAN WAEYENBERGE E. (2018), *Crisis? What crisis? A critical appraisal of World Bank housing policy in the wake of the global financial crisis*, Environment and Planning A: Economy and Space 50 (2), 288-309.

YUST B. L., URNESS M., MITCHELL D., WEBER W. G., LOOSEN A. (2015), *A qualitative assessment of experiences with selected green technologies in affordable multifamily housing*, Housing and Society 42 (3), 239-249.

Initial submission: 30.01.2020
Revised submission: 23.11.2020
Final acceptance: 21.12.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 93 - 111
https://doi.org/10.37043/JURA.2021.13.1.6

SPATIAL ANALYSIS OF CRIME OCCURRENCE IN VARIOUS REGIONS OF IRAN WITH AN EMPHASIS ON SAFETY

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Abstract: Safety is a basic issue in every social system and communities consider safety as one of their main priorities. One of the most important factors that put the safety of various communities at risk is the threats caused by crime occurrence. This paper is aimed to spatially analyze crime occurrence in various regions of Iran with an emphasis on safety. The research method is descriptive-analytical and a documentary and library data collection method is used. In this paper, the Similarity, COPRAS, mean rank method, and cluster analysis method are applied. The final results of the cluster analysis based on the mean rank method indicate a wide gap between the provinces of the country in terms of survey indicators, so that the final coefficient obtained for the provinces in the sixth cluster (the most unsafe group) is about 45 times of the final coefficient of the provinces in the first cluster (the safest group).

Key Words: *spatial analysis, crime, safety, Iran*

Introduction

Safety is a blessing because of which life exists and with the loss of which existence becomes dull; in its absence, life dies (Navidnia 2009). Safety practically covers all aspects of human life. Different aspects of safety, such as individual, national, social, aerial, road, food safety, etc., indicate the inclusiveness of safety in all aspects of individual life (Jahangiri and Mosavat 2013) and meeting many needs of the individual and society depends on safety, so that in the Maslow's hierarchy of needs, the sense of safety is put immediately after the satisfaction of basic needs. Therefore, safety is a basic issue in every social system and governments consider safety in the community as their first priority. One of the types of safety is social safety that is provided only with the recognition of behaviors that lead to increased or decreased safety in the "society". Social safety is a concept that is strongly tied with the fear of crime in social environments (Jafari et al. 2018). In two recent decades, the issue of urban safety and the necessity for reduced urban abnormalities have been the major concern for managers and planners, because safety is the basis and platform for economic, social, and environmental development and it is affected by these elements (Rahnemaei and Pourmousavi 2006). Increased safety in cities, in addition to apparent benefits such as strengthening the identity, vitality, efficiency, and beauty of space, has another advantage which is effective presence in the safe environment, where life, activity, investment, and business become more prosperous; as a result, we will observe further financial and economic growth. In contrast, unsafe spaces will repel people and investors (Hosseiniun 2007, Kalantari et al. 2010).

One of the most important threats to safety among the various classes of society is crime occurrence in that community. According to the available statistics and information, the trend of crimes is growing in most societies. This increasing trend from one location to another, depending on the type of crime, has differences from its own specific reasons and motifs. Crime causes numerous problems at community level. On the one hand, it causes insecurity, fear, panic, and disturbance of the citizens and, on the other hand, it endangers the health of cities and it forces the national judicial and law enforcement system to spend large funds on crime detection, prosecution, arrestment, and the custody of offenders, judicial proceedings,

and punishment (Zangi Abadi and Rahimi Nader 2010, Nasiri et al. 2015). In total, due to the nature of crime and its consequences and effects, crimes have various types and classes, including theft, drugs, against persons, against property, social harms, traffic violations, etc. (Saraee and Hosseini 2015). From long time ago, identifying the causes of crime and efforts to eliminate or reduce their effects has been known as the most important prevention and reduction strategies for social anomalies. Crime prevention is an important issue, with which people have been involved for centuries. Crime prevention is a necessity to reform the lives of people worldwide. If it is possible to prevent someone from committing crimes and to reduce the opportunity of violations from various local-spatial and social aspects, the community would pass the pathway of improvement much faster and the crime rate in the society will be effectively declined.

Evaluating the evidence shows that due to the large amount of security problems and challenges that have been widespread in the large cities of Iran, many studies have been carried out on crime, centers of crime, and its effective factors that are mainly specific to urban areas, but there is a large study gap in the area of crime and the occurrence of crimes at the national level. Given the system governing and the national planning system, which is a top-down planning system, and most of the services and facilities that have been unfairly distributed in a few central and large provinces of the country, the general knowledge and the national overview of the status of crimes and the determination of the status of each province of the country in terms of crime occurrence seem to be essential. Besides, for assigning the necessary funds and credits regarding the establishment of safety and the fight against crime at provincial level, it is necessary to determine the status of each province among the other provinces of the country in the fair assignment of governmental credits and facilities. Given the above points, this paper seeks to perform a spatial analysis of crime occurrence in all regions of Iran, so in accordance with the frequency of crime occurrence in each of the provinces, the most safe and unsafe provinces are specified. Finally, with regard to the characteristics and features of each province, planning is done to provide safety.

One of the most important, complex, and new concepts in the modern world and in many political, social, and economic topics, is the concept of safety. Safety is considered as one of the basic needs and necessities of the individual and society, the lack or disturbance of which is followed by worried and dangerous consequences and reflections, so that civilized humans need safety or peace of mind to live among the others and to achieve high levels of growth, and with the growth of social crimes and deviations, unsafety and deviations at the community level cause the biggest concerns. Hence, the social safety is more essential than many other issues that might be considered important for the community (Saroukhani and Hashemnejad 2011). A stable and safe society must be described by rules and regulations or a set of measures against the threats that endanger the individual or social health (Cozens 2002). Hence, providing the safety of various groups of society has been one of the most important objectives of state and security institutions and, with the design and development of numerous programs, they attempt to detect the threats and to determine the ways of dealing with them and also to consider safety as the priority in their policies (Haji et al. 2011).

Safety is the sense of comfort and the assurance of lack of offences to the life, property, and other rights of humans. This exclusive value is one of the necessities of individual and social life (Kamyar 2000). The most important psychological need is safety that is considered as the most important goal of life and the essence of mental health (Fromm 1981). The concept of safety refers to the defense of one's self, family, friends, and property (Carmona et al. 2003). The point that should be noted is that different people, given the diversity of the environment, have different visions of safety and so that the sense of security is varied with respect to the economic system, the health system, and the individual insecurity experiences. They are more concerned with the fear of the sense of unsafety than the real and objective layers of insecurity and crime occurrence (Lindström 2008). In other words, the role and importance of the sense

of safety among community members in the subjective dimension is next to the existence of safety in the objective dimension. Hence, some experts have noted that the sense of subjective safety is prior to the objective existence of safety (Saroukhani and Hashemnejad 2011). Therefore, promoting the sense of safety and, particularly, the subjective dimension of safety, is very important among the different groups of community (Rezaei Rad et al. 2007). Researchers believe that providing the necessary conditions to achieve a sense of safety is necessary for all citizens in all age and gender groups that should be considered by urban planners and officials (Tabrizi and Madanipour 2006). Generally, the sense of safety is a basic and important principle that individuals urgently need in order to demonstrate their abilities in the everyday life in urban spaces, place of residence, and workplace. Scholars have stated that the sense of safety is considerably important for the quality of life and public health of the residents of a community (Krevers and Milberg 2014). Hence, in order to improve and to increase the sense of safety among the individuals, it is necessary to provide certain facilities and necessities (Milberg et al. 2014). One of the most important measures to ensure security and the sense of safety for the citizens is crime reduction. Social anomalies and crimes that are committed by perpetrators and criminals in the urban environments are the main causes of unsafety in the living environments while preventing the safety of cities, and, as a result, disrupting the presence of people in public spaces and their social interactions. The people who are living in cities, whether they are living in their houses or they are in outdoors and public areas, are intentionally or unintentionally dealing with phenomena of crime occurrence and social anomalies, and the risk of crime occurrence is always threatening a citizen (Heshmati 2006). The lack of safety, the sense of danger, and the fear of crime reduce the use of public places and they increase the inefficiency of the urban environment. So, it can be said that the sense of safety and security is essential for the success of the urban design (Carmona et al. 2003).

It may be said that the first person to comment on the influence of the geographical environment on man was Hippocrates, the great physician of ancient Greece. He advised physicians to meditate more on climate, seasons, winds, weather, etc., and not to be unaware of the effect of these factors, and to use them to the best of their ability for the betterment of human beings (Kay Nia 1994). Crime hotspots have been in focus since the early nineteenth century, and at this time, due to the Industrial Revolution, a new phase of urbanism emerged, which led to an increase in the study of crime hotspots (Cozens 2008). But the main focus has been on the study of crime scene since the end of the twentieth century (Cook et al. 2013). In a series of surveys to determine how scattered is the delinquency of large American cities, Shaw and McKay (2014) found that delinquency usually peaks near downtown areas where rent is low and it decreases with distance from the city. Shaw and McKay (2014) work led to research into crime rates in Chicago and twenty other US cities over a period of more than 30 years. Studies based on scientific methods, principles and statistical methods about the geographical environment and crime were first conducted in the first half of the nineteenth century by Ketleh and Gary (Anselin 2000). Ketleh, the Belgian physicist and astronomer showed the correlation between the geographical environment and crime with the help of figures (Kay Nia 1994). Almost at the same time as Ketleh, Gary studied the geography of crime (Anselin 2000). In 1833, he studied the relationship between poverty, population density, and education and the types of crime in five regions of France (Shakouei 1985). He also concluded in relation to heat and cold and the geographical environment that crimes against people occur more frequently in the south and in the summer, and property crime occur more frequently in the north and in the cold (Kay Nia 1994). Another study by Maller (1937), in New York, found that there were several areas in the city where young people were delinquent. Studies also found that there is a close relationship between juvenile delinquency and factors such as population density and economic status (Maller 1937, Ludwig et al. 2001). Also, Huntington (1945) researched the role of geographical factors in the occurrence of crimes. In 1929 and 1942, the concept of urban ecology, founded at the Chicago School by Park, Burgess, and McKenzie, was used by Shaw and McKay (2014). Based on the city's ecological features, the researchers found that the highest crime rates occur in neighborhoods with low-cost rental housing (Shaw and McKay

2014). Crime follows the social physical pattern of the city. In other words, the existence of shortcomings in the organization of the police and the judiciary or in the devastated parts of the city provides favorable grounds for committing a crime (Glueck and Glueck 1950). In this regard, Wolfgang (1958) believed that almost all rape crimes take place between 8 pm and 2 am after midnight. It is important to note that, in the rate of urban violence, there has always been a relationship between the stratum of the society and the type of work, so that the highest rate of violence among the working-class youth is much higher than among the second-class social youth (Ahmadi and Mohammad-Taghi 2004). On the other hand, most crimes and violence are committed by people who have been employed in the worthless jobs in the society. The study of crime rates in relation to the social structure is another part of the geographical study of crime. Some of the results of these studies show that neighborhoods with more single people also have higher crime rates. Also, in neighborhoods where the neighbors have known each other for many years, the crime rate is low. On the contrary, the lack of communication between the neighbors increases the crime rate (Hirshfield 2005).

Achu and Suja Rose (2016) focused on the examination and analysis of the phenomenon of crime and its spatial changes using GIS for the city of Thiruvananthapuram. The analytic results indicated the presence of critical points within this city in- Kerala, India, for crimes such as murder, robbery, kidnapping, and theft (Achu and Suja Rose 2016). Yar and Nasir (2016) focused on the examination and GIS spatial and temporal analyses of crimes in the city of Mardan, Pakistan. The results of the temporal analysis showed that almost 50% of the reports of crimes occurred in the summer and 35% of the reports were given in winter. The results of the spatial analysis also indicated 5 critical points for the occurrence of crimes in Pakistan (Newton 2015, Yar and Nasir 2016). The Temporal profiling of the MCC hot spots revealed that all four crime types were simultaneously present in time and place, near licensed premises, from Friday through Sunday, in the early hours of the morning, around the closing times of the premises. At other times, criminal damage and drugs hot spots were found to occur earlier in the evening, and disorder and violence at later time periods (Newton 2015). Zhong et al. (2011) focused on the spatial analysis of the crime model in Shanghai, using the police records and geographic information systems. The results demonstrated that the crime concentration was relatively high in some major points in the downtown, transport stations, as well as highly populated areas and gradually decreased from the center to the margin (Zhong et al. 2011).

In the present study, the emphasis is on the spatial distribution of crime in the provinces of Iran, but today the growth of crime in cities, especially metropolises in all countries of the world, is the most serious social issue. In particular, informal settlements and suburban areas, which often accommodate ethnic and racial immigrant groups, are the most affected, while these groups have a lower social and economic status than the main inhabitants of large cities (Ardian et al. 2014). Also, deprivation and the lack of facilities in the isolated settlements and suburban areas compared to other urban areas, the high unemployment rate, the problems of adaptation to the social environment, the lack of familiarity with the urban jobs, poverty and the cultural duality of the immigrants and people living in these areas, as well as the lack of proper support for these spaces, have provided the ground for committing crimes within these settlements and, consequently, mostly in urban areas (Méreiné-Berki et al. 2017, Creţan and O'Brien 2019, Málovics et al. 2019a, Málovics et al. 2019b, Vesalon and Creţan 2019, Creţan 2020).

Numerous studies have been conducted on the topic of crime and its spatial distribution in Iran (Rezaei et al. 2009), most of which are specific to urban areas, but there is a wide gap with regard to crime occurrence at the national level – this being the goal that this paper seeks to achieve. Moreover, in this research, two models of Similarity and COPRAS (Appendix 1) are used to analyze inequalities, which have advantages over other multi-criteria decision-making models used in previous studies and they cover many of their weaknesses. For instance, these two methods are capable of using quantitative and qualitative criteria simultaneously for the

evaluation of options and they also can calculate the positive and negative criteria separately in the evaluation process.

Methodology

Iran, with an area of over 1.6 million km^2, is located in the southern part of the temperate northern region, between 25° 4' to 39° 46' of northern latitude from the Equator line, and 44° 2' to 63° 19' of eastern longitude from the prime meridian. Its average elevation is over 1200 m above the sea level. Iran is bounded by the Caspian Sea and by Azerbaijan, Armenia, and Turkmenistan to the north, by Afghanistan and Pakistan to the east, by the Oman Sea and the Persian Gulf to the south, and by Iraq and Turkey to the west. In 2016, Iran had 31 provinces, 429 cities, 1058 districts, 1246 towns, 2589 villages, and a population of 79 926 270 people.

The research method is descriptive-analytical, and also documentary and library data collection methods are used. The statistical population is divided between 31 provinces of Iran. The indicators consist of 7 main indicators (1. Murder; 2. Discovered drugs – kg; 3. Intentional poisoning; 4. Beating, battery, and harm; 5. Coercion and duress; 6. Knife threat; 7. Threat) in the area of crime, which were standardized in proportion to the population of each province in 2016 (Table 1). The Similarity and COPRAS methods are used to investigate and analyze the crime rate and the mean rank method is employed to determine the prioritization strategy. The cluster analysis method is used in the SPSS software for classifying the different regions of the country and the ARC GIS software is used to represent the spatial distribution of crime occurrence. It should be noted that the Shannon Entropy method was used in the present research for weighting the applied indicators.

Table 1

Indicators examined in the spatial distribution of crime in relation to the population of each province

1. Murder	2. Discovered drugs (kg)	3. Intentional poisoning	4. Beating, battery, and harm
5. Coercion and duress	6. Knife threat	7. Threat	

Source: *authors' calculations (2020)*

The COPRAS method (Comprehensive Proportion Assessment method) is one of the compromise methods that were first proposed by Zavadskas et al. (2015a, 2015b). The COPRAS method has relatively provided an optimal solution from the ideal positive and negative solution (Table 2); hence, it can be considered similar to the TOPSIS method (Razavi et al. 2014).

The similarity method solves the problem in the Euclidean geometric space (Table 3). In other words, due to the different types of criteria, this technique initially un-scales all of them and it enters them into the Euclidean geometric space. Then, it defines both positive and negative virtual ideal options, which are composed of the best and worst situations, respectively. Afterwards, the distance of each of the options from the positive and negative ideals is measured and an option will be better – the one that has the least distance from the positive ideal and the longest distance from the negative ideal. It has a minor problem, which neglects the position of the points with options and their angles of deviation with an increase in the problem dimension. Hence, Deng (2007) attempted to fix this problem. According to Deng (2007), any option that was previously introduced as a point must be converted into a vector. Therefore, the positive and negative ideals must be a vector. Furthermore, Deng (2007)

introduced a term known as degree of similarity that is equivalent to the image ratio of its option on the ideal vector. The higher the degree of similarity of an option to the positive ideal, the better situation the option will have.

Table 2

Steps to perform the method of the chorus

Step 1: Form the decision matrix. $X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1m} \\ x_{21} & x_{22} & \cdots & x_{2m} \\ \vdots & \vdots & \vdots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{nm} \end{bmatrix}$	Step 2: Non-Scale Matrix. For positive or profit indicators (B), for negative or cost indicators (C), $x_{ij}/max\ x_{ij}$	Step 3: Calculate the Weightless Weighting Matrix: At this stage, the weight of each index (W_ Ij) is multiplied by an unbalanced matrix and the matrix X_ ij is obtained.
Step 4: The value of the indices that are most desirable (profit indicators) are added to each of the m options and it is represented by P_ (I), I = 1, 2 ... m. $P_i = \sum_{j \in B} \hat{x}_{ij}\ , i = 1, 2, \ldots,$	Step 5: The minimum values of R_ I are determined based on: $R_{min} = \min R_i \qquad i, i = 1, 2, \ldots, m$	Step 6: The degree of utility of each option is calculated. $N_i = \frac{Q_i}{K} \times 100\%$

Source: *Razavi et al. (2014)*

Table 3

Procedures for carrying out the similarity method (Source: *Deng (2007)*

Step 1: Formation Decision Matrix: Similar to Other Decision Techniques	Step 2: Scalable decision matrix: Similar to the TOPSIS technique used by the Euclidean method $n_{ij} = r_{ij} / \sqrt{\sum_{i=1}^{m} r_{ij}^2}$	Step 3: Calculate the Randomized Scalar Matrix: Obtain the unbalanced matrix in the weight index of the indices: $V = N \times W$
Step 4: Identify the positive and negative ideal options $A^+ = \{v_{ij} \mid (\max_i v_{ij},\ j \in J),\ (\min_i v_{ij},\ j \in J')\}$ $A^- = \{v_{ij} \mid (\min_i v_{ij},\ j \in J),\ (\max_i v_{ij},\ j \in J')\}$	Step 5: Moving the Problem Space: At this point, the origin of the coordinates must be transferred from (0 and 0) to the negative ideal point, so it is imperative that the data of all the options, positive and negative ideal of negative ideal values, are deducted. This is an ideal to zero.	Step 6: Calculates the degree of integer with positive ideals $Length\ from\ origin = \sqrt{\sum x_i^2}$ $S^+{}_i = \frac{x}{\lvert I^+ \rvert} = \frac{Cos\ \theta \lvert A_i^+ \rvert}{\lvert I^+ \rvert}$ $Cos\ \theta = \frac{\sum \sum x_i y_i}{\sqrt{\sum x_i^2 \sum y_i^2}}$ $Cos\ \theta = \frac{x}{\lvert A_i^+ \rvert}$ $x = Cos\ \theta \lvert A_i^+ \rvert$
Step 7: Determine the best option: The option with the largest $S^+{}_i$ will be the best, and other options are sorted according to $S^+{}_i$.		

Results

Findings from the Similarity model

The findings of the Similarity model (Table 4) show that the spatial distribution of crime rate is very different in the provinces of Iran. As observed, the three provinces of Fars, Yazd, and

Table 4

Status of different provinces of the country according to their crime rate, based on the similarity model

Province	COS	A	S	COS * I A I	RANK
East Azerbaijan	0.79	0.01	0.03	0.010	18
West Azerbaijan	0.70	0.02	0.05	0.017	15
Ardabil	0.67	0.08	0.16	0.053	6
Isfahan	0.62	0.01	0.02	0.008	19
Alborz	0.76	0.10	0.22	0.074	5
Ilam	0.68	0.01	0.02	0.005	23
Bushehr	0.62	0.01	0.01	0.004	24
Tehran	0.88	0.04	0.09	0.031	10
Chaharmahal and Bakhtiari	0.31	0.06	0.05	0.018	14
South Khorasan	0.66	0.13	0.25	0.082	4
Khorasan Razavi	0.63	0.01	0.02	0.007	21
North Khorasan	0.43	0.02	0.02	0.008	20
Khuzestan	0.23	0.00	0.00	0.001	31
Zanjan	0.38	0.06	0.07	0.022	12
Semnan	0.52	0.06	0.09	0.030	11
Sistan and Baluchestan	0.37	0.10	0.11	0.036	8
Fars	0.63	0.20	0.38	0.128	1
Qazvin	0.59	0.01	0.01	0.003	25
Qom	0.65	0.05	0.10	0.032	9
Kurdistan	0.77	0.03	0.06	0.019	13
Kerman	0.41	0.04	0.04	0.015	16
Kermanshah	0.43	0.00	0.01	0.002	28
Kohgiluyeh and Boyer Ah-mad	0.63	0.01	0.02	0.005	22
Golestan	0.52	0.00	0.01	0.002	29
Gilan	0.54	0.00	0.00	0.001	30
Lorestan	0.54	0.00	0.01	0.002	26
Mazandaran	0.32	0.01	0.01	0.002	27
Markazi	0.64	0.02	0.04	0.014	17
Hormozgan	0.59	0.19	0.33	0.111	3
Hamedan	0.69	0.07	0.14	0.048	7
Yazd	0.66	0.19	0.37	0.123	2

Source: *authors' calculations (2020)*

Hormozgan ranked first to third in terms of studied criteria, with the priority coefficients of 0.128, 0.123, and 0.111, respectively, while they had the worst conditions (the highest crime rate) among other provinces. In the next steps, there are the provinces such as South Khorasan, Alborz, Ardabil, Hamedan, Sistan and Baluchestan, Qom, and Tehran, with the priority coefficients of 0.082, 0.074, 0.053, 0.048, 0.036, 0.032, and 0.031, and these provinces are in a bad situation in terms of crime occurrence. In contrast, the least amount of crime

occurrence based on the Similarity model was related to the provinces of Khuzestan, Lorestan, Gilan, Golestan, Kermanshah, Mazandaran, and Qazvin. In order to determine the status of each province, based on their similarity in the survey indicators, the results of the Similarity model are clustered using the SPSS software. In the cluster analysis, various provinces of the country are classified in various clusters based on the nearest neighborhood (Fig. 1).

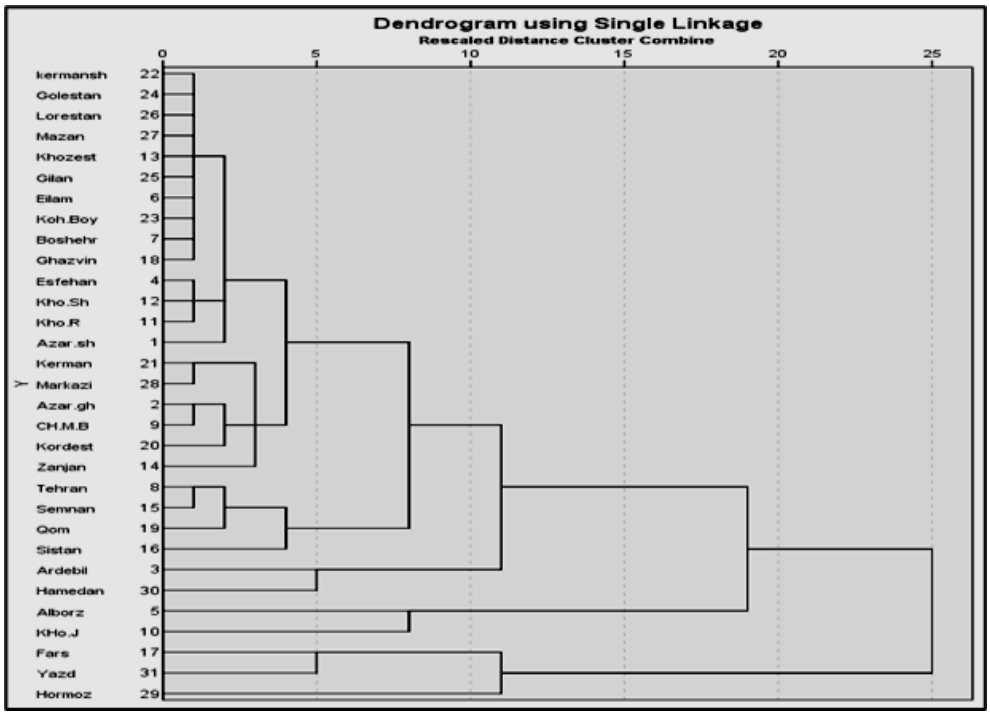

Fig. 1 – **Hierarchical clustering of the provinces of the country based on the Similarity Index**
Source: *authors' calculations (2020)*

The results of the hierarchical cluster analysis are shown based on the nearest neighborhood and with regard to the final results of the Similarity model. Accordingly, the provinces of the country are grouped into 6 homogeneous groups, which are obtained based on the similarity of the provinces of the country in terms of crime indicators. It should be noted that, in the performed clustering, the sixth cluster indicates the worst situation and the first cluster indicates the best situation. First cluster: in this cluster, the provinces of Qazvin, Bushehr, Kohgiluyeh and Boyerahmad, Ilam, Gilan, Khuzestan, Mazandaran, Lorestan, Golestan, and Kermanshah were located. In fact, the above-mentioned provinces had the best situation or, in other words, were the safest provinces in terms of crime indicators, with the average final coefficient of 0.003, compared to other provinces of the country. Second cluster: in this cluster, the four provinces of East Azerbaijan, Khorasan Razavi, North Khorasan, and Isfahan were located with the average final coefficient of 0.008, which had a slightly better situation than the other provinces of the country, except the provinces located in the first cluster. Third cluster: the results show that provinces of Zanjan, Kurdistan, Chaharmahal and Bakhtiari, West Azerbaijan, Markazi, and Kerman are located with the final coefficient of 0.018. Six of the above provinces have an inappropriate situation than two earlier clusters, but they are in a more appropriate

situation than the two other provinces located in the next clusters. Fourth cluster: in this cluster, the 4 provinces of Sistan and Baluchestan, Qom, Semnan, and Tehran are located with the final coefficient of 0.032. These provinces have a worse situation in crime indicators than the earlier clusters and they are in fact among the unsafe provinces. It should be noted that these provinces have a more suitable condition than the provinces located in Clusters 5 and 6, but they were in an inappropriate situation compared to all groups. Fifth cluster: in this cluster, the four provinces of South Khorasan, Alborz, Hamedan, and Ardabil are located with the final coefficient of 0.064, which have a relatively more suitable condition than the provinces in the sixth cluster and they have an inappropriate condition compared with other provinces of the country in terms of the examined indicators. Sixth cluster: the results showed that 3 provinces of Fars, Yazd, and Hormozgan, with the final coefficient of 0.120, were in the worst situation. These three provinces have the highest crime rates for the survey indicators and they are located in the unsafe group of the provinces.

The final results from the cluster analysis based on the Similarity model indicate a wide gap between the provinces of the country in terms of the examined indicators, so that the final coefficient obtained for the provinces in the sixth cluster (the most unsafe group) is about 40 times of the final coefficient of the provinces in the first cluster (the safest provinces in the country).

Spatial representation of the status of crime indicators in the provinces of Iran, based on the Similarity model

After clustering the provinces of the country in terms of crime indicators based on the similarity model, the results were entered into the GIS software and the spatial distribution of the survey indicators in the provinces of the country was shown (Fig. 2). As it can be seen, the spatial

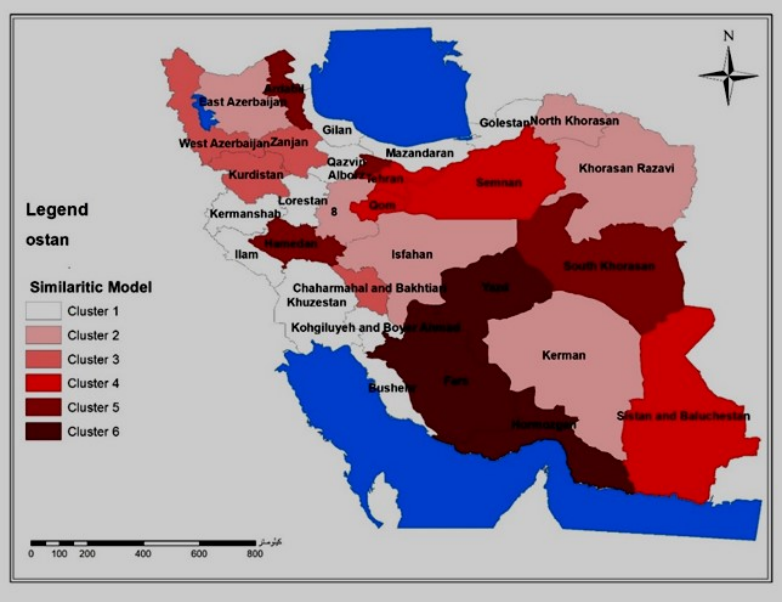

Fig. 2 – **Spatial distribution and cluster analysis of crime indicators in the provinces of Iran, based on the Similarity Model**
Source: *authors' calculations (2020)*

Table 5

Status of different provinces of the country according to their rate of crime, based on the COPRAS model

Province	PI	RI	RMIN.RI	1.RI	Q	N	RANK
East Azerbaijan	0.0041	0.0003	0.0022	3673.48	0.00	4.67	20
West Azerbaijan	0.0078	0.0004	0.0014	2390.64	0.01	8.76	17
Ardabil	0.0322	0.0003	0.0023	3879.59	0.03	36.11	7
Isfahan	0.0031	0.0001	0.0078	13346.95	0.00	3.50	21
Alborz	0.0344	0.0004	0.0015	2598.03	0.03	38.58	6
Ilam	0.0031	0.0000	0.1225	208694.51	0.00	3.51	22
Bushehr	0.0017	0.0000	0.2296	391070.52	0.00	1.96	25
Tehran	0.0117	0.0004	0.0017	2829.23	0.01	13.12	14
Chaharmahal and Bakhtiari	0.0150	0.0004	0.0014	2451.37	0.02	16.84	11
South Khorasan	0.0537	0.0001	0.0046	7835.32	0.05	60.24	4
Khorasan Razavi	0.0045	0.0001	0.0095	16213.14	0.00	5.03	19
North Khorasan	0.0047	0.0001	0.0066	11301.41	0.00	5.29	18
Khuzestan	0.0006	0.000	1.0000	1703288.20	0.00	0.70	31
Zanjan	0.0193	0.0003	0.0021	3550.32	0.02	21.64	9
Semnan	0.0126	0.0004	0.0015	2606.89	0.01	14.17	12
Sistan and Baluchestan	0.0353	0.0003	0.0020	3460.15	0.04	39.57	5
Fars	0.0883	0.0001	0.0074	12587.67	0.09	98.99	2
Qazvin	0.0015	0.0003	0.0022	3775.53	0.00	1.63	26
Qom	0.0173	0.0002	0.0036	6196.35	0.02	19.40	10
Kurdistan	0.0105	0.0003	0.0021	3654.79	0.01	11.74	16
Kerman	0.0118	0.0001	0.0047	8286.26	0.01	13.19	13
Kermanshah	0.0009	0.0000	0.4252	724314.50	0.00	1.02	29
Kohgiluyeh and Boyer Ahmad	0.0027	0.0000	0.1456	247986.90	0.00	3.08	23
Golestan	0.0010	0.0000	0.0303	51553.45	0.00	1.09	28
Gilan	0.0007	0.0000	0.0189	32127.92	0.00	0.79	30
Lorestan	0.0011	0.0000	0.3852	656108.84	0.00	1.18	27
Mazandaran	0.0023	0.0000	0.6746	1149117.18	0.00	2.61	24
Markazi	0.0105	0.0003	0.0023	3872.30	0.01	11.78	15
Hormozgan	0.0777	0.0002	0.0026	4365.82	0.08	87.09	3
Hamedan	0.0320	0.0005	0.0012	1988.81	0.03	35.91	8
Yazd	0.0892	0.0004	0.0015	2580.55	0.09	100.00	1

Source: *authors' calculations (2020)*

distribution of crime indicators was uneven in the country and it did not follow the specific spatial distribution process. However, the results show that the status of crime indicators in the western and northern parts of the country (the provinces adjacent to the Caspian Sea), as well as in the northeastern part of the country, have an acceptable status and the status of the survey indicators in the center and the north (with the exception of the provinces adjacent to the Caspian Sea), northwest, and southeast of the country is inappropriate.

The results of the COPRAS model (Table 5) show that the spatial distribution of crime occurrence in the Iranian provinces is very different, being similar to the results of the Similarity

model. According to the results of the COPRAS model, the four provinces of Yazd, Fars, Hormozgan, and South Khorasan ranked first to third in terms of indicators, with the importance coefficient of 100, 98.99, 87.09, and 60.24, respectively, which have the worst situation among the provinces of the country. In the next ranks, the provinces such as Sistan and Baluchestan, Alborz, Hamedan, and Ardabil are located and these provinces have been in inappropriate conditions for crime occurrence compared to other provinces. In contrast, the lowest crime rate occurred, based on the COPRAS model, in provinces such as Khuzestan, Gilan, Kermanshah, Golestan, Lorestan, Qazvin, Bushehr, Mazandaran, Kohgiluyeh and Boyer Ahmad, Isfahan, and Ilam. In order to determine the status of each province based on their similarity in the surveyed indicators, the results of the COPRAS model were clustered using the SPSS software. In the cluster analysis, different provinces of the country were classified in various clusters based on the nearest neighborhood (Fig. 3).

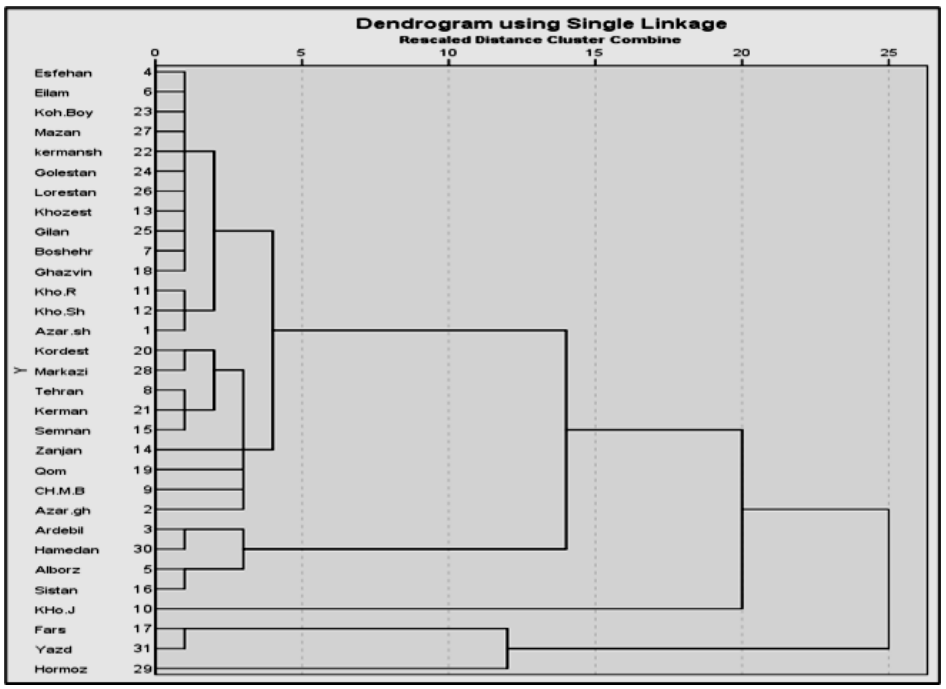

Fig. 3 – **The hierarchical clustering of the provinces of the country based on the COPRAS Index**

Source: *authors' calculations (2020)*

In the cluster analysis using the COPRAS method, the same as the similarity model, the provinces of the country are classified into 6 homogeneous groups and these groups are obtained based on the similarity of the provinces of the country in terms of the surveyed indicators. It should be noted that in the clustering that has been made, the sixth cluster indicates the worst condition and the first cluster indicates the best condition. First cluster: in this cluster, the provinces of Qazvin, Bushehr, Gilan, Khuzestan, Isfahan, Ilam, Lorestan, Golestan, Kermanshah, Kohgiluyeh and Boyerahmad, and Mazandaran are located. In fact, the above-mentioned provinces were in the best situation with the average coefficient of 1.92 compared to other provinces of the country in terms of crime indicators, or, in other words, they

were the safest provinces of the country. Second cluster: in this cluster, there were three provinces of East Azerbaijan, North Khorasan, and Khorasan Razavi with the importance coefficient of 4.99, which have a slightly more appropriate situation than the other provinces of the country, except the provinces in the first cluster.

Third cluster: the results showed that the provinces of Semnan, Kerman, Tehran, Markazi, and Kurdistan, with the importance coefficient of 12.80, were in this cluster. The five aforementioned provinces have inappropriate situation compared to two previous clusters, but compared to the other provinces located in the next clusters, they were in a better situation. Fourth cluster: in this cluster, there were 4 provinces of West Azerbaijan, Chaharmahal and Bakhtiari, Qom, and Zanjan, with the importance coefficient of 16.66. These provinces have a worse situation than the previous clusters for crime indicators; in fact, they are located in the group of the unsafe provinces of the country. It should be noted that these provinces have a better situation than the provinces located in clusters 5 and 6, but they were in an inappropriate situation compared to all other groups. Fifth cluster: in this cluster, there are the four provinces of Sistan and Baluchestan, Alborz, Hamedan, and Ardabil, with the importance coefficient of 37.54, which have a more appropriate situation than the provinces in the sixth cluster and they have an inappropriate situation compared to the other provinces for the survey indicators. Sixth cluster: the results show that the 4 provinces of Fars, Yazd, Hormozgan, and South Khorasan are in the worst condition with the importance coefficient of 86.58. These three provinces had the highest crime rates in terms of survey indicators and they were in the most unsafe group of provinces.

The final results from the cluster analysis based on the COPRAS model, the same as the Similarity model, indicate a deep gap between the provinces of Iran in terms of the survey indicators, so that the final coefficient obtained for the provinces located in the sixth cluster (the most unsafe group) is about 45 times of the final coefficient of the provinces located in the first cluster (the safest group).

Spatial representation of crime indicators in the provinces of Iran based on the COPRAS model

After clustering the provinces of the country in terms of the indicators based on the COPRAS model, the results were entered into the GIS software and the spatial distribution of the surveyed indicators in the provinces of the country was shown (Fig. 4). As it can be seen, the spatial distribution of the indicators in the country, based on COPRAS model, was uneven and it did not follow a specific spatial distribution process. Nevertheless, it can be said that the status of crime indicators in the western, southwestern, northern, as well as northeastern parts of the country, is acceptable and the status of the surveyed indicators in the central, northwestern, and southeastern parts of the country is unsuitable.

Determining the prioritization strategy using the mean rank method

Given the little difference in the results of the spatial analysis of crime occurrence in the provinces of Iran, based on the two models of Similarity and COPRAS, the mean rank method is used to eliminate these differences and to determine the real status of each province, as well as to determine the prioritization strategy.

Based on the final results obtained from the mean rank method (Table 6), the provinces of Yazd, Fars, Hormozgan, and South Khorasan, with the final importance coefficients of 50.06, 49.56, 43.60, and 30.16, ranked first to fourth and they had the worst situation among the provinces of the country. In the next ranks, the provinces Sistan and Baluchestan, Alborz,

Table 6

Determine the prioritization strategy based on the rank average method

Province	Mean Rank	Final rank	Ostan	Mean Rank	Final rank
Yazd	1.5	1	Markazi	16	17
Fars	1.5	2	East Azerbaijan	19	18
Hormozgan	3	3	North Khorasan	19	19
South Khorasan	4	4	Khorasan Razavi	20	20
Alborz	5.5	5	Isfahan	20.5	21
Ardabil	5.6	6	Ilam	22	22
Sistan and Ba-luchestan	6.5	7	Kohgiluyeh and Boyerahmad	22.5	23
Hamedan	7.5	8	Bushehr	24.5	24
Qom	9.5	9	Qazvin	25.5	25
Zanjan	10.5	10	Mazandaran	25.5	26
Semnan	11.5	11	Lorestan	26.5	27
Tehran	12	12	Kermanshah	28.5	28
Chaharmahal and Bakhtiari	12.5	13	Golestan	28.5	29
Kurdistan	14.5	14	Gilan	30	30
Kerman	14.5	15	Khuzestan	31	31
West Azerbaijan	16	16			

Source: *authors' calculations (2020)*

Hamedan, and Ardabil are located, and these provinces have been in an inappropriate condition for crime occurrence compared to other provinces. In contrast, the lowest crime rate occurred, based on mean rank method, in the provinces such as Isfahan, Ilam, Kohgiluyeh and Boyerahmad, Mazandaran, Kermanshah, Golestan, Lorestan, Khuzestan, Gilan, Bushehr, and Qazvin. Finally, the cluster analysis obtained from the results of the mean rank method is investigated (Fig. 5).

In the final clustering, based on the mean rank method, the provinces of the country are located in 6 homogeneous clusters. In this clustering, the sixth cluster indicates the worst condition and the first cluster indicates the best condition. First cluster: in this cluster, the provinces of Isfahan, Ilam, Kohgiluyeh and Boyerahmad, Mazandaran, Kermanshah, Golestan, Lorestan, Khuzestan, Gilan, Bushehr, and Qazvin are located. In fact, the above provinces, with the final importance coefficient of 0.96, were in the best situation for the crime occurrence indicators, or, in other words, they are the safest provinces of the country. Second cluster: in this cluster, three provinces of Khorasan Razavi, North Khorasan, and East Azerbaijan, with the average importance coefficient of 2.50, are located, which have a slightly more appropriate situation than the other provinces in the country, except the provinces in the first cluster.

Third cluster: the results showed that the provinces of Kurdistan, Markazi, Tehran, Kerman, and Semnan, with the importance coefficient of 6.41, are located in this cluster. The five aforementioned provinces have an inappropriate situation compared to the two previous

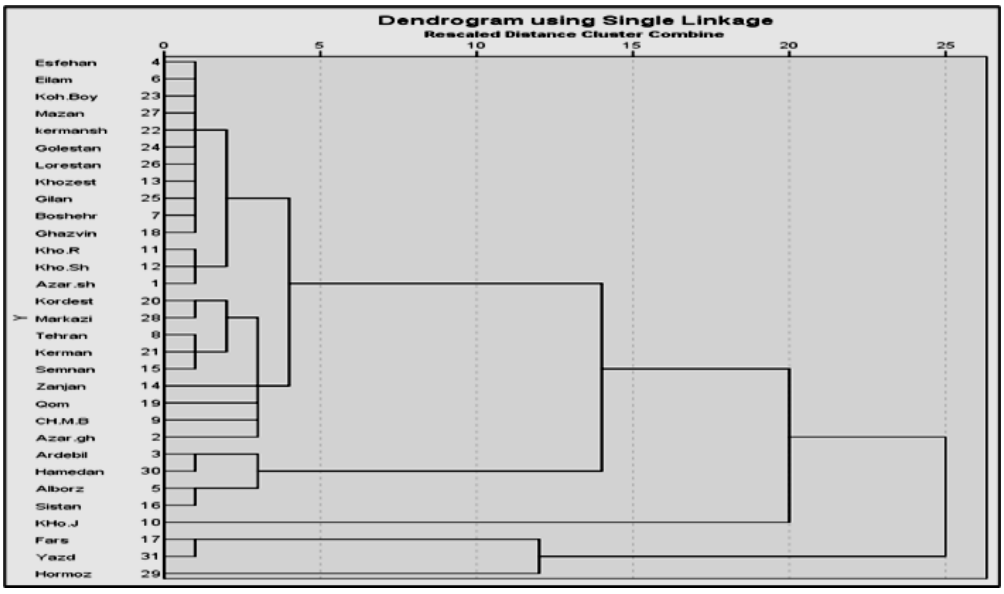

Fig. 5 – **Final clustering of the provinces of the country based on the average ratings method**
Source: *authors' calculations (2020)*

clusters, but, compared to the other provinces located in the next clusters, they are in a better situation. Fourth cluster: in this cluster, there were the 4 provinces of Zanjan, Qom, West Azerbaijan, and Chaharmahal and Bakhtiari, with the importance coefficient of 7.83. These provinces had a worse situation than the previous clusters for crime indicators; in fact, they were located in the group of the unsafe provinces of the country. Fifth cluster: in this cluster, there are the four provinces of Ardabil, Hamedan, Alborz, and Sistan and Baluchestan, with the importance coefficient of 18.80, which have a slightly more appropriate situation than the provinces in the sixth cluster and they have an inappropriate situation compared to the other provinces for the surveyed indicators. Sixth cluster: the results show that the 4 provinces of Fars, Yazd, Hormozgan, and South Khorasan are in the worst condition with the importance coefficient of 43.35. These four provinces have the highest crime rate in terms of the examined indicators and they are in the most unsafe group of provinces. The final results of the cluster analysis based on mean rank method indicate a wide gap between the provinces of the country in terms of the survey indicators, so that the final coefficient obtained for the provinces in the sixth cluster (the most unsafe group) is about 45 times of the final coefficient of the provinces in the first cluster (the safest group).

Spatial representation of the status of crime indicators in the provinces of Iran based on the mean rank method

After the final clustering of the provinces of the country based on the crime rate, with the help of the mean rank method, their spatial distribution is represented using the ARC GIS software (Fig. 6). As it can be found, the final spatial distribution of crime indicators in the different regions of the country did not follow a balanced pattern and it did not have a particular spatial distribution process. However, the spatial distribution of the surveyed indicators in the provinces of Iran can be stated in the following manner: the western, southwestern, northern

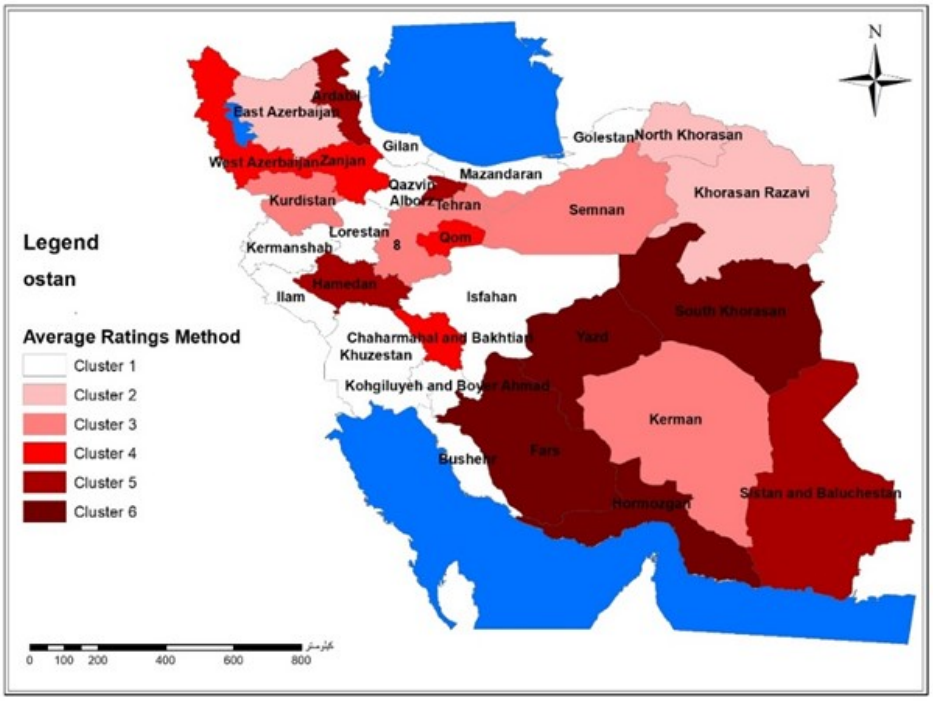

Fig. 6 **– The ultimate spatial distribution of crime indicators in the provinces of the country, based on the Average Ratings Method**
Source: *authors' calculations (2020)*

(the provinces adjacent to the Caspian Sea), as well as northeastern parts of the country, have a more acceptable situation than the other parts of the country and the status of the survey indicators in the central, southern, southeastern, northern (excluding the provinces adjacent to the Caspian Sea), and the northwestern provinces is of a very poor situation.

Discussion

One of the important necessities of this research has been to know the principles and concepts of security, crime prevention approaches, identification of crime hotspots and the extent and types of crime distribution in the provinces of Iran. Therefore, in this study, the provinces of the country were well studied and ranked in terms of crime. The 7 crime indicators in the provinces showed well the distribution of crime in the country. The results obtained from the distribution of crime in the provinces of the country indicated that the provinces located in the central plateau of Iran, the south and the southeast of the country were in a more unfavorable situation than other parts of the country, due to high migration, illiteracy, unemployment, and other conditions. Therefore, they need to provide appropriate security programs, and the attention of officials and of the relevant institutions to deal with crime. In fact, one of the reasons for committing more crime in provinces such as Fars, Yazd and Sistan and Baluchestan, which are in a very insecure situation, could be due to the very large migration from the cities and the neighboring provinces, especially to the center of these provinces. The existence of facilities and suitable

conditions for the welfare and comfort of people, including the existence of factories and large industrial companies in the centers of Fars and Yazd provinces, has caused many immigrants to these two centers to constitute an illiterate workforce or at the elementary literacy level. This migrant workforce cannot be properly absorbed in these areas due to cultural differences and socialization issues, and many of them have failed to achieve their working goals and the decent income and comfort they expected. And, consequently, they try to provide for themselves in other ways while they provide the ground for insecurity.

Sistan and Baluchestan province, because of its isolated and infertile nature, especially in the desert and arid regions of Iran, has been a source of political, economic and security problems for the current governments due to the lack of welfare and the lack of motivation to live. The potential inability to produce, the lack of employment, the low income and the lack of access to the basic needs have been the main socio-economic characteristics of this region, which has provided the ground for problems and disorders such as migration, smuggling, riots and insecurity. The special geographical situation of this province and some other socio-political conditions indicate the existence of a deep gap between these regions and other regions of the country. The combination of these factors has caused the economy of Sistan and Baluchestan province to be directly and indirectly dependent on illegal border exchanges and it has provided the ground for insecurity in this province. In fact, the results show an overview of the situation of crime in the different provinces of Iran, which has been determined based on the population density of each province, the incidence and the crime rate in there.

Conclusions

One of the most complex issues in all countries is crime. The occurrence of various types of crimes causes insecurity and it imposes various material and immaterial problems for the society. Given the importance of the discussions related to crimes in welfare, comfort, and the safety of citizens, the comprehensive knowledge of crimes at large scales is one of the necessities that should be considered by the researchers and planners in the country. Evidence shows that there is a severe study gap in this regard and most of the crime-related studies focus on a limited geographical scope while most are specific to urban areas. This has led us to investigate the spatial distribution of crimes at national and large-scale levels given the objective of the paper which is the spatial analysis of crime occurrence in the different provinces of Iran with an emphasis on safety. In so doing, it would be possible to identify the safest and the most unsafe provinces based on the frequency of crime occurrence in each of the provinces, and given the characteristics and features of each province, a planning is done for providing their safety.

In total, the results of the study showed a gap and inequality between the provinces of the country in terms of surveyed indicators, to the extent that the final coefficient obtained for the provinces in the sixth cluster (the most unsafe group) is about 45 times of the final coefficient of the provinces in the first cluster (the safest group). According to the findings of the research, the safest provinces of the country, based on the frequency of crime occurrence in the cluster analysis, were Isfahan, Ilam, Kohgiluyeh and Boyerahmad, Mazandaran, Kermanshah, Golestan, Lorestan, Khuzestan, Gilan, Bushehr, and Qazvin, which had the lowest crime occurrence with the final mean importance coefficient of 0.96 compared to the other provinces of the country. The most unsafe provinces of the country, in terms of the frequency of crime occurrence in seven survey criteria, were Fars, Yazd, Hormozgan, and South Khorasan, which were in the worst situation compared to other provinces, with the final importance coefficient of 43.35. The final results of the spatial distribution of crime indicators also showed that different regions of the country did not follow a balanced pattern and they did not have a particular spatial distribution process. However, the spatial distribution of the surveyed indicators in the provinces of Iran can be stated in a way that the western, southwestern, northern (the

provinces adjacent to the Caspian Sea), as well as the northeastern parts of the country, had an acceptable situation compared to other parts of the country and they were in fact the most safe areas of the country. Moreover, the status of the surveyed indicators in the central, southern, southeastern, northern (excluding the provinces adjacent to the Caspian Sea), and northwestern provinces were in a very poor situation and, in fact, they are considered as the most unsafe areas of the country.

According to the obtained results, it can be stated that, by legalizing the principles, strategies and executive methods, as well as involving the society in crime prevention, the formation and development of non-governmental organizations in the field of social harms, creating an integrated, participatory and accountable management and, finally, a fair spatial distribution of income, wealth and power in all provinces of the country, can greatly help preventing crime and ensuring social security.

References

AHMADI H., MOHAMMAD-TAGHI I. (2004,(*The Culture of Poverty, Marginalization and the Tendency to Delinquent Behavior among the Marginalized Youth of Dehpialeh in Shiraz*, Research Journal of the University of Isfahan 19 (2), 99-118.

ANSELIN L. (2000), *GIS, spatial econometrics and social science research*, Journal of Geographical Systems 2 (1), 11-15.

ACHU A. L., SUJA ROSE R. S. (2016), *GIS Analysis of Crime Incidence and Spatial Variation in Thiruvananthapuram City*, International Journal of Remote Sensing Applications 6, 1-7.

ARDIAN N., BAGHIANIMOGHADAM M. H., HEKMATNIA H., EHRAMPOUSH M. H., ARDIAN M., MASOUDNIA E. (2014), *The Spatial Analysis of Hot Spots in Urban Areas of Iran. The case Study: Yazd*, Revista de Cercetare și Intervenție Socială 44, 103-115.

CARMONA M., TIESDELL S., HEATH T., OC T. (2003), *Public Places, Urban Spaces: The dimensions of urban design*, Architectural Press, Oxford.

COOK P. J., MACHIN S., MARIE O., MASTROBUONI G. (2013), *Crime economics in its fifth decade*, in: Cook P. J., Machin S., Marie O., Mastrobuoni G. (eds.), Lessons from the economics of crime: what reduces offending?, The MIT Press, Cambridge, MA, pp. 1-16.

COZENS P. (2008), *Crime prevention through environmental design in Western Australia: planning for sustainable urban futures*, International Journal of Sustainable Development and Planning 3 (3), 272-292.

COZENS P. M. (2002), *Sustainable Urban Development and Crime Prevention through Environmental Design for the British City*. *Towards an Effective Urban Environmentalism for the 21st Century*, Cities 19 (2), 129-137.

CREȚAN R. (2020), *Ethnic spatial segregation in European cities*: *edited by Hans Skifter Andersen, London/New York, Routledge, 2019, 226 pp., £115.00 (hbk), ISBN-978-1-138 -35891-1*, Housing Studies 35 (1), 189-191.

CREȚAN R., O'BRIEN T. (2019), *'Get out of Traian Square!': Roma stigmatization as a Mobilizing Tool for the Far Right in Timişoara, Romania*, International Journal of Urban and Regional Research 43 (5), 833-847.

DENG H. (2007), *A Similarity-Based Approach to Ranking Multicriteria Alternatives*, in: Huang D. S., Heutte L., Loog M. (eds.), Advanced Intelligent Computing Theories and Applications. With Aspects of Artificial Intelligence. ICIC 2007. Lecture Notes in Computer Science 4682, Springer, Berlin, Heidelberg, pp. 253-262.

FROMM E. (1981), *The sane society*, Behjat Publications, Tehran.

GLUECK S., GLUECK E. T. (1950), *Unraveling juvenile delinquency*, Harvard University Press, Cambridge, MA.

HAJI Y., MOHAMMAD A., BAQIRI A. (2011), *Study status of developing the document of I.R of Iran's National Security Strategy*, Political Knowledge 7 (2), 69-97.

HESHMATI M. (2006), *The role of urban planning in crime control*, Soffeh 15 (41), 82-

89.

HOSSEINIUN S. (2007), *Providing a sense of safety in the urban space*, Journal of Shahrdariha 8 (82), 87-90.

HUNTINGTON E. (1945), *Mainsprings of civilization*, Wiley, New York.

JAFARI K., MESGARZADEH S., MIRZAKHANI M. (2018), *Influential factors on Social Security among citizens of Tabriz*, Journal of Sociology Studies 10 (38), 61-83.

JAHANGIRI J., MOSAVAT E. (2013), *An Evaluation of the Factors Affecting Woman's Social Security (Case Study: Women Living in Shiraz City)*, Journal of Strategic Studies on Security and Social Order 6 (2), 41-55.

KALANTARI M., HENDIANI A., SARMAD M. R. (2010), *Role of crime hotspots in forming spatial patterns of misdemeanor studied by Aliabad Inspection Station in Birjand (geographical analysis of crime)*, Police Management Research 5 (4), 563-584.

KAMYAR Q. (2000), *Urban Design Rights*, Amjad Publications, Tehran.

KAY NIA M. (1994), *Fundamentals of Criminology*, University of Tehran Press, Tehran.

KREVERS B., MILBERG A. (2014), *The instrument 'Sense of Security in Care – Patients' Evaluation': its development and presentation*, Psycho-Oncology 23 (8), 914-920.

LINDSTRÖM M. (2008), *Social capital, anticipated ethnic discrimination and self-reported psychological health: a population-based study*, Social Science & Medicine 66 (1), 1-13.

LUDWIG J., DUNCAN G. J., HIRSCHFIELD P. (2001), *Urban Poverty and Juvenile Crime: Evidence from a Randomized Housing-Mobility Experiment*, The Quarterly Journal of Economics 116 (2), 655-679.

MALLER J. B. (1937), *Juvenile Delinquency in New York City: A Summary of a Comprehensive Report*, The Journal of Psychology 3 (1), 1-25.

MÁLOVICS G., CREŢAN R., MÉREINÉ-BERKI B., TÓTH J. (2019a), *Socio-environmental justice, participatory development, and empowerment of segregated urban Roma: Lessons from Szeged, Hungary*, Cities 91, 137-145.

MÁLOVICS G., CREŢAN R., MÉREINÉ BERKI B., TÓTH J. (2019b), *Urban Roma, segregation and place attachment in Szeged, Hungary*, Area 51 (1), 72-83.

MÉREINÉ-BERKI, MÁLOVICS G., TÓTH J., CREŢAN R. (2017), *The role of social capital and interpersonal relations in the alleviation of extreme poverty and spatial segregation of Romani people in Szeged*, Journal of Urban and Regional Analysis 9 (1), 33-50.

MILBERG A., FRIEDRICHSEN M., JAKOBSSON M., NILSSON E.-C., NISKALA B., OLSSON M., WÅHLBERG R., KREVERS B. (2014), *Patients' Sense of Security During Palliative Care—What Are the Influencing Factors?*, Journal of Pain and Symptom Management 48 (1), 45-55.

NASIRI E., GOLMEHR E., RAHMANI M. H. (2015), *Geo-spatial analysis of crime and crime-prone areas. Case study: Misdemeanor Theft in Qazvin*, Geography 12 (43), 157-176.

NAVIDNIA M. (2009), *The Police Perspective: Security and Social Capital*, Strategic Studies Quarterly 12 (44), 29-46.

NEWTON A. (2015), *Crime and the NTE: multi-classification crime (MCC) hot spots in time and space*, Crime Science 4, 30.

RAHNEMAEI M. T., POURMOUSAVI S. M. (2006), *Investigating security instabilities in Tehran Metropolitan based on urban sustainable development indexes*, Geographical Research Quarterly 38 (57), 177-193.

RAZAVI H., HASHEMI S. S., AMOUZADEH M., RAJI H. (2014), *Multi-indicator decision-making in certainty and uncertainty conditions*, Termeh Publications, 196-199.

REZAEI M., BARTAV I., RAJAEE S. A. (2009), *Spatial analysis and crime prevention using Geographic Information Systems*, Journal of Crime Prevention Studies 4 (11), 129-148.

REZAEI RAD M., DOAGUYAN D., AMIRI R. (2007), *Effectiveness of social safety promotion plan for young women's clothing in city of Sari*, Journal of Police Management Studies 2 (4), 501-516.

SARAEE M. H., HOSSEINI S. M. (2015), *Spatial analysis of crime in city of Yazd*, Police Geographical Studies 3 (9), 93-120.

SAROUKHANI B., HASHEMNEJAD F. (2011), *A survey of relationship between social capital, its components, and sense of social safety among youth in city of Sari*, Journal of Sociology of Youth Studies 2 (2), 81-94.

SHAKOUEI H. (1985), *Social Geography of Cities (Social Ecology of the City)*, ISBA, Tehran.

SHAW C. R., MCKAY H. D. (2014), *Juvenile delinquency and urban areas*, in: Anderson T. L. (ed.), Understanding deviance: connecting classical and contemporary perspectives, Routledge, New York, pp. 106-127.

TABRIZI L. R., MADANIPOUR A. (2006), *Crime and the City: Domestic Burglary and the Built Environment in Tehran*, Habitat International 30 (4), 932-944.

VESALON L., CREȚAN R. (2019), *"Little Vienna" or "European avant-garde city"? Branding narratives in a Romanian City*, Journal of Urban and Regional Analysis 11 (1), 19-34.

WOLFGANG M. E. (1958), *Patterns in criminal homicide*, University of Pennsylvania Press, Philadelphia.

YAR P., NASIR J. (2016), *GIS Based Spatial and Temporal Analysis of Crimes, a Case Study of Mardan City, Pakistan*, International Journal of Geosciences 7 (3), 325-334.

ZANGI ABADI A., RAHIMI NADER H. (2010), *Spatial analysis of crime in city of Karaj (using GIS)*, Quarterly of Law 40 (2), 179-198.

ZAVADSKAS E. K., ANTUCHEVIČIENĖ J., KAPLIŃSKI O. (2015a), *Multi-criteria decision making in civil engineering: Part I – a state-of-the-art survey*, Engineering Structures and Technologies 7 (3), 103-113.

ZAVADSKAS E. K., ANTUCHEVIČIENĖ J., KAPLIŃSKI O. (2015b), *Multi-criteria decision making in civil engineering. Part II – applications*, Engineering Structures and Technologies 7 (4), 151-167.

ZHONG H., YIN J., WU J., YAO S., WANG Z., LV Z., YU B. (2011), *Spatial Analysis for Crime Pattern of Metropolis in Transition Using Police Records and GIS: a Case Study of Shanghai, China*, International Journal of Digital Content Technology and its Applications 5, 93-105.

Appendix 1
Abbreviations used in the text and the equivalent to each

Abbreviation signs	Equivalent to English
ARC GIS	Geographic Information System
COPRAS	Complex Proportional Assessment
SPSS	Statistical Package for the Social Sciences
Cos	Degree of conformity
a	Ideally positive
s	The degree of similarity of options vectors
PI	The sum of the values of the criteria that the larger values are more preferred
RI	The sum of the values of the criteria that the smallest values are preferred
RMIN	Calculate the minimum values of RI
Q	Calculate the relative weight of each option
N	Calculate the degree of utility of the options (maximum weight)

Initial submission: 21.09.2019
Revised submission: 29.11.2020
Final acceptance: 22.12.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 113 - 124
https://doi.org/10.37043/JURA.2021.13.1.7

ANALYSIS OF THE RELATIONSHIP OF INVESTMENT AND DEMOGRAPHIC FACTORS IN THE DEVELOPMENT OF DEPRESSED REGIONS

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Abstract: Social and economic spheres of depressed regions develop unfavorably which, in its turn, leads to the negative pace of the national economy development. “Depressed regions” have a higher growth rate of investments in fixed capital per capita than the Russian indicators, but the growth of investment does not cause unambiguous changes in the demographic indicators of development. All “depressed regions” are currently characterized by depopulation and a negative balance of interregional migration. Thus, despite the growth of investment, “depressed regions” are characterized by a reduction in labor and demographic potential. The problem of analyzing the relationship between investment and demographic factors in the development of “depressed regions” is not fully studied today, which undoubtedly affects the quality and effectiveness of decisions made by state authorities to overcome the depressive nature of their economies.

Key Words: *investment factors, demographic factors, “depressed regions”, Russian Federation.*

Introduction

Russia both now and in the past has been characterized by significant interregional socioeconomic inequality and the formation of various problem areas (Grigorieva et al. 2011, Zubarevich 2019). The country has two main categories of problem regions: depressed and underdeveloped regions. The underdeveloped ones are traditionally characterized by a low level of development and they have never had a serious impact on the country’s economy. As a rule, they are specialized in agrarian and raw material sectors, they have a low intensity of economic activity, traditionally lower living standards, poor infrastructure development, reduced educational and professional quality of labor resources, socio-economic, political and cultural backwardness. Some regions of the North Caucasus and South Siberia (Ingushetia, Altai, North Ossetia, etc.) are underdeveloped. Another type of problem areas (we will discuss them in this research) are depressed regions. Their main distinguishing feature is that in the past these regions were developed territories and occupied a prominent place in the country, but later they turned out to be in economic decline (Seliverstov et al. 1996). Depressed regions are of particular interest in the development of any state. Depressed regions are territories with an economical state which is currently characterized by lower (comparing to the national average) development indicators. Due to a long depressive situation and accumulation of structural imbalances, the depressed region can move into the category of underdeveloped territories. Russia and a number of other countries of the former eastern bloc have specific features of depression associated with the transition from a planned economy to a market one.

We used the following indicators to identify the depressed subjects of the Russian Federation according to the existing idea of regional depression (Chernyshev 2017):

1. Long-term decline in industrial production, expressed in the industrial production index during the post-Soviet period. This indicator is the main one, as if the region does not have a significant decrease in the volume of industrial production (primarily manufacturing or mining), it

cannot be considered depressed. To identify subjects of the Russian Federation with pronounced regional depression, we consider a threshold value of the decline indicator in industrial production to be a decrease in industrial production to a level of no more than 75% compared with 1991.

Table 1

Indicators of socio-economic development of the depressed regions of Russia

Depressed regions of Russia	The average population in 2018 (thousand people)	The level of industrial production in 2018 to the level of 1991 (%)	Gross regional product per capita in 2018 (thousand rubles)	The unemployment rate, on average for 2009-2018 (%)	The volume of industrial production per capita in 2018 (thousand rubles)
Ivanovo region	1009.2	37.6	196.0	6.1	187.8
Oryol Region	743.3	53.0	310.4	6.5	179.9
Smolensk region	946.1	72.0	330.8	6.2	290.8
Pskov region	633.1	74.9	259.4	7.6	194.1
Volgograd region	2514.6	64.5	338.9	7.0	411.5
Chuvash Republic	1227.3	62.4	242.6	6.6	189.1
Kirov region	1277.7	59.1	260.3	6.7	220.4
Ulyanovsk region	1242.6	63.3	280.0	5.9	244.0
Kurgan region	840.1	58.3	253.6	9.2	159.5
Altai region	2341.9	69.0	234.9	8.1	164.6

Source: *compiled by the authors on Rosstat (2019)*

2. The volume of gross regional product per capita is significantly lower than the average Russian level. We believe that it is incorrect to consider depressed a region where there is a decrease in industrial production, but the level of gross regional product per capita corresponds to the average Russian level or it even exceeds it. For example, in Moscow, the decrease in industrial production is caused not by economic depression, but by the restructuring of the economy in the course of the post-Soviet period. In the category of depressed regions, we include the subjects of the Russian Federation where the GRP per capita is less than 75% of the average Russian level.

3. The unemployment rate is not lower than the national average level. Obviously, the decline in production in industrial regions should be accompanied by an increase in unemployment.

4. As an additional criterion, we used the volume of industrial production per capita. The threshold value was more than 30% in relation to the average level of industrial production per capita in the Russian Federation. This criterion allowed separating the depressed regions with an industrial orientation from the underdeveloped ones.

According to the data for 2016, 2017 and 2018, the list of depressed regions was stable, since 10 constituent entities of the Russian Federation met these criteria (Table 1). Various researchers consider other regions of Russia to be depressed as well. Depressed regions do

not form significant adjacent areas on the territory of the country and they are mainly located in the European part of Russia.

"Depressed regions", as a rule, are characterized by an acute shortage of resources, which are necessary for overcoming the state of depression and the active growth of their economy in the future. Therefore, the development of measures to change the state of these regions should be based on the maximum possible consideration of the mutual influence of the main socio-economic development factors (Salik 2004). Therefore, it is important to study the relationship of investment and the demographic factors of "depressed regions" as they represent a problem of high relevance and practical importance for the economy of any modern state.

The purpose of this study is to test the hypothesis that there is a relationship between investment and demographic factors in the development of "depressed regions". For this, the authors have used such parameters as "Investments in fixed capital", "Number of employees", "Share of employees", "Structure of investments" for the analysis.

The scientific novelty of the study is to establish the relationship between these indicators, making it possible to formulate a list of measures of the state investment policy of "depressed regions", the implementation of which will ensure the inflow of investments necessary for the economy of such regions, and a considerable improvement of the demographic situation.

Literature review

It should be noted that depressed regions were distinguished first by Friedmann in the 1960s (Friedmann and Alonso 1964, Friedmann 1966). In his research, Friedman proposed the following typology of regions (Sokolov 2016): 1. Core regions, which develop through intellectual and information activities, service industries, and high-tech industries. These regions are focused on the use of advanced world experience, on the creation of basic innovations, on the formation of the necessary business environment and the living environment of local communities. 2. Ascending regions – their development is mainly due to the transfer of production from core regions to their territory. 3. Development corridors, which mainly develop due to the advantageous geographical position between core regions or between the core regions and the ascending ones. 4. Regions of the new development of natural resources, which develop due to new agricultural lands, forest and water resources, minerals, etc. 5. Descending or depressed regions characterized by: depletion of natural resources, instability of economic situation, outdated structure of production, lack of susceptibility to innovations, underdeveloped infrastructure and other factors constraining their socio-economic development.

Kukliński (1990) has also distinguished depressed regions in his typology of regions. He identified the following regions: 1. Creative and innovative regions, which can correspond to the core regions of Friedmann. 2. Adaptive regions, which correspond to the ascending regions, development corridors and the regions of new development in Friedmann's typology. 3. Conservative regions which correspond to the depressed regions of Friedmann (Sokolov 2016).

Depressed regions also include those regions that are characterized by the decline of major industries (Salik 2004). Therefore, we can conclude that depressed regions represent a separate group, which objectively indicates their presence, and it also confirms the relevance and importance of scientific research of this type of region to develop measures to overcome the depressive nature of their economies, taking into account the characteristics of these regions.

A large number of works are devoted to the development of depressed regions. In particular, some works (Isserman and Rephann 1995, Wood and Bischak 2000, Ezzell et al. 2012) analyze their current state, they identify factors and development trends, including the depressed districts of the Appalachian region, they offer new more accurate indicators for monitoring the socio-economic situation of these districts (Partridge et al. 2008), and they assess the relationship between entrepreneurship and their economic growth (Stephens and Partridge 2011), between infrastructure investments and economic growth (James et al. 2008).

At the same time, according to the analysis of the current state of open-source research, we can conclude that there are no studies which establish the connection between investment and demographic factors in the development of depressed regions. There is a small number of scientific works which, using the example of depressed regions of countries with a post-socialist economy, have analyzed their state and have realized an assessment of the relationship of economic factors of development and the transformation of the demographic sphere of these territories: population reproduction, fertility, migration, unemployment, education, etc.

So, some researchers (Fattakhov et al. 2016, Fattakhov et al. 2017, Fattakhov et al. 2019), on the example of statistical data of two Russian federal districts (Siberian and Volga regions) with several “depressed” regions, have studied the interaction of economic and demographic factors in the process of development of large cities. The researchers have established the existence of such influence. At the same time, we haven’t studied the relationship between investment and demographic factors in the development of “depressed” regions in this research.

Other researchers (Burkin et al. 2016) have evaluated the impact of economic factors on the main demographic indicators of the regions using the regression analysis of panel data. The objects of analysis are 80 constituent entities of the Russian Federation, including “depressed” regions. An assessment of such an influence can undoubtedly be used when choosing the methods for managing the social and economic development of “depressed” regions. At the same time, given the importance of a quick and substantial improvement in the demographic situation in these regions, and the need for external investments to get their economies out of the depressed phase of development, the most urgent issue is to establish a connection between the investment and the demographic factors of their development.

Such a relationship is partially considered by Russian scientists (Koreva and Boitcova 2013). The authors have stated that the investment in fixed assets per capita affects the number of births and the migration growth. It should be noted that this study is based on data for the Russian Federation in general, and it does not give an accurate idea of the relationship between these indicators in the case of “depressed” regions.

Krasnoperova (2017) considers the factors, including the demographic ones, which influence the economy of the depressed regions of post-socialist East Germany. Using the methods of regression analysis, the researcher concluded that the factor of the share of youth in the population, as well as a number of other demographic factors: migration growth, the share of students, etc. (Krasnoperova 2017), is crucial in transforming the socio-economic development of depressed regions.

Novotný et al. (2016) study the relationship between demographic development and the economic transformation of small towns (using the example of twelve small towns of Eastern Slovakia) (Novotný et al. 2016). The authors study the data obtained from the 1991 and 2011 censuses on the structure of the population by age, economic activity of the population, and work trips (outbound and inbound). The analysis shows that most small cities are characterized by population stagnation, changes in the job structure and a weak position in the regional economy. It means there is a link between these indicators.

Hapenciuc and Neamtu (2016) analyze the relationship between the gross domestic product per capita and the proportion of people with higher education, comparing the levels of education and economic development for 2000-2014 in the Romanian regions. Scientists have analyzed the relationship between the share of population with higher education and the gross domestic product per capita (Hapenciuc and Neamtu 2016). The results of the study state that the regions where the proportion of the population with higher education is low, there is a low gross domestic product per capita. If there are a large number of people with higher education in the region, its gross domestic product is bigger.

Hapenciuc et al. (2016) examine the relationship between the following indicators: "unemployment rate", "participation in education and vocational training", "employment percentage", and "gross domestic product" for 2000-2014, in order to identify the differences between regions in Romania (Hapenciuc et al. 2016). The authors present three categories of regions: in a favorable position, intermediate and in an unfavorable position.

Summarizing the foregoing, we have come to the following conclusion: the relationship between investment and demographic factors in the development of depressed regions hasn't been fully studied by foreign and Russian scientists; depressed regions, as an object of study, have not been fully considered. It confirms the high relevance and practical significance of this research.

Methodology

The present study has established the connection of investment factors with the number of employed people with the help of the pair correlation analysis. The pair correlation analysis, as a method of mathematical statistics, allows establishing a statistical relationship between two random variables. It is assumed that a change in one value leads to a systematic change in another value.

"Investments in fixed assets in de facto prices (million rubles)" and the "Number of employees at the age of 15-72 (thousand people)" were chosen as studied parameters. The correlation analysis was carried out from the point of view of the studied regions in the period from 2000 to 2018. The pair correlation coefficient was interpreted by the Cheddok scale. Thanks to the Cheddock scale, it becomes possible to transfer the quantitative value of the relationship of factors into a qualitative characteristic. The extreme values of the scale are weak coupling with a correlation coefficient from 0.1 to 0.3 and very high coupling with a coefficient from 0.9 to 0.99.

We carried out an one-factor analysis of variance in the PPP Statistica10RU in order to identify the most significant investment factors which influence the employment level of the studied regions. The main aim of this analysis is to find out how significant the difference between the averages is, with the help of comparison and the analysis of sample variances. Moreover, we have taken the specific part of the working population as a dependent variable in order to avoid the "population of the region" factor, which is mostly determined by the size of the Russian Federation subject.

We have assessed the influence of investments in fixed assets by types of fixed assets, ownership, sources of financing and types of economic activity. Thus, categorical predictors were these variables, also expressed in relative terms as a share in the investment structure. All variables used for the analysis were encoded on a scale of 1-2, where code 1 was assigned to variables with lower value, and code 2 was used for variables with a higher specific weight. The confidence limits (confidence interval) were reduced to 90% due to the limited number of observations. The results were analyzed according to the variation (SS) and confidence level

indicators (p). The total variation was divided by the sum of squares due to intragroup and intergroup variability. When the intragroup variation exceeded the intergroup variation, we made a conclusion about the significant influence of other uncontrollable factors that were not considered in the analysis. The p-level value for the studied variable, less than the declared 0.10, indicated the significance of this variable. We have confirmed the statistical significance of the considered factor by highlighting it in red.

Results

To establish the relationship between the studied values, we calculated the correlation coefficient for the period from 2000 to 2018, i.e. for 19 years. Table 2 demonstrates the results of the correlation analysis of the studied regions.

Table 2

Results of the correlation analysis
"Number of Employees" – "Investments in fixed assets"

Year	Correlation coefficient	Year	Correlation coefficient	Year	Correlation coefficient
2000	0.8096	2007	0.9566	2014	0.9166
2001	0.8288	2008	0.9568	2015	0.8363
2002	0.8694	2009	0.9152	2016	0.8372
2003	0.8689	2010	0.8761	2017	0.8552
2004	0.9459	2011	0.9004	2018	0.9095
2005	0.9729	2012	0.9058	–	–
2006	0.9651	2013	0.9520	–	–

The values of the pair correlation coefficients, ranging from 0.81 to 0.97, indicate the presence of a strong positive relationship between such factors as "investment in fixed assets" and the "number of employed population" defined for the studied regions. The coefficient fluctuations reflect a slight change in the strength of communication from "high" to "very high", which is associated with a change in the value of investments, as well as the influence of external variables, such as changes in the age of the population, migration, and others.

But at the same time, a comparison of indicators "Number of employees at the age of 15-72 (thousand people)" (kn) and "Investments in fixed assets in comparable prices (million rubles)" (ki), in 2017 in relation to 2000, showed a disproportion expressed in the fact that if the number of the working population is decreasing, the economy of depressed regions has an increasing volume of investment (Fig. 1).

We explain this result by the fact that recently there has been a constant outflow of the population from the studied regions, accompanied by a decrease in the number of working population, where the most marked negative migration is typical for the Kirov and Kurgan regions. The results are not typical for the Russian Federation as a whole (the investment volume in comparable prices increased by 6.31 times, and the change in the number of working people by 1.05 times).

According to the analysis of variance, the influence of the investment structure by types of fixed assets is insignificant. In all categories of fixed assets (dwellings, buildings – except residential, and structures, cars, equipment, vehicles, etc.), the p-level turned out to be higher than the p = 0.1 stated for analysis. It means that the investments in certain types of fixed assets are

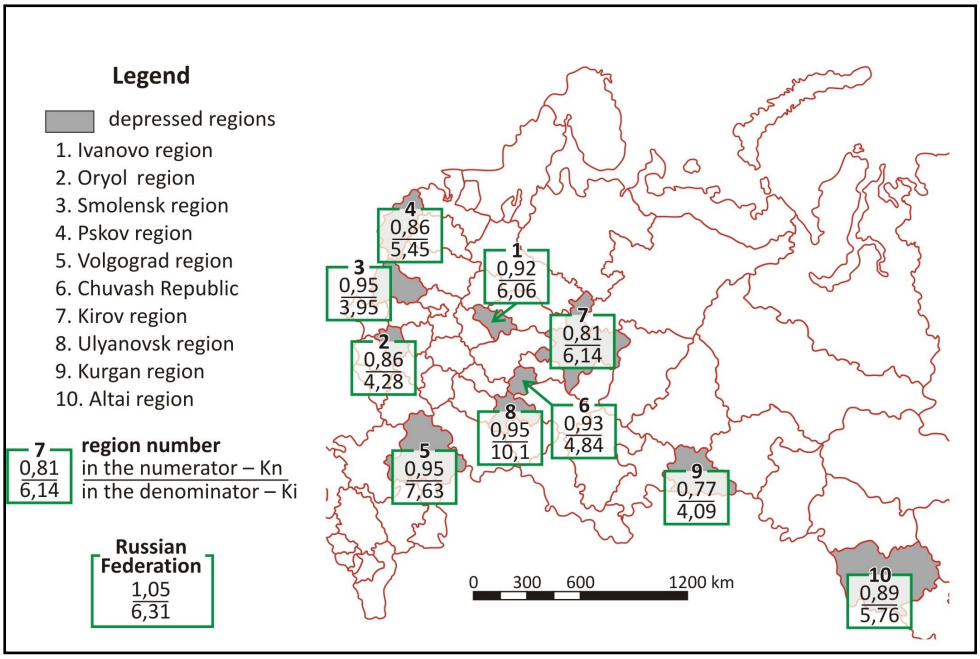

Fig 1 - **The ratio of the values of the indicator "Number of employees at the age of 15-72 (thousand people)", in 2017 to 2000 (kn); Ratio of the indicator "Investments in fixed assets in comparable prices since 2000 (million rubles)", in 2017 to 2000 (ki)**
Source: *made by the authors based on Rosstat (2010, 2017, 2018)*

equivalent. That is, changing the structure of investments by types of fixed assets does not influence much on the number of working population.

Having analyzed how the investment structure is influenced by ownership, it was revealed that the most significant are the investment resources aimed to develop the objects in Russian property (Table 3), regardless of the type of ownership (state, municipal, private, mixed). The p -level value for the studied factor, equal to 0.039969, is lower than the p = 0.10 stated for the analysis, which indicates a high influence of the Russian property variable on the number of people employed in various areas of the national economy. The value of the intragroup variation SS = 1.42857, which exceeds the intergroup variation SS = 1.07143, indicates the influence of other factors on the dependent variable.

When analyzing the impact of investments structured by sources of financing, we have found out that the funds from the federal budgets have the greatest influence on "the level of employment of the population". Other factors are also strongly influenced here, as evidenced by the sum of SS squares equal to 1.42857, due to the intragroup dispersion.

Thus, the most influential are the investment funds from the federal budget which are invested in the development of objects owned by the Russian Federation. Since the investment in fixed assets of enterprises and organizations engaged in the national economy is aimed to develop business entities, and the growth of production volumes unambiguously contributes to the employment development, the first one is a result of increased state control over the distribution of investments, and the second one is a result of increased commercial efficiency,

the viability and attractiveness of business entities.

It is very important to analyze how investments influence the level of the working activity of the population depending on the investment distribution by type of economic activity. “Production and distribution of electricity, gas and water” and “Transport and communications” turned out to be significant.

Table 3

Analysis of variance for variables “The proportion of employed population” – “The investment structure in fixed capital by economic activity”

Indicator	SS	p
1. “Structure of investment in fixed capital by ownership forms: Russian property”	1.07143	0.039969
Other factors	1.42857	–
2. “Structure of investment in fixed capital by sources of financing: Raised funds (the federal budget)”	1.07143	0.039969
Other factors	1.42857	–
3.”Economic activities: production and distribution of electricity, gas and water”	0.90000	0.066688
Other factors	1.60000	–
4. “Economic activities: transport and communications”	1.07143	0.039969
Other factors	1.42857	–

Table 4

Distribution of the average annual number of employees by types of economic activity in 2016 (as a percentage of the total number of employees) – fragment

	Subject of the Russian Federation	The average number of employees (thousands of people)	Manufacturing industries	Wholesale and retail trade; repair of motor vehicles, motorcycles, household goods and personal items	Production and distribution of electricity, gas and water	Transport and communication
1.	Ivanovo region	536	23.9	20.2	3.8	6.0
2.	Oryol Region	385	16.5	17.8	2.9	7.6
3.	Smolensk region	519	18.9	17.4	4.7	9.5
4.	Pskov region	334	15.9	16.1	3.9	8.9
5.	Volgograd region	1289	13.9	19.6	3.0	8.3
6.	Chuvash Republic	646	19.6	16.3	2.1	5.3
7.	Kirov region	680	19.9	17.3	3.5	6.7
8.	Ulyanovsk region	653	21.9	16.5	3.5	7.4
9.	Kurgan region	411	16.2	17.3	3.5	7.0
10	Altai region	1159	13.5	19.1	3.1	7.4

Source: *compiled by the authors on Rosstat (2017)*

Table 5

Distribution of the average annual number of employees by types of economic activity in 2018 (as a percentage of the total number of employees) – fragment

	The subject of the Russian Federation	The average annual number of employees (thousand people)	Manufacturing	Wholesale and retail trade; repair of motor vehicles and motorcycles	Providing electric energy, gas and steam; air conditioning	Transportation and storage	Information and communications
1.	Ivanovo region	444.9	23.5	22.1	3.4	5.3	1.5
2.	Oryol Region	314.5	16.7	18.4	2.5	6.3	1.9
3.	Smolensk region	432.5	19.1	18.2	4.0	8.6	2.0
4.	Pskov region	282.7	15.8	16.5	2.8	8.3	1.2
5.	Volgograd region	1140.6	13.6	19.8	2.1	7.1	1.6
6.	Chuvash Republic	516.8	20.4	16.1	1.8	4.4	1.5
7.	Kirov region	585.4	20.1	17.4	3.0	5.5	1.8
8.	Ulyanovsk region	570.9	22.0	16.7	2.8	6.2	2.1
9.	Kurgan region	326.0	18.0	17.8	2.9	6.0	1.4
10	Altai region	1023.4	13.0	18.9	2.6	6.6	1.9

Source: *compiled by the authors on Rosstat (2019)*

It is impossible to explain the revealed dependence by a higher “number of working population” employed in these industries, since there are industries with a much larger number of employed people, such as “Manufacturing industries” and “Wholesale and retail trade; repair of motor vehicles, motorcycles, household goods and personal items” (Table 4).

We can see a similar picture for 2018. Due to the changes in certain forms of data presentation by Rosstat, Table 5, in addition to the standard type of economic activity “Manufacturing”, presents the indicators: “Wholesale and retail trade; repair of motor vehicles and motorcycles”, “Provision of electric energy, gas and steam; air conditioning”, “Transportation and storage” and “Information and communications activities”.

Fig. 2 graphically shows the specific weight of the average annual number of the employees by certain types of economic activity, in comparison.

Discussion

The authors explain the revealed patterns by the presence of the following premises. The significance of energy, gas, steam and water supply activities is currently increasing. Russia is one of the world’s largest energy producers of various types. A leading sector of the economy is also the gas industry. Moreover, the country takes the first place in the world in terms of drinking water and technical water consumption. In addition, there are several thousand enterprises specializing in this field in Russia, and social stability in the society depends on the success of its development, since electricity, gas, water supply of public and residential buildings is a prerequisite for their normal functioning, and the uninterrupted supply of these types of resources to industrial facilities determines the successful and dynamic economic development of Russia (Pronin 2009).

"Transport and communications also play one of the leading economic, political and strategic roles for the development of the country... The most important branches of the infrastructure of any state are transport, road facilities, communications and information technology. They provide production and interregional ties (Fetisov 2003). This determines the importance of investments in this sector of the national economy, on the quantitative and qualitative component of which the economic well-being of the Russian Federation depends directly.

Our findings confirm a higher proportion of the gross value added of these areas of the economy in the sectoral structure compared with the national indicators, which is typical for most of the studied regions. Thus, for example, if in the Russian Federation, in 2018, the average weight in the structure of gross value added of "Providing electric energy, gas and steam; air conditioning" was 3.5%, in the Ivanovo region this value was 5.0%, in Smolensk region – 8.2%, in Pskov Region – 3,6%, in Chuvash Republic – 4.1%, in Ulyanovsk Region – 3,6%, in Kurgan Region – 7,8%. In the "Transportation and storage" sector, half of the regions correspond to the identified patterns.

Thus, the increase in investment inflows into the fixed assets of enterprises operating in the studied regions and in industries "Providing electric energy, gas and steam; air conditioning", "Transportation and storage" and "Information and communications", from the federal budget, will increase the number of the working population and, consequently, it will reduce the level of unemployed people, the migration outflow, the full use of labor resources and the capacity, the increase in tax deductions and, in general, the speed development of the economy and the social sphere in the regions classified as "depressed".

Conclusions

The authors of the study have confirmed that there is a connection between the investment and demographic factors characterizing the development of depressed regions. Also, the authors have established a relationship between the number of working population in the studied regions and the volume of investment in the fixed assets. Also, they have shown the influence of investment inflows, structured by the type of economic activity, on the labor activity of the population in the depressed regions. The most significant turned out to be such types of economic activities as "Production and distribution of electricity, gas and water" and "Transport and communications". According to the research results, the investments from the federal budget aimed to develop the objects owned by the Russian Federation are the most significant in terms of increasing the employment level of the population.

Thus, we can underline that it is impossible to solve the socio-economic problems of "depressed regions", subjects of the Russian Federation, without the participation of the federal center. At this level, it is necessary to develop and to implement a coordinated investment, demographic and migration policy adapted for the depressed subjects of the Russian Federation, which have a common goal – to preserve labor resources, to increase the direct investment and, ultimately, to overcome the economic lag. The main objective of the investment block of such a policy is to reduce the outflow of private capital from depressed areas while increasing investment in the development of federal-owned facilities, primarily infrastructure objects employed in transport, communications, production and distribution of electricity, gas and water, as they demonstrate the highest efficiency in terms of maintaining employment and creating new jobs. The need to create new jobs in depressed regions is proved by research from other countries with economies in transition that have confirmed the limited ability to improve employment by migrating to more developed regions (Fidrmuc 2004). It does not diminish the role of the private sector, where the development of public-private partnerships in the form of vertically integrated structures is a promising direction. Moreover, one of the important tasks is to optimize the size, composition and structure of the public

sector. Such a policy will contribute to the development of the studied regions, it will avoid their conservation in the existing state, and it will reduce the uneven development of the constituent entities of the Russian Federation. We recommend researching further the mutual influence of other socio-economic factors affecting the development of depressed territories.

References

BURKIN M. M., MOLCHANOVA E. V., KRUCHEK M. M. (2016), *Integral criterion of the influence of social, economic and environmental factors on the regional demographic processes*, Ekologiya cheloveka (Human Ecology) 6, 39-46.

CHERNYSHEV K. A. (2017), *The study of permanent migration of economically depressed regions*, Economic and Social Changes: Facts, Trends, Forecast 10 (4), 259-273.

EZZELL T., LAMBERT D., OGLE E. (2012), *Strategies for Economic Improvement in Appalachia's Distressed Rural Counties: An Analysis of Ten Distressed and Formerly Distressed Appalachian Counties*, Appalachian Regional Commission, Retrieved from: www.arc.gov.

FATTAKHOV R. V., ABDULOVA L. R., ORESHNIKOV V. V. (2016), *Analyzing and assessing the interaction of parameters of demographic and economic development of regions and cities: the Volga Federal District case*, Economic Analysis: Theory and Practice 2, 77-90.

FATTAKHOV R. V., NIZAMUTDINOV M. M., ORESHNIKOV V. V. (2017), *Toolkit to justify the parameters of the strategic development of the region based on adaptive imitation modeling*, Region: Ekonomika i Sotsiologiya 1, 101-120.

FATTAKHOV R. V., NIZAMUTDINOV M. M., ORESHNIKOV V. V. (2019), *Assessment of the Sustainability of the Socio-economic Development of the Regions in Russia*, The World of New Economy 13 (2), 97-110.

FETISOV V. (2003), *The budget system of the Russian Federation: textbook for universities*, UNITY-DANA, Moscow.

FIDRMUC J. (2004), *Migration and regional adjustment to asymmetric shocks in transition economies*, Journal of Comparative Economics 32 (2), 230-247.

FRIEDMANN J. (1966), *Regional development policy: A Case Study of Venezuela*, The MIT Press, Boston.

FRIEDMANN J., ALONSO W. (eds.) (1964), *Regional development and planning: a reader*, The MIT Press, Cambridge, MA.

GRIGORIEVA L. M., ZUBAREVICH N. V., KHASAEV G. R. (eds.) (2011), *Russian regions: economic crisis and problems of modernization*, TEIS, Moscow.

HAPENCIUC C. V., NEAMTU D. M. (2016), *Comparative analysis of the geographical disparities regarding the level of education of the population and the level of economic development in Romania and in the regional profile*, Ecoforum 5 (2), 35-45.

HAPENCIUC C.-V., NEAMTU D.-M., BEJINARU R. (2016), *Comparative statistical analysis of existing differences in the regional development of Romania regarding the main socio-economic indicators*, Strategica 560-574.

ISSERMAN A., REPHANN T. (1995), *The economic effects of the Appalachian Regional Commission: an empirical assessment of 26 years of regional development planning*, Journal of the American Planning Association 61(3), 345-364.

JAMES K., LEIN K., DAY L. (2008), *Assessing the growth-inducing impact of the Appalachian Development Highway System in southern Ohio: Did policy promote change?*, Land Use Policy 25 (4), 523-532.

KOREVA O., BOITCOVA T. (2013), *Analysis and evaluation of the impact of individual factors on the state of the modern demographic situation in the Russian Federation*, Naukovedenie 6, 16EVN613.

KRASNOPEROVA I. (2017), *Factors of transformation of the socioeconomic development in the depressed regions of Germany*, Vestnik Moskovskogo Universiteta, Seriya 5: Geografiya 6, 79-87.

KUKLIŃSKI A. (1990), *Globality versus locality*, University of Warsaw, Warsaw.

NOVOTNÝ L., CSACHOVÁ S., KULLA M., NESTOROVÁ-DICKÁ J., PREGI L. (2016), *Development Trajectories of Small Towns in East Slovakia*, European Countryside 8 (4), 373-394.

PARTRIDGE M. D., LOBAO L., JEANTY W., LIONEL J. (2008), *"Bo" Beaulieu, and Stephan Goetz. 2008. An Assessment of Alternative Measures for Determining Economically Distressed Counties and Areas in the Appalachian Region*, Appalachian Regional Commission, Retrieved from: www.arc.gov.

PRONIN N. (2009), *The problem of assessing the risks of investing in the production and sale of electricity, gas and water*, Bulletin of the Moscow State Regional University, 44-49.

ROSSTAT (2010), *Regions of Russia: Socio-economic indicators*, Rosstat, Moscow.

ROSSTAT (2017), *Regions of Russia: Socio-economic indicators*, Rosstat, Moscow.

ROSSTAT (2018), *Regions of Russia: Socio-economic indicators*, Rosstat, Moscow.

ROSSTAT (2019), *Regions of Russia: Socio-economic indicators*, Rosstat, Moscow.

SALIK D. (2004), *The Regional competitiveness: some notions*, in: Rezep V. J., Competitiveness: a general approach, RECEP's Reports, Rus.-European center of econ. politics.

SELIVERSTOV V., BANDMAN M., GOUZNER C. (1996), *Methodological basis for the development of a federal program to help depressed and backward regions*, Region: Economics and Sociology, 3-43.

SOKOLOV S. (2016), *Socio-economic regionalization of Western Siberia using the methodology of John Friedmann*, Economics and the Banking System: Theory and Practice, 345-350.

STEPHENS H. M., PARTRIDGE M. D. (2011), *Do Entrepreneurs Enhance Economic Growth in Lagging Regions?*, Growth and Change 42 (4), 431-465.

WOOD L. E., BISCHAK G. A. (2000), *Progress and Challenges in Reducing Economic Distress in Appalachia: An Analysis of National and Regional Trends since 1960*, Appalachian Regional Commission, Retrieved from: www.arc.gov.

ZUBAREVICH N. (2019), *Inequality of regions and large cities of Russia: what was changed in the 2010s?*, Obshchestvennye nauki i sovremennost 4 (C), 57-70.

Initial submission: 25.05.2019
Revised submission: 14.04.2020
Final acceptance: 29.05.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 125 - 144
https://doi.org/10.37043/JURA.2021.13.1.8

EVALUATION OF REGIONAL DEVELOPMENT WITH BANKING AND FINANCE DATA

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Abstract: This research aims to measure the change of provincial development levels of Turkey's 81 provinces through banking sector data. The applied methodology is the Malmquist Total Factor Productivity Index (MTFPI). We perform the analysis based on two models. The main difference between models relies on handling the factor associated with 'loans'. The first approach sees the loans as an output factor, which is based on the idea that loans indicate investment and therefore development. In the second model, we take the loans as an input factor, which represents the idea that loans indicate debt and therefore they should be minimized. We evaluate the findings with respect to geographical classification and the province development index.

Key Words: *regional development, banking system, data envelopment analysis, Malmquist Total Factor Productivity Index.*

Introduction

Measuring regional development levels is important in shaping micro and macro planning. Such measurements can provide insight on what to be prioritized in policies or investments while generating long-term development plans, as well as, it is possible to identify potential allocation areas for the resources and funds in the short-term. Having an idea on the level of financial, intellectual and environmental development at the regional level is beneficial for identifying reference provinces and preparing improvement policies for the undeveloped ones. Accordingly, various research can be found that evaluate the financial, intellectual and environmental aspects of regional development at the provincial level. The studies address a variety of issues, such as: identifying how effective the resources of provinces are used (Giffinger et al. 2007, Ulucan and Atıcı 2010, Giffinger and Haindlmaier 2010, Raźniak et al. 2015); evaluating life quality in order to position the well-being of countries on a provincial basis (Zhu 2001, Morais and Camanho 2011, Carboni and Russu 2015); determining the level of provinces in terms of planning services (Lahdelma et al. 2002, O'Connor 2010); assessing environmental development (Hanson et al. 2011, Sheng and Tang 2016); evaluating intellectual development (López-Ruiz et al. 2014, Nitkiewicz et al. 2014); and the measurement of competitiveness among provinces (Kourtit et al. 2013, Singhal et al. 2013a, Singhal 2013b).

Regional development is highly associated with regional prosperity. For measuring the level of prosperity (therefore development) in a given region, the banking data, as well as the economic indicators, can play a key role since they have the potential to give an idea on the financial structure of the region. Such data can reveal how the money is distributed between deposits and loans, which indirectly provides insight on the financing of the investments within the region. Provincial-level evaluations using economic indicators (such as employment level, tax revenues, imports, exports, size of the manufacturing industry in the given region, etc.) is very common in evaluating regional development levels.

In this research, we aim to incorporate a financial perspective to such evaluations using the banking data of the provinces together with other indicators. The banking data used in this study include different types of loans (personal, sectoral and non-cash sectoral loans) given out

by the bank branches and deposits (deposits and foreign exchange deposits) in the branches at provincial level. Together with indicators such as employment, participation rate in the labor force, imports, exports and several indicators on investors, we aim to come up with a multi-dimensional measure of regional development with respect to the economic and financial structure in 81 provinces of Turkey to reflect the level of prosperity as well. The analysis is intending to evaluate the period following the 2008 crisis for which there exists a prevalent claim that the Turkish financial sector has experienced the effects of this crisis less severely than the western economies (Yörükoğlu and Atasoy 2010, Kibritci Artar and Atilgan Saridoğan 2012).

Data Envelopment Analysis (DEA) is a widely used methodology to evaluate relative performance in the presence of multiple dimensions (input and output) in the intended evaluations. It is a non-parametric method applied in both micro and macroeconomic levels since its introduction by Charnes et al. (1978). DEA provides a relative measurement of efficiency for the evaluated units. This is done by comparing the evaluated unit's performance with an efficient frontier using linear programming. In its standard use, the method measures the relative efficiency at a point in time. Because it is a relative measure, the efficiency measured at one point in time is relative to the given period's frontier. When the evaluation period changes, the frontier also changes and, therefore, the efficiency measure in a given period may not be comparable with the next period's measure. Building upon these facts on the DEA measures, the Malmquist Total Factor Productivity Index (MTFPI) has been developed (Caves et al. 1982, Färe et al. 1992) to measure the changes over time by considering both changes in efficiency and the shift on the frontier from one period to another.

Our evaluations intend to involve the handling of multiple indicators as well as multiple periods (2009-2014). Therefore, in measuring the provincial level financial performance, we use DEA and MTFPI to observe the movement of the measures over time. With the use of these methods, the efficiency score of each province and its change over time are measured relative to all other provinces. We interpret the findings relying on the existing measure of the Provincial Development Index (PDI) developed by Gül and Çevik (2015), classifying the provinces of Turkey into 5 clusters relying on their development level. Regarding the model design, we undertake the problem with two main approaches. The main difference between these two approaches relies on handling the factor associated with 'loans'. The first approach sees the loans as an output factor, which relies on the idea that loans indicate investment and therefore development. On the contrary, in the second model, we take the loans as an input factor, which relies on the idea that loans indicate debt and therefore they should be minimized.

The current research evaluates the provincial development levels in Turkey and its change over the years followed by the 2008 crisis, leaning on the idea that banking data can provide additional perspective (regarding prosperity) to the assessment of regional development. Commonly used economic factors are not ignored during evaluations, and instead, banking sector data is articulated into conventional variables, resulting in a comprehensive look at regional development. Inserting new dimensions to the problem enabled us to interpret the provinces' development level from a different angle, by discussing the provincial-level results concerning the current classification regarding development. This provides us to observe how the provinces that are currently identified as developed or underdeveloped perform with respect to the models involving both economic and financial criteria. The results may reveal potential improvement areas and the provinces that require attention in managing regional development. The findings are also interpreted concerning the GDP change during the same period, which reveals a similar pattern in one of the approaches.

The paper is organized as follows: Section 2 presents the basics of the DEA and MTFPI methodologies. Section 3 is devoted to empirical application. We introduce the data set, discuss the model design and present the findings in this section. Finally, Section 4 concludes.

Methodology

The Malmquist Total Factor Productivity Index (MTFPI) is a Data Envelopment Analysis (DEA) based approach that allows the efficiency measurement over a certain period (Malmquist 1953, Caves et al. 1982, Färe et al. 1992). MTFPI measures the change in total factor productivity between two data points by calculating the ratios of the differences of each data point relative to the efficient frontiers of production technologies in each period. The distance function is used for the measurement. It is a nonparametric measure of productivity change which also contains information about the source of this change. The index represents the magnitude of improvement (or decrease) in the productivity of the evaluated unit from period t to $t+1$. The calculation of the index relies on the evaluation of the unit in both periods c and $t+1$ followed by cross evaluations of each period's performance within the data of the other period by making use of the fundamental CCR DEA model developed by Charnes et al. (1978). To calculate the MTFPI for each unit, DEA linear programs should be solved.

Let us consider n decision-making units. We assume that each decision-making unit j for $j = 1,2,\ldots,n$ uses m different inputs x_{ij}. For $i = 1,2,\ldots,m$ and it produces s different outputs. Y_{rj} For $r = 1,2,\ldots,s$. Let ϕ represent the efficiency score for unit o. Variables λ_j are introduced corresponding to each decision-making unit ($i = 1,2,\ldots,m$)to form a Production Possibility Set (PPS) consisting of observed units, their convex combinations, scaled units (because the constant returns to scale are assumed) and outperformed units. The units on the boundary (frontier) of the PPS are defined as efficient and they attain the efficiency score of 100%, where the efficiency scores for others are measured relative to the frontier. The linear programming formulation to calculate the efficiency score of unit o is given below:

$$
\begin{aligned}
&Max\ \phi && && (1)\\
&s.t. && &&\\
&\textstyle\sum_{j=1}^{n}\lambda_j x_{ij} \le x_{io} && i = 1,2,\ldots,m &&\\
&\textstyle\sum_{j=1}^{n}\lambda_j y_{rj} \ge \phi y_{ro} && r = 1,2,\ldots,s &&\\
&\lambda_j \ge 0 && j = 1,2,\ldots,n &&
\end{aligned}
$$

In general, DEA models provide the efficiency measurement at a point in time. Let

$$D_o^t(x^t, y^t) = \phi$$

In order to measure the change from one period to another, the MTFPI is calculated for each unit. MTFPI consists of two components as Efficiency Change and Technological Change. Efficiency Change refers to the ratio of efficiency score in period $t+1$ to the efficiency score in period t. This measure itself is not enough to identify the change in productivity from one period to another because these scores are relative to different frontiers. Therefore, it is essential to measure the change in the frontier from one period to another. This is the second component of the MTFPI, known as technological change. The calculation of Efficiency Change (EC) and Technological Change (TC) components for a unit are given below:

$$EC = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \quad (2)$$

$$TC = \left[\left(\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})}\right) * \left(\frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)}\right)\right]^{1/2} \quad (3)$$

Once both components are calculated relying on the linear programs, the MTFPI of a unit is calculated as given below (given as $M_o(x^{t+1}, y^{t+1}, x^t, y^t)$ to represent the change from period t to $t+1$.

$$M_O(x^{t+1}, y^{t+1}, x^t, y^t) = \left[\left(\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)}\right)\left(\frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^t, y^t)}\right)\right]^{1/2} \quad (4)$$

Data Envelopment Analysis (DEA) and related methodologies such as Malmquist Total Factor Productivity Index (MTFPI) can be counted in the commonly used methods to measure the relative performance of provinces regarding regional development. MTFPI enables the application of DEA in multiple periods. Among the accounted research above, several DEA and its associate methods (e.g. Super Efficiency, Fuzzy DEA, Malmquist Total Factor Productivity Index) have been applied to different types of provincial data to come up with identifying efficiency levels as well as a ranking of the provinces (for examples, see Zhu 2001, Giffinger and Haindlmaier 2010, Ulucan and Atıcı 2010, Morais and Camanho 2011, Kourtit et al. 2013, Nitkiewicz et al. 2014, Carboni and Russu 2015, Wang et al. 2016, Chen 2017, Li et al. 2017, Li et al. 2018, Deilmann et al. 2018, Cao et al. 2019).

Banking is one of the major areas where DEA and MTFPI are also applied (some examples include Paradi and Schaffnit 2004, Thoraneenitiyan and Avkıran 2009, Paradi et al. 2011, Piot-Lepetit and Nzongang 2014, Alves et al. 2020, Christopoulos et al. 2020). DEA is also used to evaluate the performance of financial institutions (Sufian 2008, Cummins et al. 2010) and micro -finance institutions (Gutiérrez-Nieto et al. 2009, Biener and Eling 2011, Bassem 2014).

Results

Data

In measuring the regional development at provincial-level in Turkey, we undertook 16 variables (input and output factors). The set of factors involves economic indicators (such as employment level, tax revenues, imports, exports, size of the manufacturing industry in the given region, etc.) which are very common in evaluating the regional development levels. We benefited from the previous literature while identifying these variables (Atan et al. 2004, Düzakın 2009, López-Ruiz et al. 2014, Nitkiewicz et al. 2014, Piot-Lepetit and Nzongang 2014, Carboni and Russu 2015). Within the scope of the research, we aim to incorporate a financial perspective to the evaluations using the banking data of the provinces together with other indicators. Therefore, the set of factors also includes factors from the banking sector in the provinces of Turkey. All factors used in the study are explained below.

The factors related to the labor force (Turkish Statistical Institute 2016):

- *Participation Rate in Labor Force* represents the total number of people participating in the labor force in provinces between 2009 and 2014.

- *Employment Rate* represents the total number of employees hired in provinces between 2009 and 2014.

The factors related to the manufacturing industry (Turkish Ministry of Science, Industry and Technology).

- *Number of Workplaces in Manufacturing Industry* refers to the total number of active firms in the period of 2009-2014.
- *Net Sales in Manufacturing Industry* refers to net sales of firms (in Turkish Liras) by the end of the year between 2009-2014.

The factors related to the banking sector (Banking Regulation and Supervision Agency 2016):

- *Personal Loans* are cash credits used by individuals. It includes personal finance credit, vehicle loan, commercial personal finance credit, and mortgage loan.
- *Sectoral Loans* are cash loans provided for small, medium and large-sized commercial enterprises for commercial goods and services purchase as their legal entity.
- *Deposits* are bank accounts that contain money deposited to withdrawn at any time or the end of a specific term or notice. This variable refers to the sum of all types of deposit accounts (Turkish Lira) in banks of provinces.
- *Foreign Exchange Deposit (FED) Account* refers to the sum of all foreign exchange deposit accounts in banks of provinces. (Measured in Turkish Lira conversion).
- *Total TL+FED* refers to the sum of all accounts in banks of provinces (measured in US Dollars).
- *Non-Cash Sectoral Loans* are bank's credit facility by giving guarantee and bail in favor of legal entities and appropriate credits for the sector of legal entities with the aim that they could sustain their import and export activities. Letter of guarantee, external letter of guarantee and letter of credits are included in this loan group.

The factors related to investment potentials (Central Registry Agency 2016):

- *The number of Investors* refers to the number of individual investors registered in a certain province and transacting in the stock market.
- *Total Account Balance* refers to the total account balance amount of individual investors registered in a certain province and transacting in the stock market.

The Factors associated with contribution foreign trade (Turkish Statistical Institute 2016):

- *Import* represents total annual import activities carried out in provinces (measured in Turkish Liras).
- *Export* represents total annual export activities carried out in provinces (measured in Turkish Liras).

Other Factors:

- *Tax Revenues* represent the provincial-based tax revenues (in Turkish Liras). We acquire data from the Turkish Revenue Administration (2016).
- *Energy Consumption* expresses the total electrical energy consumed throughout a year in provinces as MWh. It measures the total electricity consumption of both industry and household in the provinces. The data source is the Turkish Statistical Institute.

Note that the factors associated with banking cover three main types of banks operating in Turkey: Deposit Banks, Participation Banks (Interest-free banks) and Development & Investment Banks. All categories include sub-categories as public, private and foreign banks. The data is collected from the database of the Banking Regulation and Supervision Agency of

Turkey at provincial level for all types.

Findings

We establish two models in handling the factors listed above. The controversy is related to the factors related to 'loans'. We approach these variables from two perspectives. The first approach looks at the loans as an output factor, which relies on the idea that loans indicate investment and therefore development. On the contrary, in the second model, we capture the loans as input factors, relying on the idea that loans indicate debt and therefore they should be minimized. This means that for loans, we have "*the more is better*" in one model and "*the less is better*" in another, respectively. Hence, we consider the factors associated with loans in our models as proxies of investment or indebtment in the given region. Below, we provide the findings of both models.

Model 1: Loans as Outputs

The model includes 9 outputs and 7 inputs that 81 provinces and the data from 2009-2014. Inputs and outputs used in the analysis are given in Table 1. Scores for each province are presented in Table A1 of the Appendix.

Fig. 1 presents the movement of the Malmquist Total Factor Productivity Index (MTFPI) over years together with its components. The MTFPI moves along with the technological change component in the period of 2009-2014. 2009-2010 is the most progressive period, while the most decrease is observed in the 2011-2012 period. The efficiency change component is more stable, in general. This shows that the changes in MTFPI are mostly caused by the shift in the investment environment (represented by technological change), rather than the individual changes in the financial structure of provinces (that can be embodied by the efficiency change component). Taking 2009 as the base year, the relationship between technological change and MTFPI can also be observed in Table 2. While the efficiency change component decreases

Table 1

Input and Output Factors for Model 1

Inputs	Outputs
Participation Rate in Labor Force	Personal Loans
Employment Rate	Sectoral Loans
Number of Workplace in Manufacturing Industry	Deposits (Turkish Lira)
Net Profit In Manufacturing Industry	Deposits (Foreign Exchange)
Import	Total Deposits
Export	Non-Cash Sector Loans
Energy Consumption	Tax Revenues
	The Number of Investors
	Total Account Balance

with the rate of 1% between the years of 2009-2014, the technological change component increases by 76%, resulting in a 75.4% increase in total productivity.
Since it is observed that technological change is dominant in increasing the total productivity, it is reasonable to observe its relationship with the GDP growth in the country over the given period. Fig. 2 presents the GDP Increase with MTFP. Generally, the GDP increase rate of

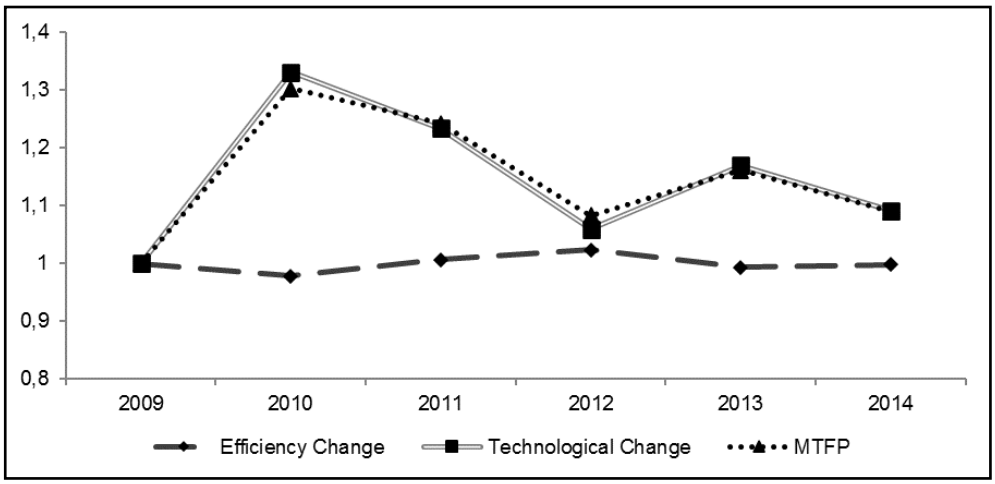

Fig. 1 - **MTFP Change by Year (Model 1)**

Turkey and the total factor productivity change seem to be parallel with each other. This is a sign that economic growth over the given period has a reflection on local development.

Fig. 3 shows the change in total factor productivity based on PDI. The results are interesting. Between 2002 and 2014, category 5, which consists of the least developed provinces, exhibit the largest progress. Category 4 has also experienced growth between 2010 and 2011. The

Table 2

Change in Cumulative Efficiency by Years (Model 1)

Years	Efficiency Change	Technological Change	Total Factor Productivity
2009	1	1	1
2010	0.978	1.331	1.302
2011	0.984	1.642	1.617
2012	1.006	1.739	1.751
2013	0.999	2.033	2.033
2014	0.997	2.218	2.214
Geometric Mean	**0.993**	**1.765**	**1.754**

least progress is observed in the most developed category. These findings may indicate that the growth in the post-crisis period seems to be deployed at different levels throughout the country. It is observed that the categories with the least developed provinces (category 4 and category 5) experience a noticeable growth relative to the other categories.

Model 2: Loans as Inputs

The model includes 6 outputs and 10 inputs of 81 provinces and the data from 2009-2014. The inputs and outputs used in the analysis are given in Table 4. The scores for each province are presented in Table A2 of the Appendix.

Fig. 4 presents the movement of the Malmquist Total Factor Productivity Index (MTFPI) over the years based on Model 2 together with its components. The largest fluctuation has been

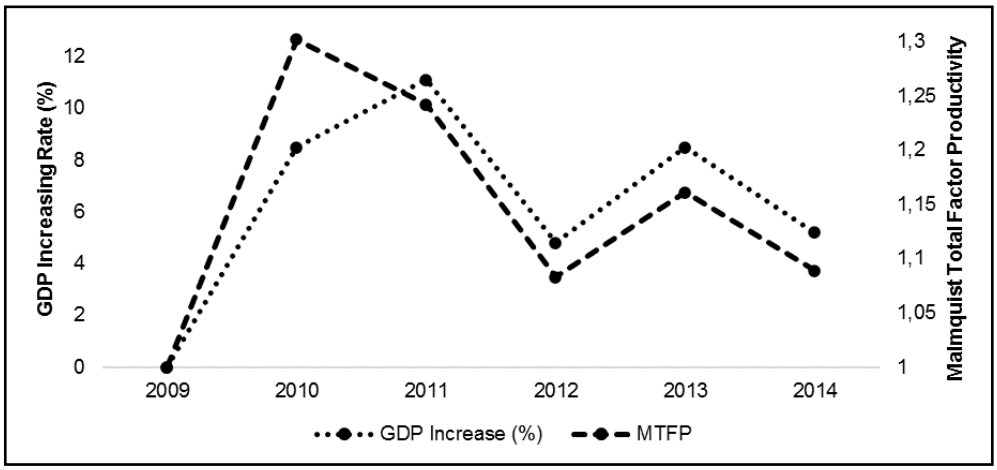

Fig. 2 - **GDP Growth Rate and Comparative MTFPI Chart (Model 1)**

Table 3

Province Classification of PDI

	Category 1	Category 2	Category 3	Category 4	Category 5
# of Provinces	6	17	27	14	17

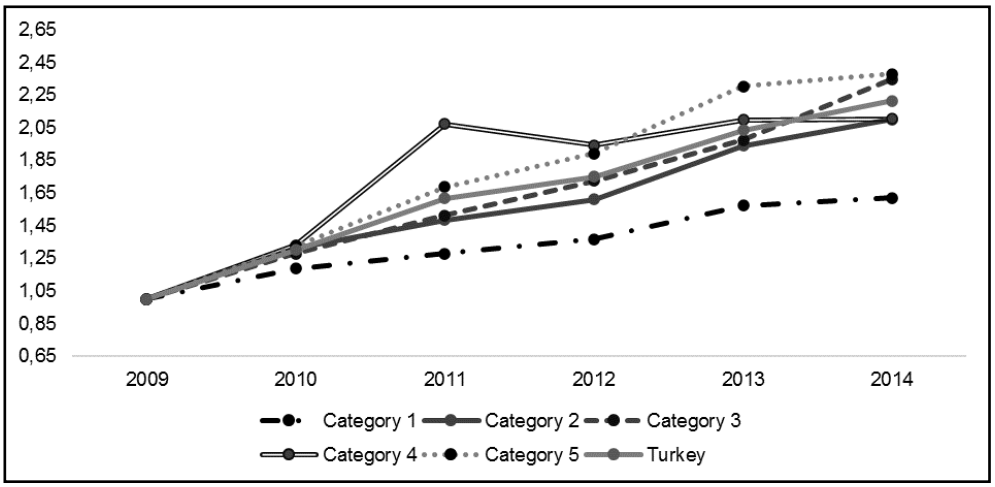

Fig. 3 - **Total Factor Productivity Change by PDI (Model 1)**

observed between the years 2009-2011. In this model, MTFPI also moves along with the technological change rather than the efficiency change. The directions are opposite with the Model 1 findings since the factors have changed sides.

Table 5 reveals the MTFPI over the years and it indicates a decrease in terms of total

Table 4

Input and Output Factors for Model 2

Inputs	Outputs
Participation Rate in Labor Force	Deposit (Turkish Lira)
Employment Rate	Deposit (Foreign Exchange)
Number of Workplace in Manufacturing Industry	Total Deposit
Net Profit in Manufacturing Industry	Tax Revenues
Personal Loans	Number Of Registered Investor to Stock Market
Sectoral Loans	Total Amount Of Account Balance
Non-Cash Sector Loans	
Energy Consumption	
Import	
Export	

productivity caused by technological change. By looking at the results in Table 2 and Table 5 together, it is possible to say that the direction of productivity depends on the treatment of loans. If loans are input factors, then there is a decline in the total productivity and vice versa.
Model 2 results can also be interpreted in terms of PDI. Fig. 5 presents the movement of MTFPI with respect to different categories. Every category experiences a decrease except for

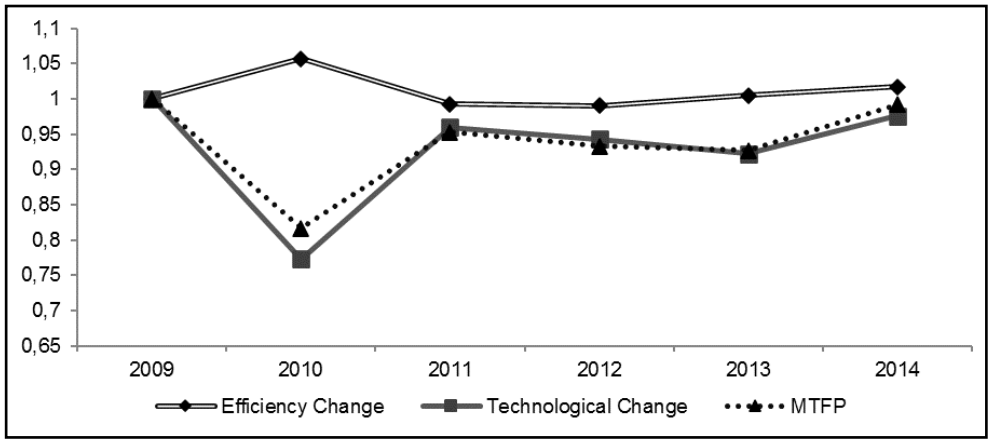

Fig. 4 - **Chart of MTFP by years (Model 2)**

category 4 between 2010 and 2011 (none of the MTFPI values are over 1 except for that one). Categories 1, 2, 3 and 5 follow mainly a stationary movement over the years. For category 4, there is a spike in 2011, followed by a relatively slower growth.

Table 5

Change in the Cumulative Efficiency by year (Model 2)

Years	Efficiency Change	Technological Change	MTFPI
2009	1	1	1
2010	1.057	0.773	0.817
2011	1.050	0.742	0.779
2012	1.039	0.700	0.726
2013	1.044	0.645	0.673
2014	1.062	0.630	0.668

Discussion

The findings presented in the previous section indicate that if the factors related to loans (personal loans, sectoral loans, and non-cash loans) are treated as outputs, growth in productivity is observed. Treating 'loans' as an output factor yields scores that are more closely

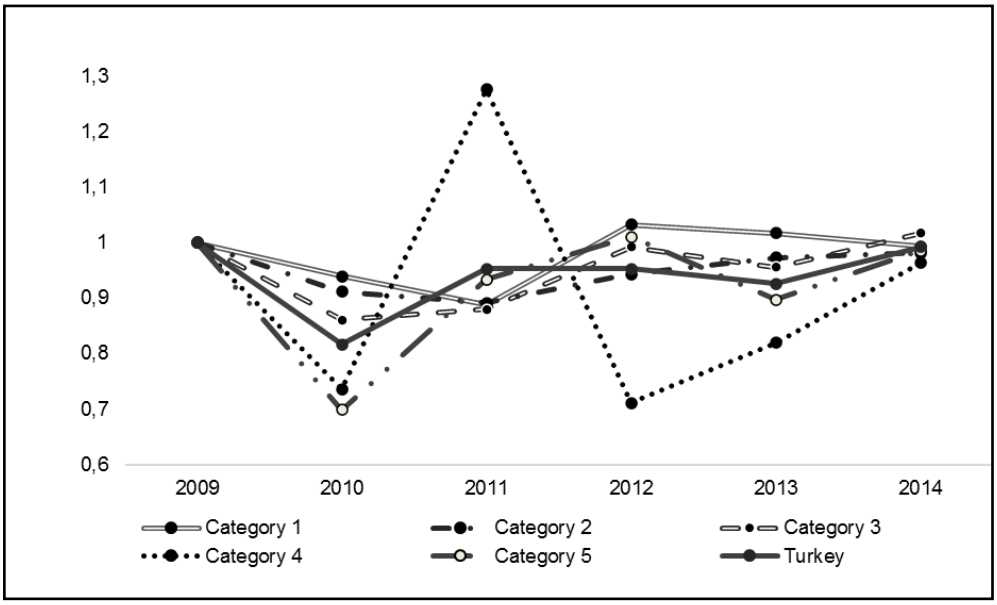

Fig. 5 - **Total Factor Productivity Change by PDI (Model 2)**

related to the GDP growth of Turkey during the given period. Fig. 6 visualizes the MTFPI scores of Model 1 at provincial level. It is noticeable that the eastern parts of the country experience a larger growth relative to the west. Some provinces attain a very high level of change (greater than 4), mostly located in the east. The east mostly consists of category 4 and 5 provinces; however, these provinces experience the largest growth according to Model 1.

Note that Model 1 considers 'loans' as outputs. We approach the factors associated with loans as a proxy of investment in this model. Of course, one should note that the analysis does not solely rely on the variables associated with loans. There are other financial outputs and also an input side of the story. We have variables on employment, the size of the manufacturing industry, etc. These will also differ between high-income and low-income provinces. Nevertheless, the Data Envelopment Analysis is about accounting for such trade-offs through the multi-dimensional relativity of output/input ratios. From that perspective, in the post-crisis period, there had been an expansion in the financial system at regional level, especially for less developed provinces according to Model 1. If loans indicate investment, then there had been a growth in regional development for the less developed regions after the 2008 crisis.

On the other hand, loans can be thought of as the proxy of indebtment as in Model 2. Fig. 7 visualizes the MTFPI scores of Model 2 at provincial level. It is observed that the majority of the provinces exhibit a decrease. When Fig. 6 and Fig. 7 are compared, it can be seen that only a few of the provinces could keep their productivity growth position. One province experiences a

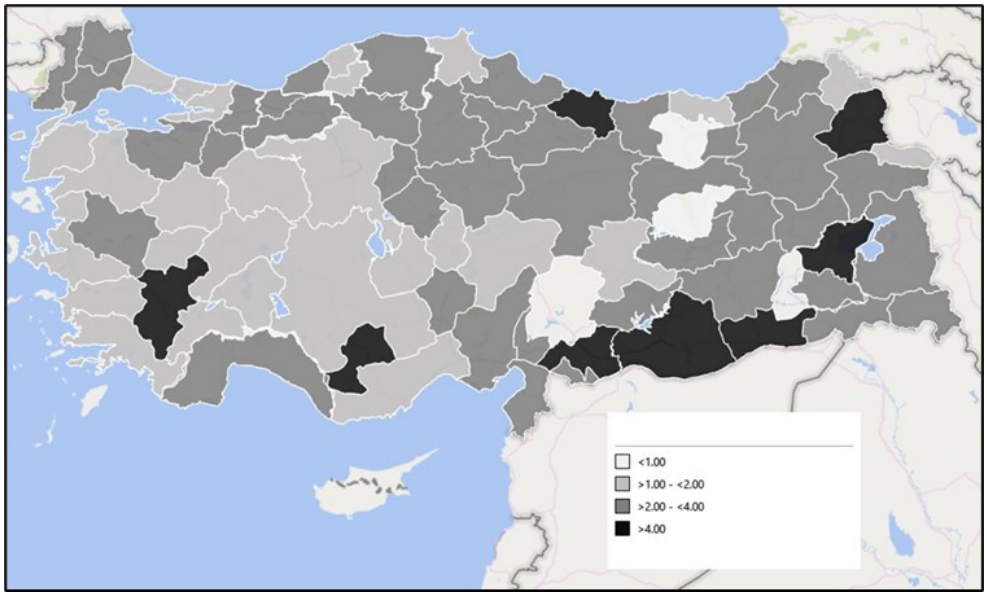

Fig. 6 - **Provinces by their MTFPI Scores (Model 1)**

high level of growth and only 10 provinces attain a score greater than 1. So, when the factors associated with loans are taken as inputs, the development levels of the provinces concerning banking and finance data reveal a decrease in all categories of provinces. This, of course, contradicts with the GDP growth during the given period. Note that loans include the cash and non-cash sectorial loans. If loans indicate debt, then there had been a decline in regional development for the entire country after the 2008 crisis. One advocating loans as a means of debt would think that the decrease in the development levels in the post-crisis period is based on recovering the effects of the recession during the crisis, which would be reasonable. The contradictions between the results of the two models reveal that the idea of growth is mainly affected by depending on the opinion towards the 'loans' provided by the banks.

It should also be noted that the technological change component is more effective in the change of MTFPI. The change mostly relies on the shifts on the frontier, in other words, the technological change component. Rather than individual changes in the scores (corresponding to the efficiency change component) of individual units (provinces in our case), the growth, or decline mostly, is mainly based on the shift of the frontier as a whole. In other words, from whichever perspective we approach the problem, the effects of the crisis are visible throughout the entire sample rather than the small changes at unit level.

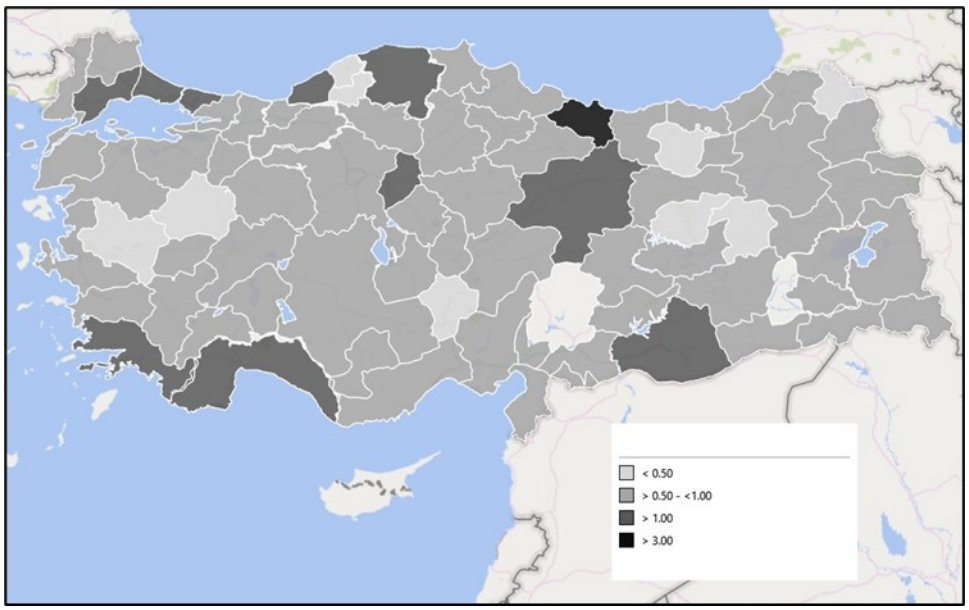

Fig. 7 **- Provinces by their MTFPI Scores (Model 2)**

Conclusions

In this paper, we aim to measure the provincial level financial performance of Turkish provinces using banking and finance data along with other economic indicators. For this purpose, we develop two Data Envelopment Analysis (DEA) models, mainly differing from each other in terms of handling the factors associated with 'loans', which turns out to affect the results when the direction of those variables is changed. The methodology is based on relativity and multi-dimensionality so that a broad perspective on regional development is aimed to be presented. As well as being a non-parametric efficiency evaluation method, DEA can also serve as an effective tool for a relative assessment in measuring regional development levels. Besides, we use a multi-period structure and the Malmquist Total Factor Productivity Index (MTFPI) method is employed to measure the change in 5 years after the 2008 crisis (between 2009 and 2014). The index is composed of two main components, namely as efficiency change and as technological change. The former represents the changes in the efficiency of individual units, whereas the latter is based on the shift in the production technology as a whole. The results are interpreted with respect to cumulative changes and to provincial development index categories. The results presented at cumulative and provincial level categories may reveal potential improvement areas and the provinces that require attention in managing regional development.

We evaluate the provincial development levels in Turkey and its change over the years, leaning

on the idea that banking data can provide an additional perspective to the assessment of regional development. Considering the banks' key role in the financial system, the evaluations fed by the banking perspective along with the macroeconomic indicators can contribute to the way we approach regional development. The use of DEA in a mix of economic and financial/ banking indicators conveys a new perspective to the assessment. Of course, banking data requires careful handling since different perspectives may lead to different directions as exposed by the findings of this research.

References

ALVES A. B., WANKE P., ANTUNES J., CHEN Z. (2020), *Endogenous Network Efficiency, Macroeconomy, and Competition: Evidence from the Portuguese Banking Industry*, The North American Journal of Economics and Finance 52, 101114.

ATAN M., ÖZGÜR E., GÜLER H. (2004), *Comparison of Developmental Levels of Provinces by Multivariate Statistical Analysis and DEA*, Gazi University Journal of Faculty of Economics and Administrative Sciences 6 (2), 25-42.

BANKING REGULATION AND SUPERVISION AGENCY (2016), *FinTürk*, Retrieved from: www.bddk.org.tr.

BASSEM B. S. (2014), *Total Factor Productivity Change of MENA Microfinance Institutions: A Malmquist Productivity Index Approach*, Economic Modelling 39, 182-189.

BIENER C., ELING M. (2011), *The Performance of Microinsurance Programs: A Data Envelopment Analysis*, The Journal of Risk and Insurance 78 (1), 83-115.

CAO L., ZHOU Z., WU Y., HUANG Y., CAO G. (2019), *Is metabolism in all regions of China performing well? – Evidence from a new DEA-Malmquist productivity approach*, Ecological Indicators 106, 105487.

CARBONI O. A., RUSSU P. (2015), *Assessing Regional Wellbeing in Italy: An Application of Malmquist–DEA and Self-organizing Map Neural Clustering*, Social Indicators Research 122, 677-700.

CAVES D. W., CHRISTENSEN L. R., DIEWERT W. E. (1982), *The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity*, Econometrica 50 (6), 1393-1414.

CENTRAL REGISTRY AGENCY (2016), *CSD of Turkey*, Retrieved from: www.mkk.com.tr.

CHARNES A., COOPER W. W., RHODES E. (1978), *Measuring the Efficiency of Decision Making Units*, European Journal of Operational Research 2 (6), 429-444.

CHEN C. C. (2017), *Measuring departmental and overall regional performance: applying the multi-activity DEA model to Taiwan's cities/counties*, Omega 67, 60-80.

CHRISTOPOULOS A. G., DOKAS I. G., KATSIMARDOU S., SPYROMITROS E. (2020), *Assessing banking sectors' efficiency of financially troubled Eurozone countries*, Research in International Business and Finance 52, 101121.

CUMMINS J. D., WEISS M. A., XIE X., ZI H. (2010), *Economies of Scope in Financial Services: A DEA Efficiency Analysis of the US Insurance Industry*, Journal of Banking & Finance 34 (7), 1525-1539.

DEILMANN C., HENNERSDORF J., LEHMANN I., REIßMANN D. (2018), *Data envelopment analysis of urban efficiency—Interpretative methods to make DEA a heuristic tool*, Ecological Indicators 84, 607-618.

DÜZAKIN H. (2009), *Measuring the Province Performances With DEA*, Journal of Cukurova University Faculty of Economics and Administrative Sciences 13 (2), 17-32.

FÄRE R., GROSSKOPF S., LINDGREN B., ROOS P. (1992), *Productivity Changes in Swedish Pharamacies 1980–1989: A non-parametric Malmquist approach*, Journal of Productivity Analysis 3, 85-101.

GIFFINGER R., FERTNER C., KRAMAR H., MEIJERS E. (2007), *City-ranking of European Medium-Sized Cities*, European Smart Cities, Retrieved from: www.smart-cities.eu.

GIFFINGER R., HAINDLMAIER G. (2010), *Smart Cities Ranking: An Effective Instrument for the Positioning Of Cities?*, ACE: Architecture, City and Environment 4 (12), 7-25.

GÜL H. E., ÇEVIK B. (2015), *Development Level Research of Cities in Turkey with the Data of 2013*, ı Türkiye İş Bankası İktisadi Araştırmalar Bölümü, pp. 1-27.

GUTIÉRREZ-NIETO B., SERRANO-CINCA C., MOLINERO C. M. (2009), *Social Efficiency in Microfinance Institutions*, Journal of the Operational Research Society 60 (1), 104-119.

HANSON S., NICHOLLS R., RANGER N., HALLEGATE S., CORFEE-MORLOT J., HERWEIJER C., CHATEAU J. (2011), *A global ranking of port cities with high exposure to climate extremes*, Climatic Change 104, 89-111.

KİBRİTCİ ARTAR O., ATILGAN SARIDOĞAN A. (2012), *The Effects of the Global Financial Crisis on the Financial Structure of the Banking Sector in the Turkish Economy*, The Journal of Marmara Social Research 2, 1-17.

KOURTIT K., NIJKAMP P., SUZUKI S. (2013), *The Rat Race Between World Cities: In Search of Exceptional Places by Means of Super-efficient Data Development Analysis*, Computers, Environment and Urban Systems 38, 67-77.

LAHDELMA R., SALMINEN P., HOKKANEN J. (2002), *Locating a Waste Treatment Facility by Using Stochastic Multicriteria Acceptability Analysis with Ordinal Criteria*, European Journal of Operational Research 142 (2), 345-356.

LI L.-B., LIU B.-L., LIU W.-L., CHIU Y.-H. (2017), *Efficiency evaluation of the regional high-tech industry in China: A new framework based on meta-frontier dynamic DEA analysis*, Socio-Economic Planning Sciences 60, 24-33.

LI N., JIANG Y., MU H., YU Z. (2018), *Efficiency evaluation and improvement potential for the Chinese agricultural sector at the provincial level based on data envelopment analysis (DEA)*, Energy 164, 1145-1160.

LÓPEZ-RUIZ V.-R., ALFARO-NAVARRO J.-L., NEVADO-PEÑA D. (2014), *Knowledge-city Index Construction: An Intellectual Capital Perspective*, Expert Systems with Applications 41 (12), 5560-5572.

MALMQUIST S. (1953), *Index Numbers and Indifference Surfaces*, Trabajos de Estadistica 4, 209-242.

MORAIS P., CAMANHO A. S. (2011), *Evaluation of Performance of European Cities with the Aim to Promote Quality of Life Improvements*, Omega 39 (4), 398-409.

NITKIEWICZ T., PACHURA P., REID N. (2014), *An Appraisal of Regional Intellectual Capital Performance Using Data Envelopment Analysis*, Applied Geography 53, 246-257.

O'CONNOR K. (2010), *Global City Regions and the Location of Logistics Activity*, Journal of Transport Geography 18 (3), 354-362.

PARADI J. C., SCHAFFNIT C. (2004), *Commercial Branch Performance Evaluation and Results Communication in a Canadian Bank—a DEA Application*, European Journal of Operational Research 156 (3), 719-735.

PARADI J. C., ROUATT S., ZHU H. (2011), *Two-stage Evaluation of Bank Branch Efficiency Using Data Envelopment Analysis*, Omega 39 (1), 99-109.

PIOT-LEPETIT I., NZONGANG J. (2014), *Financial Sustainability and Poverty Outreach within a Network of Village Banks in Cameroon: A Multi-DEA Approach*, European Journal of Operational Research 234 (1), 319-330.

RAŹNIAK P., WINIARCZYK-RAŹNIAK A., NOWOTNIK D. (2015), *Central and Eastern European Cities in Globalized World*, Socio-Economic Problems and the State 12 (1), 22-33.

SHENG N., TANG U. W. (2016), *The First Official City Ranking by Air Quality in China — A Review and Analysis*, Cities 51, 139-149.

SINGHAL S., MCGREAL S., BERRY J. (2013a), *Application of a Hierarchical Model for City Competitiveness in Cities of India*, Cities 31, 114-122.

SINGHAL S., MCGREAL S., BERRY J. (2013b), *An Evaluative Model for City Competitiveness: Application to UK Cities*, Land Use Policy 30 (1), 214-222.

SUFIAN F. (2008), *The Efficiency of Non-Bank Financial Intermediaries: Empirical*

Evidence from Malaysia, The International Journal of Banking and Finance 5 (2), 149-167.

THORANEENITIYAN N., AVKIRAN N. K. (2009), *Measuring the Impact of Restructuring and Country-Specific Factors on the Efficiency of Post-Crisis East Asian Banking Systems: Integrating DEA with SFA*, Socio-Economic Planning Sciences 43 (4), 240-252.

TURKISH REVENUE ADMINISTRATION (2016), *Budget Revenues*, Retrieved from: www.gib.gov.tr.

TURKISH STATISTICAL INSTITUTE (2016), *Socio-economic data*, Retrieved from: www.tuik.gov.tr.

ULUCAN A., ATICI K. B. (2010), *Efficiency Evaluations with Context-dependent and Measure-specific Data Envelopment Approaches: An Application in a World Bank Supported Project*, Omega 38 (1-2), 68-83.

WANG J., ZHAO T., ZHANG X. (2016), *Environmental assessment and investment strategies of provincial industrial sector in China — Analysis based on DEA model*, Environmental Impact Assessment Review 60, 156-168.

YÖRÜKOĞLU M., ATASOY H. (2010), *The effects of the global financial crisis on the Turkish financial sector*, BIS Papers 54, 387-405.

ZHU J. (2001), *Multidimensional Quality-of-life Measure with an Application to Fortune's Best Cities*, Socio-Economic Planning Sciences 35 (4), 263-284.

Initial submission: 14.10.2019
Revised submission: 13.04.2020
Final acceptance: 29.05.2020

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Appendix
Table A1

Model 1: Ranking Cumulative Efficiency Change of Provinces

Rank	Provinces	Efficiency Change	Rank	Provinces	Technological Change	Rank	Provinces	MTFPI
1	Şanlıurfa	1.815	1	Ordu	5.898	1	Şanlıurfa	8.292
2	Muş	1.411	2	Bitlis	4.783	2	Ordu	7.558
3	Ordu	1.282	3	Kars	4.713	3	Bitlis	5.631
4	Ağrı	1.276	4	Şanlıurfa	4.573	4	Kars	4.713
5	Bursa	1.270	5	Yozgat	4.035	5	Mardin	4.478
6	Denizli	1.235	6	Kilis	3.809	6	Karaman	4.433
7	Erzurum	1.216	7	K.maraş	3.772	7	Gaziantep	4.369
8	Karaman	1.211	8	Mardin	3.763	8	K.Maraş	4.351
9	Tekirdağ	1.205	9	Gaziantep	3.679	9	Denizli	4.318
10	Mardin	1.189	10	Karaman	3.660	10	Hatay	3.848
11	Gaziantep	1.189	11	Hatay	3.654	11	Muş	3.639
12	Bitlis	1.177	12	Denizli	3.499	12	Yozgat	3.458
13	K. Maraş	1.154	13	Erzincan	3.499	13	Elazığ	3.370
14	Düzce	1.133	14	Tokat	3.492	14	Siirt	3.284
15	İzmir	1.129	15	Osmaniye	3.408	15	Sivas	3.237
16	Sakarya	1.098	16	Elazığ	3.370	16	Kilis	3.164
17	Hakkari	1.089	17	Siirt	3.285	17	Bilecik	3.039
18	Bilecik	1.067	18	Amasya	3.093	18	Erzincan	3.019
19	Samsun	1.061	19	Sivas	3.085	19	Kırıkkale	2.910
20	Zonguldak	1.059	20	Giresun	3.028	20	Osmaniye	2.890
21	Hatay	1.053	21	Çankırı	2.965	21	Düzce	2.835
22	Sivas	1.048	22	Kırıkkale	2.910	22	Amasya	2.762
23	Balıkesir	1.045	23	Bilecik	2.849	23	Erzurum	2.718
24	Manisa	1.010	24	Çorum	2.785	24	Samsun	2.689
25	Aksaray	1.000	25	Kastamonu	2.768	25	Tokat	2.673
26	Ankara	1.000	26	Van	2.741	26	Kastamonu	2.643
27	Antalya	1.000	27	Adıyaman	2.711	27	Tekirdağ	2.632
28	Ardahan	1.000	28	Muş	2.577	28	Şırnak	2.479
29	Artvin	1.000	29	Şırnak	2.574	29	Bingöl	2.476
30	Batman	1.000	30	Bingöl	2.544	30	Bursa	2.465
31	Bayburt	1.000	31	Samsun	2.538	31	Sakarya	2.463
32	Edirne	1.000	32	Diyarbakır	2.531	32	Batman	2.429
33	Elazığ	1.000	33	Düzce	2.501	33	Edirne	2.419
34	Eskişehir	1.000	34	Adana	2.445	34	Zonguldak	2.413
35	Iğdır	1.000	35	Malatya	2.442	35	Adana	2.410
36	İstanbul	1.000	36	Batman	2.429	36	Çankırı	2.400
37	Karabük	1.000	37	Edirne	2.419	37	Diyarbakır	2.391
38	Kars	1.000	38	Niğde	2.391	38	Hakkari	2.383
39	Kırıkkale	1.000	39	Bolu	2.367	39	Giresun	2.361
40	Kırklareli	1.000	40	Rize	2.349	40	Rize	2.349

Appendix
Table A1

Model 1: Ranking Cumulative Efficiency Change of Provinces

Rank	Provinces	Efficiency Change	Rank	Provinces	Technological Change	Rank	Provinces	MTFPI
41	Kırşehir	1.000	41	Bayburt	2.318	41	Bayburt	2.318
42	Kocaeli	1.000	42	Zonguldak	2.279	42	Adıyaman	2.289
43	Mersin	1.000	43	Kırklareli	2.250	43	Manisa	2.260
44	Muğla	1.000	44	Sakarya	2.242	44	Kırklareli	2.250
45	Nevşehir	1.000	45	Erzurum	2.236	45	Ağrı	2.233
46	Rize	1.000	46	Manisa	2.232	46	Niğde	2.195
47	Trabzon	1.000	47	Kayseri	2.214	47	Çorum	2.185
48	Tunceli	1.000	48	Hakkari	2.185	48	Antalya	2.131
49	Yalova	1.000	49	Tekirdağ	2.184	49	Kırşehir	2.097
50	Gümüşhane	1.000	50	Antalya	2.131	50	Bolu	2.058
51	Siirt	0.999	51	Sinop	2.119	51	Artvin	2.027
52	Isparta	0.997	52	Kırşehir	2.097	52	Van	2.002
53	Burdur	0.996	53	Bartın	2.066	53	Nevşehir	1.994
54	Adana	0.986	54	Afyonkarahisar	2.034	54	Trabzon	1.993
55	Uşak	0.982	55	Artvin	2.027	55	Kayseri	1.949
56	Bingöl	0.972	56	Nevşehir	1.994	56	Malatya	1.911
57	Şırnak	0.962	57	Trabzon	1.993	57	Burdur	1.897
58	Çanakkale	0.958	58	Bursa	1.941	58	Iğdır	1.884
59	Kastamonu	0.956	59	Burdur	1.902	59	Yalova	1.862
60	Diyarbakır	0.946	60	Iğdır	1.884	60	Bartın	1.828
61	Aydın	0.940	61	Yalova	1.862	61	Karabük	1.800
62	Niğde	0.917	62	Kütahya	1.814	62	Sinop	1.793
63	Amasya	0.893	63	Karabük	1.800	63	Eskişehir	1.734
64	Konya	0.891	64	Ağrı	1.748	64	Çanakkale	1.586
65	Bartın	0.886	65	Eskişehir	1.734	65	Kütahya	1.575
66	Kayseri	0.880	66	Çanakkale	1.653	66	Aksaray	1.558
67	Bolu	0.869	67	Aksaray	1.558	67	Ardahan	1.550
68	Kütahya	0.868	68	Ardahan	1.550	68	İstanbul	1.507
69	Erzincan	0.861	69	Aydın	1.537	69	Uşak	1.492
70	Yozgat	0.857	70	Konya	1.525	70	Muğla	1.467
71	Osmaniye	0.848	71	Uşak	1.519	71	Kocaeli	1.466
72	Sinop	0.847	72	İstanbul	1.507	72	Afyonkarahisar	1.454
73	Adıyaman	0.844	73	Muğla	1.467	73	Aydın	1.447
74	Kilis	0.830	74	Kocaeli	1.466	74	Ankara	1.366
75	Çankırı	0.810	75	Ankara	1.366	75	Konya	1.355
76	Çorum	0.784	76	Isparta	1.237	76	Isparta	1.235
77	Malatya	0.783	77	Mersin	1.230	77	Mersin	1.230
78	Giresun	0.779	78	Balıkesir	1.121	78	Balıkesir	1.172
79	Tokat	0.766	79	İzmir	1.012	79	İzmir	1.144
80	Van	0.730	80	Gümüşhane	0.297	80	Gümüşhane	0.297
81	Afyonkarahisar	0.716	81	Tunceli	0.109	81	Tunceli	0.109

Table A2

Model 2: Ranking Cumulative Efficiency Change of Provinces

Ranking	Provinces	Efficiency Change	Ranking	Provinces	Technological Change	Ranking	Provinces	MTFPI
1	Ordu	1.835	1	Ordu	1.961	1	Ordu	3.597
2	Şanlıurfa	1.633	2	Kırıkkale	1.424	2	Kırıkkale	1.424
3	Kastamonu	1.484	3	Antalya	1.219	3	Antalya	1.312
4	Tekirdağ	1.417	4	Sivas	1.142	4	Sivas	1.238
5	Sakarya	1.361	5	Kırklareli	1.055	5	Şanlıurfa	1.076
6	Bitlis	1.343	6	Kayseri	1.045	6	Kastamonu	1.067
7	Kars	1.283	7	İstanbul	1.040	7	Zonguldak	1.048
8	Kütahya	1.251	8	Muğla	1.034	8	İstanbul	1.040
9	Yozgat	1.220	9	Kırşehir	0.993	9	Muğla	1.034
10	Samsun	1.217	10	Zonguldak	0.991	10	Tekirdağ	1.032
11	Bilecik	1.192	11	Ankara	0.948	11	Kırşehir	0.993
12	Çankırı	1.183	12	Yalova	0.940	12	Kayseri	0.977
13	Tokat	1.178	13	Nevşehir	0.933	13	Kırklareli	0.963
14	Adıyaman	1.167	14	Diyarbakır	0.933	14	Ankara	0.948
15	Burdur	1.129	15	Mersin	0.907	15	Yalova	0.940
16	Elazığ	1.126	16	Trabzon	0.858	16	Yozgat	0.935
17	Karaman	1.124	17	Eskişehir	0.857	17	Nevşehir	0.933
18	Bayburt	1.114	18	Rize	0.851	18	Karaman	0.923
19	Manisa	1.113	19	Karaman	0.820	19	Trabzon	0.917
20	Erzincan	1.102	20	Hatay	0.813	20	Mersin	0.907
21	Balıkesir	1.097	21	Edirne	0.808	21	Elazığ	0.889
22	Sivas	1.085	22	Iğdır	0.808	22	Rize	0.851
23	Erzurum	1.077	23	İzmir	0.799	23	Edirne	0.847
24	Antalya	1.074	24	Elazığ	0.789	24	Hatay	0.846
25	Trabzon	1.069	25	Aksaray	0.780	25	Iğdır	0.837
26	Amasya	1.067	26	Erzurum	0.774	26	Diyarbakır	0.836
27	Düzce	1.065	27	Yozgat	0.766	27	Erzurum	0.834
28	Osmaniye	1.064	28	Giresun	0.736	28	Eskişehir	0.818
29	Zonguldak	1.056	29	Bayburt	0.733	29	Bayburt	0.816
30	Edirne	1.048	30	Tekirdağ	0.727	30	İzmir	0.799
31	Hatay	1.041	31	Kastamonu	0.718	31	Bitlis	0.790
32	Çorum	1.037	32	Artvin	0.716	32	Erzincan	0.787
33	Iğdır	1.036	33	Erzincan	0.715	33	Tokat	0.785
34	Aydın	1.035	34	Çorum	0.715	34	Aksaray	0.780
35	Batman	1.035	35	Balıkesir	0.709	35	Balıkesir	0.779
36	Ağrı	1.035	36	Amasya	0.702	36	Amasya	0.749
37	Niğde	1.033	37	Siirt	0.700	37	Kars	0.746
38	Afyon	1.022	38	Gaziantep	0.699	38	Çorum	0.741
39	Sinop	1.014	39	K.Maraş	0.697	39	Samsun	0.740
40	Bartın	1.005	40	Kocaeli	0.689	40	Giresun	0.720

Table A2

Model 2: Ranking Cumulative Efficiency Change of Provinces

Ranking	Provinces	Efficiency Change	Ranking	Provinces	Technological Change	Ranking	Provinces	MTFPI
41	Bolu	1.002	41	Çanakkale	0.672	41	Artvin	0.716
42	Van	1.001	42	Tokat	0.667	42	Siirt	0.700
43	Muş	1.001	43	Şanlıurfa	0.659	43	Kocaeli	0.689
44	Yalova	1.001	44	Adana	0.645	44	K.Maraş	0.678
45	Aksaray	1.000	45	Uşak	0.636	45	Çanakkale	0.672
46	Ankara	1.000	46	Aydın	0.623	46	Gaziantep	0.658
47	Ardahan	1.000	47	Denizli	0.623	47	Aydın	0.645
48	Artvin	1.000	48	Bursa	0.616	48	Adana	0.638
49	Bingöl	1.000	49	Samsun	0.608	49	Uşak	0.636
50	Çanakkale	1.000	50	Mardin	0.603	50	Burdur	0.621
51	Gümüşhane	1.000	51	Hakkari	0.600	51	Sakarya	0.618
52	Hakkari	1.000	52	Bitlis	0.590	52	Bursa	0.616
53	Isparta	1.000	53	Kars	0.581	53	Hakkari	0.600
54	İstanbul	1.000	54	Van	0.574	54	Düzce	0.593
55	İzmir	1.000	55	Şırnak	0.569	55	Van	0.574
56	Karabük	1.000	56	Muş	0.562	56	Batman	0.574
57	Kırıkkale	1.000	57	Düzce	0.556	57	Ağrı	0.572
58	Kırşehir	1.000	58	Batman	0.556	58	Adıyaman	0.571
59	Kocaeli	1.000	59	Ağrı	0.553	59	Şırnak	0.569
60	Mersin	1.000	60	Bolu	0.551	60	Muş	0.562
61	Muğla	1.000	61	Burdur	0.550	61	Afyon	0.557
62	Nevşehir	1.000	62	Malatya	0.549	62	Bolu	0.552
63	Rize	1.000	63	Afyon	0.546	63	Malatya	0.548
64	Siirt	1.000	64	Isparta	0.542	64	Denizli	0.547
65	Şırnak	1.000	65	Konya	0.531	65	Isparta	0.542
66	Tunceli	1.000	66	Kilis	0.506	66	Çankırı	0.541
67	Uşak	1.000	67	Sinop	0.500	67	Mardin	0.526
68	Malatya	0.999	68	Adıyaman	0.489	68	Bilecik	0.519
69	Bursa	0.998	69	Ardahan	0.489	69	Konya	0.509
70	Kilis	0.996	70	Osmaniye	0.477	70	Osmaniye	0.507
71	Adana	0.990	71	Bingöl	0.474	71	Sinop	0.507
72	Giresun	0.981	72	Çankırı	0.457	72	Kilis	0.504
73	K.Maraş	0.972	73	Sakarya	0.453	73	Ardahan	0.489
74	Konya	0.958	74	Bilecik	0.435	74	Kütahya	0.488
75	Eskişehir	0.955	75	Manisa	0.431	75	Manisa	0.479
76	Gaziantep	0.943	76	Niğde	0.413	76	Bingöl	0.474
77	Kayseri	0.935	77	Bartın	0.399	77	Niğde	0.427
78	Kırklareli	0.913	78	Kütahya	0.390	78	Bartın	0.401
79	Diyarbakır	0.897	79	Karabük	0.384	79	Karabük	0.384
80	Denizli	0.879	80	Gümüşhane	0.165	80	Gümüşhane	0.165
81	Mardin	0.871	81	Tunceli	0.004	81	Tunceli	0.004

Table A3

Province Classes in PDI

Categories	Provinces
Category 1	Ankara, Antalya, Bursa, İstanbul, İzmir, Kocaeli
Category 2	Adana, Aydın, Balıkesir, Çanakkale, Denizli, Eskişehir, Gaziantep, Hatay, Kayseri, Konya, Manisa, Mersin, Muğla, Sakarya, Samsun, Tekirdağ, Trabzon
Category 3	Afyonkarahisar, Amasya, Bartın, Bilecik, Bolu, Burdur, Çorum, Diyarbakır, Düzce, Edirne, Elazığ, Erzurum, Isparta, K. Maraş, Karabük, Karaman, Kırıkkale, Kırklareli, Kütahya, Malatya, Nevşehir, Rize, Sivas, Şanlıurfa, Uşak, Yalova, Zonguldak
Category 4	Aksaray, Artvin, Çankırı, Erzincan, Giresun, Kastamonu, Kırşehir, Mardin, Niğde, Ordu, Osmaniye, Sinop, Tokat, Tunceli
Category 5	Adıyaman, Ağrı, Ardahan, Batman, Bayburt, Bingöl, Bitlis, Gümüşhane, Hakkari, Iğdır, Kars, Kilis, Muş, Siirt, Şırnak, Van, Yozgat

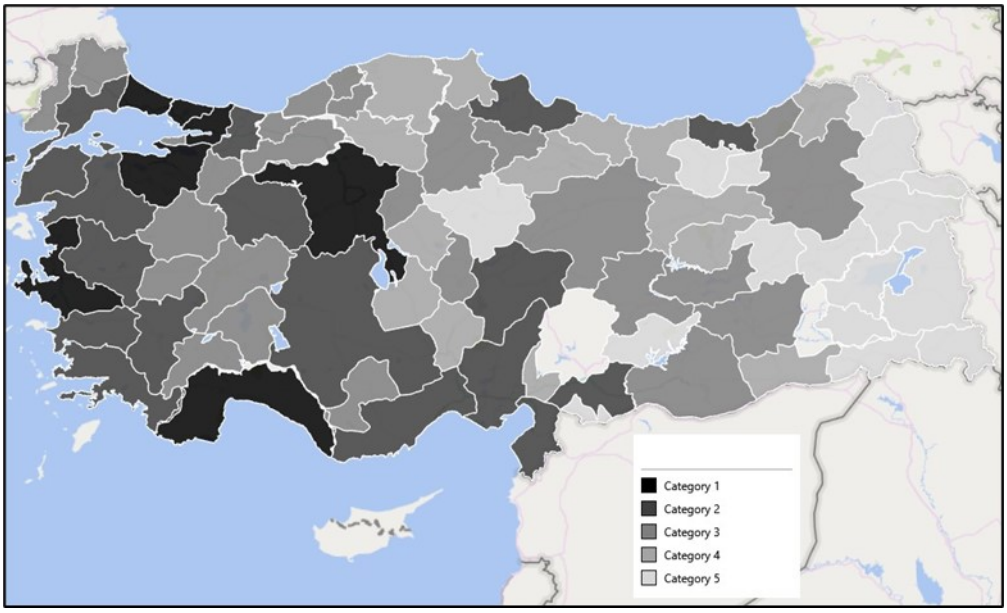

Fig. A1 - **Classified Provinces of Turkey**

Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 145 - 161
https://doi.org/10.37043/JURA.2021.13.1.9

THE URBAN POOR IN DHAKA: PERSPECTIVES ON THE RIGHT TO THE CITY

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Abstract: The urban poor experience serious discontents, harassment, eviction, police repression and local goons threatening when using urban space for living and livelihood purposes. This study pursues to understand the poor people's negotiation strategies with different powerful agents who occupy money, muscleman and political affiliation. Following a mixed method approach, this study investigates the two biggest slums in Dhaka as case studies. Findings show that urban poor have to build different social-contract relations with various local agents as survival mechanisms while economic activities using urban space are considered to be illegal in Bangladesh. The role of the state is somewhat ambiguous in this regard. On the one hand, the state is not evicting the poor permanently from the city but it is repatriating them on other grounds and, on the other hand, it permits hundreds of informal intermediary agents to work for sustaining informal urban settlements for the poor people. We argue that these distinctive socio-structural arrangements in Dhaka city is hindering poor people from getting united and claiming their rights to the city while also not providing them proper opportunities to fully appropriate the urban space. These socio-economic relations need to be considered in order to make a just city for all, from the RTC perspective.

Key Words: *urban space, right to the city, appropriation of space, urban poor, gendered space.*

Introduction

Dhaka has emerged as one of the fastest growing megacities in the world with an annual growth rate of 4.4 percent (UN-HABITAT 2008, Arefin 2018). The city holds a striking population of 17 million currently and it is projected to be over 27 million by 2030 (Ahmed 2014, Mohiuddin 2014). It is estimated that about 35% people live below the poverty line in Dhaka city while nearly 20% of them were classified as living in hardcore poverty in more than 4000 slums or informal settlements throughout the city (Islam 2005). Other studies reveal that more than one third of the approximately 12 million inhabitants of Dhaka live in *bosti*[1)], informal or irregular settlements developed on different private and public lands (World Bank 2007, Government of Bangladesh 2008, Hossain 2011, Hackenbroch and Hossain 2012). The global triumph of neoliberal policies as well as the accelerated rate of urbanization has greatly changed the rural-urban structure, creating a massive trend of migration to city areas. Being the hub of all kinds of socio-economic, cultural and political activities, Dhaka experiences approximately 300,000-400,000 new comers each year (WSUP 2017), which is, therefore, creating enormous pressure on its limited space. Providing space for living and livelihood activities to this ever increasing population has become as challenging as bringing them in all necessary social services. As a result, conflicts over using urban spaces have become regular phenomena in Dhaka, like in all other cities of the global south (Lata et al. 2019).

In the cases of Mumbai and Chennai, as urban space has become very contentious, lives and livelihoods of the urban poor in informal settlements have become increasingly problematic

1) A slum or *bosti* is a residential area with substandard housing that is poorly serviced and/or overcrowded, and therefore unhealthy, unsafe and socially undesirable.

(Phadke 2007, Mohan 2017). Furthermore, the marginalized Romani people of Szeged, Hungary, pose an example of extreme poverty, a lack of subsistence and job opportunities, poor and uncertain housing conditions, inability to provide education for their children and everyday discrimination (Málovics et al. 2019). Likewise, poor slum dwellers in Dhaka, who are also vulnerable for their tenuous day to day position in the urban space, have to sustain their livelihoods in flexible and precarious types of informal "street economy" (Etzold and Keck 2009, Etzold et al. 2009).

The proliferations of street economy, as well as the conflicts between street vendors and a range of formal and informal intermediary actors, are increasingly making urban spaces a matter of appropriation and contestation. Urban poor in many cities, particularly in Latin America, have established examples of successful movements through their organized and collective efforts (Crossa 2009, Mackie et al. 2014). But in the case of Dhaka, although vendors are a regular subject to exploitation, coercion and impendence, they are not united for claiming their rights; they rather prefer alternative ways to sustain their activity in cities by negotiating with different agents (Hackenbroch et al. 2016, Lata et al. 2019).

However, in this context, this study conducts Sattola and Pallabi, two informal settlements in Dhaka city, as case studies to explore every day experiences of slum dwellers while using urban spaces mainly for making a living. We will proceed with empirical data by analyzing the nexus between street vendors, local powerful agents and the state's role in making these informal uses of urban space long lasting, albeit through frequent displacement and dispossession. We argue that this peculiar socio-political arrangement of Dhaka city is providing urban poor with uncertain and vulnerable opportunities for living while also preventing them to get organized and claim their rights to the city. Therefore, these localized arrangements and social relationships need to be considered in order to understand social and economic realities, to make an egalitarian city and to develop more pragmatic poverty reduction strategies.

Against this backdrop, the next section firstly contextualizes urban space and the 'Right to the City' along with various protests of the urban poor for claiming their 'Right to the City' across the world. Then, it is followed by a short description of the participants and the detailed methods of the study. Again, it then presents the empirical findings by examining the experiences of urban poor people in Dhaka while accessing urban space in and out of the informal settlements. The article then concludes with a discussion of the urban space, the negotiation process and the absence of protest in claiming their rights over the production of space in Dhaka city.

Contextualizing urban space

Lefebvre (1991) proposed a conception of space assuming it from three realities: spatial practice (perceived space which arises out of everyday realities), representations of space (i.e. conceived space and represented space), and representational space (i.e. spaces experienced through images and symbols, the spaces of passion and action). The notion of urban space includes what he calls perceived space, conceived space and lived space while lived space "is the complex combination of perceived and conceived space. It represents a person's actual experience of space in everyday life'' (Lefebvre 1991: 39). Harvey (1973) also propounded a tripartite conceptualization of space. According to him, "space is neither absolute, nor relative, nor relational in itself, but it can become one or all simultaneously depending on the circumstances and on human practice" (Harvey 1973: 13). However, Santos Junior (2014), combining both Lefebvre and Harvey, offered a more simplistic view of urban space. To him, space may be considered as space within a city which is for public use as well as a collective possession and it also belongs to the authority of the public or to the society as a whole (Santos Junior 2014). Spaces can be of a variety of uses, such as (Santos Junior 2014):

spaces for circulation (street or square), spaces for leisure and reaction (urban park or garden), spaces for contemplation (such as waterfall), and spaces designated for preservation or conservation (such as ecological reserve). He further distinguished between the public and the private space as:

> *"the concept of public space or the public sphere is distinguished from the private sphere and refers to spaces of public interest (Bobbio 2006), spaces constituted of identities and collective action (Sader 1988), spaces that allow societal representation and collective expression (Dahl 1997), spaces for political freedom (O'Donnell 1999), spaces advancing the condition of equality (Arendt 1981), and spaces reflecting democratic formation of opinion and public will (Habermas 1997)"* (Santos Junior 2014: 148).

However, urbanization under capitalism involves the creation and destruction of common spaces in cities which is necessary for the production and reproduction of capital. But the use of public space in everyday life also implies a process of negotiations between different actors (Hackenbroch 2013a) because space is the ultimate locus and medium of struggle and it has therefore become a crucial political issue (Elden 2007). Seeing access to space as a product of negotiations needs an analysis of the concept of power and power relations among different actors (Hackenbroch 2013b). Social groups may vary according to their uses, values and meanings when accessing spaces but such differences may arise so many tensions and contradictions among individual and social purposes of using spaces, among the state as well as other forms of dominating social power (Lata and Walters 2016, Sharp et al. 2000). As a result, the poor, the unprivileged and those marginalized from political power suffer first and foremost from the dispossession process (Harvey 2007, Harvey 2009). Power and power relations are dispersed throughout the society (Sharp et al. 2000), and they imply that the poor and the most vulnerable do indeed possess an agency in that they "always seek to negotiate options that help to secure their livelihoods" (Bohle 2007: 130). But referring to Foucault, Sharp et al. (2000) outlined that power does not only refer to domination, but it also refers to the ability to resist.

Therefore, public spaces are experienced as much materially as they are intellectually, and as well as emotionally, and they need to be considered thereby. In this study, the urban common space for the urban poor is treated as space for physical, mental and social activities and relations through the appropriation and participation of decision making over the production of spaces.

Framing the right to the city

The Marxist social scientist Henry Lefebvre (1968) developed the concept of the 'right to the city' and he used it to mean an urge for all inhabitants in the city to contribute to the "production of urban space" (Lefebvre 1991) and to appropriate its uses (Zérah et al. 2011). Later, his concept was more elaborated and contextualized to the contemporary urban scenario by another neo-Marxist thinker, David Harvey. According to Lefebvre (1968, 2009), it is a political program that aims to strengthen the ability of urban dwellers, regardless of their citizenship, ethnicity, ability, gender and so forth, to take part in the process of spatial production in the city (Purcell 2002, Purcell 2003). The right to the city is viewed to be a critique and counter narrative to the neo-liberal economic reforms of the capitalist mode of production that has altered the nexus between the state, the private sector and the civil society around the world (Zérah et al. 2011). Therefore, the right to the city entails the need to restructure the power relations in the production of urban space and it claims to shift the control from the state to the urban inhabitants (Purcell 2002: 102).

To Lefebvre (1996), the right to the city is to be achieved through two action plans: the right to participation and the right to appropriation. The right to participation allows all inhabitants, not

just legal citizens of a city, to take part in the decision making that shapes the urban spatial and social conditions (Lefebvre 1996, Anderson 2014). By their participation in the decision-making process, the inhabitants living in the city can take control of their city life through appropriation. For Lefebvre (1996), 'appropriation' includes the right of the inhabitants to physically access, occupy and use the urban spaces and, hence, this notion has been the primary focus of the advocates of the right to the city in the case of the urban poor (Arefin 2018). Moreover, Holston (2008) argues that the focus of this approach needs to be shifted from the right to 'the needs of the urban poor' to 'the rights of the citizens', even by bringing changes to the set of available rights when they no longer reflect the justified necessities of citizenship. Therefore, Fernandes (2007: 208) stresses: "The right to the city consists of the right of all city dwellers to fully enjoy urban life with all of its services and advantages – the right to habitation – as well as taking direct part in the management of cities – the right to participation". Purcell (2003) coined a similar term to mean that the urban citizens (including government, private, as well as supra governmental agents) should have a direct say in all decisions which produce and configure the urban space (Plyushteva 2009).

More recent researchers relate the notion of the right to the city to the poverty reduction approach in a context of globalized urbanization. According to Parnell and Pieterse (2010), understanding the all-encompassing criteria of the notion of the right to the city, from civil and political to more collective rights, such as the right to urban services (Arefin and Rashid 2018), helps to develop more pragmatic government interventions to achieve poverty reduction goals (Parnell and Pieterse 2010, Zérah et al. 2011). Therefore, the concept of the right to the city can be traced from individual rights to collective rights, as well as corporate rights, to shape the city with active participation and decision making by all its citizens.

Social movements and the right to the city

The Right to the city movements along with anti-globalization and global justice movements appeared as a re-action to the commercialization of space and the creation of city as part of the market economy under the neoliberal economic reform (Brenner et al. 2012). Since 1960s, cities like London, Melbourne and Toronto experienced an influx and the settlement of a new class of middle income residents into the city centre as a result of the gentrification process (Smith and Williams 1986, Ley 1996, Tonkiss 2005), which eventually caused eviction, homelessness and the displacement of lower income people from their places (Centre for Urban Studies 1964, Lancione 2017). As a result of this process of gentrification, in the United States it is found that the historically Latino Mission neighbourhood went from being 50 percent Latino in 2000 to almost 38.9 percent in 2013 while in that same time period the number of black population in San Francisco was reported to decrease from 60,500 to just 48,000 people (Lees and Phillips 2018). Similarly, cities like Mumbai, Rio de Janeiro, Jakarta and Lagos are adopting models for making more clean and green cities by re-building their city structures (Samara et al. 2013, Lata 2020a). However, in most cases, when implementing such kind of urban renewal and refurbishment projects, the urban poor people's access to urban spaces for living, livelihood and all other services is severely being neglected. Displacing the poor from the city spaces, nevertheless, has now widely been addressed and challenged by the vanguards of the right to the city movements as Holston (2011: 336) rightly argued: "marginalized groups are shifting from a framework of 'declaring needs' to a framework of demanding those needs as rights".

Powerful nations like USA and China, as well as powerful governments, are always found to be in constant opposition with marginalized groups and they rarely acknowledge equal rights to the city for all urban citizens. But this was possible in the context of Latin America and of some European countries where the political movement won its place on the UN's New Urban Agenda as the 'World Charter for the Right to the City' (Colau 2016). The right to the city movements incorporate a range of diversified agendas of the urban social movements that

have emerged in several countries, especially in Latin America, such as the movements against evictions, homelessness and the urban reform; for better sanitation, environmental justice and free public transport; the rights of the immigrants and cultural movements (Siddiqui 2008, Grill 2012, Santos Junior 2014). The Brazilian government was the first to initiate the making of a 'just city' for its citizens in 2001, by enacting the City Statue law to recognize the right to the city as a collective right (Fernandes 2007, Lata 2020b). In Mexico City, the shortage of housing for its citizens has created immense pressure on the real estate companies to implement redevelopment projects which eventually has marginalized low income residents and it pushed them toward the periphery of the city (Adler 2015). Consequently, informal settlements continued to proliferate while 50 percent of the population lacked access to municipal services like water and electricity (Adler 2015). Out of this massive segregation, the Right to the City movement sprung up by a collection of citizen groups that organized the city's marginalized groups along with some non state actors like NGOs (Adler 2015). As a result, the Mexican government posed the Right to the City Charter in 2010, emphasizing more on some core principles of urban governance, such as sustainability, democracy, equity, social justice and equal city rights for every citizen (Adler 2015).

Another successful right to the city movement was the Movimiento de Pobladores en Lucha (MPL) in Chile (Machabanski 2013). MPL, an organization of urban poor working class people, has been working since 2006 and it has now grown to be a nationwide organization working against the displacement and housing insecurity of the urban poor (Machabanski 2013, Arefin 2018). Machabanski (2013) argues that this organization, however, through the empowerment and the increased participation of the marginalized urban poor, has managed to reclaim space and to build community in a way that is paving the road for the production of a dignified habitat for all. Besides, the efforts of MPL made possible long term solutions to the exclusionary institutionalized systems of urban planning and development projects by bringing poor working people into the ownership rights and decision making process. So, the most remarkable work of MPL is the transformation of impoverished victims (of displacement) into empowered citizens. Besides, the recent protest of Romanian commoners against the shale gas extraction was a successful attempt against the neoliberal agenda for central and Eastern Europe (Vesalon and Creţan 2015). The slogan – '*We are not the Wild West of American Investors'* – during the protest made by the Romanians constructs the public opinion on the social control of natural resources (Vesalon and Creţan 2015). Again, the protest made by the common people of Bucharest in Romania against the corrupted government and political elite after the Colectiv fire in October 2015 is the momentum where protesters used the urban space and the city centre location for a spontaneous action against the governing system, including deep rooted injustice and corruption, state repression, stolen election and grievances, to establish their right to the city (Creţan and O'Brien 2020). Similarly, in the context of south Asian countries, the street vendors of Delhi, Gujarat and Mumbai in India have successfully achieved their vending rights through law enforcement by collective political actions under organizations like NASVI and SEWA (Jhabvala 2010, Alva 2014, Roever 2016).

However, in Dhaka, the urban space assumes more importance as it becomes increasingly appropriated, unequal and contested (Mohan 2017), as Lefebvre (1991) argued that the space is becoming a central object of political struggle in the contemporary world (Haque 2012, Arefin 2018). In his work, Lefebvre (2009) suggested that just as everyday life has become colonized by capitalism, so too has its location-social space (Ross 1988) and there is therefore work to be done on understanding space and how it is socially constructed and used (Elden 2007). Therefore, the urban space in Dhaka has become the most political economy that is necessarily linked with the capitalist development. The production of urban space in Dhaka (Hossain and Hackenbroch 2019), therefore, has become the strategy of "accumulation by dispossession" [2)](Harvey 2003, Harvey 2004) in the urbanization process that is obstructing the common people's right to the city. The city embodies the individual command of resources at

the expense of collective rights to common city dwellers and as a result the poor, the underprivileged, and the marginalized people in the city suffer the most, both socially, economically and politically (Harvey 2003, Harvey 2008). So, the concept of the 'right to the city' of the urban poor, as proposed by Lefebvre (1996) and Harvey (2008), seen as their right to appropriate and to participate in the decision-making process over the production of urban spaces, is always contentious, debated and superficially articulated.

Methodology

Participants

The study covers two selected areas of Dhaka City, which is densely populated by the slum dwellers, known as Sattolla and Pallabi (Fig. 1). For this study, 180 respondents were purposively taken from both these areas and among the respondents a fair distribution of male (52.2%) and female (47.8%) was studied. Most of the respondents belong to the age category of 25-54 which is near about 58% and the youth (15-24) and the elderly (55-60+) segment of population covers about 26.11%, and 16.66%, respectively (Table 1). Again, the study depicts that about 41% of the respondents had no education and, moreover, it was found that around 49% of the respondents had only elementary education and only a few had some secondary (7.8%) and above secondary (2.8%) education. Also, around 52.8% of the total respondents were engaged in various informal activities, whereas another 16.1% of the respondents were engaged in private sectors. Moreover, about 2.22% of the respondents were engaged in government jobs and another 6.7% respondents were unemployed. Again, 7.2% of the respondents are involved in business and the rest of them are housewives (11.7%) and students (3.33%). Furthermore, the study also reveals that almost 85% slum dwellers of this study are migrants, whereas only 15% are local inhabitants of the city.

Data Collection Technique and Analysis

In 2016 and 2017, the authors conducted a research on the urban slum dwellers of two densely populated slums: Sattola at Mohakhali, and Pallabi at Mirpur-12, in Dhaka city. The aim of the study was to know the urban poor people's access to urban spaces for everyday life and their ways of negotiation with different stakeholders as survival mechanisms. The study areas were purposively selected because of some important reasons. Both slums are among the densely populated slums in Dhaka; Sattola has nearly 12,893 households (Roy et al. 2014, Marcil et al. 2016, Lata et al. 2019) and more than 12,000 households are estimated to be located in Pallabi (Rokanuzzaman et al. 2013). Moreover, both areas represent geographically varied contexts. Pallabi is situated in the Dhaka North City Corporation which is also far from the city centre, while Sattola is in the Dhaka South City Corporation and it is also close to the city centre. However, the most decisive feature is that both areas are juxtaposed with more affluent neighborhoods.

The findings of this study are based on empirical data collected through a combination of a survey, in-depth interviews, observations, and field notes. The survey recruited over 180 respondents (94 males and 86 females) from both areas, through a semi-structured questionnaire, particularly to explore socio-economic and demographic characteristics, as well as to understand the patterns, objectives and problems of using the urban spaces by the urban poor people. In-depth interviews were carried out with 14 informal workers and 2 local

Accumulation by dispossession is a concept presented by the Marxist geographer David Harvey (2004). It defines neoliberal capitalist policies that result in a centralization of wealth and power in the hands of a few by dispossessing the public and private entities of their wealth or land (Harvey 2004). Such policies are visible in many western nations from the 1970s and to the present day. Harvey (2004) argues that these policies are guided by four principles: privatization, financialization, management and the manipulation of crises and state redistributions.

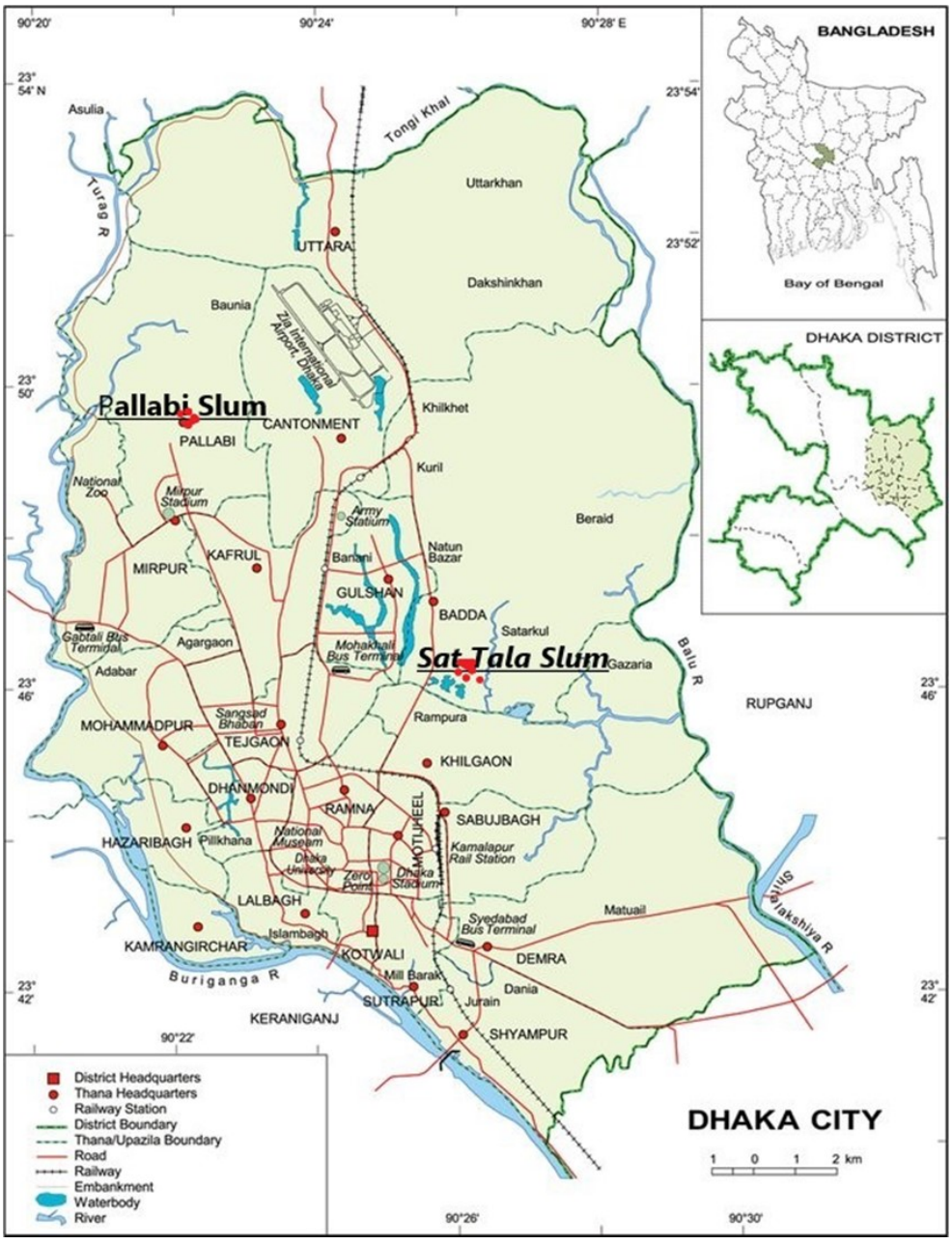

Fig. 1 **- Location and administrative map of Dhaka City, with Pallabi and Sattala slum**
Source: *Swapan et al. (2017)*

Table 1

Demographic profile of the respondents

Variables	Indicator	Sample (n)	Percentage (%)
Gender	Male	94	52.2
	Female	86	47.8
Age	15-24	47	26.11
	25-54	103	57.22
	55-60+	30	16.66
Education	No schooling	74	40.6
	Primary school	88	48.9
	Secondary school	14	7.8
	Graduate	4	2.2
	Post-Graduate	1	0.6
Occupation	Unemployed	12	6.7
	Business	13	7.2
	Govt. service	4	2.2
	Private service	29	16.1
	Informal job	95	52.8
	Student	6	3.3
	Housewife	21	11.7
Migration Status	Yes	153	85
	No	27	15

Source: *Field Survey (2016-2017)*

government stakeholders. The themes covered in the in-depth interviews were: urban social services available to the poor, the appropriation of space, eviction, as well as displacement, negotiation strategies, claiming the right to the city and the role and responsibility of local government officials. In addition to the interviews, the researchers spent a substantial amount of time observing the everyday activities of informal workers and their interaction with other agents in the study settings. Furthermore, the researchers were involved in numerous informal discussions with slum people in order to verify the information collected through other research tools.

Qualitative data were analyzed using an open coding approach until significant typologies and categories emerged from the data. Besides, quantitative data were coded and entered into IBM SPSS 24 for statistical analysis and tabular presentation, while bivariate and cross tabulations were operated. This study combines both methods for collecting and analyzing data so that a solid picture of the everyday life, the struggle and the mechanisms of survival of the informal workers can be generated.

Results

Appropriation of urban common spaces

The city's common spaces are appropriated by the capital which is necessary for the production-reproduction of capitalist relations in the contemporary neoliberal cities (Santos Junior 2014). Dhaka, a neo-capitalist hub of accelerating capital, is experiencing such scenarios over the urban space in the name of 'creative destruction', as proposed by Harvey

(2008). So, the question which comes first is: 'how do the urban poor utilize the everyday urban spaces when space becomes a means of constant contentious and a mode of capitalist production?'.

In the context of Dhaka, it was found that most of the urban poor living in various slums are involved in the informal economy as rickshaw pullers, street vendors, hawkers (i.e. roadside business), garments workers etc., which is the only source of livelihood for them (Ishtiaque and Mahmud 2011). From this study, it was found that among those who are engaged in different types of occupations, around 52.85% are engaged in informal activities, as their education supports less for formal activities. As a result, in most of the cases they had to utilize different public spaces like streets, neighborhood locality, transportation, park etc. in the cities for doing their everyday task. But, as space becomes vital for the capitalist and also for the urban poor, contradictions are always found over the control of the space which restricted the urban poor's movement over the space. This study depicts that about 43.8% of the respondents couldn't use the same space every day and about 53.3% respondents faced various difficulties, including public harassment, police repressions, local *mastans* threatening and frequent evictions from one place to another. In an interview with Md. Kabir Hossain, a 45 years old fisherman, currently doing business at Mohakhali Wareless gate from Sattala Slum, the researchers evidenced the frequent movements of the informal workers from one place to another. To his utterance:

> *"When I started with this business (fish selling), I had no capital. I used to live under the open space and had no permanent space to use. Every day I had to face various problems while using public spaces. Then a few months later, I got this free space. But I couldn't enjoy using this space a long time because a multi-storied apartment building was built here within a few months. Again, after some days, a man came to me and ordered to pay 3500 taka monthly fees if I want to continue using this space".*

Zakaria Ahmed, a 42 years old rickshaw puller living in Pallabi Slum at Mirpur-12, also shares similar experiences while driving rickshaws in various public spaces in the city:

> *"I could drive the rickshaw from Pallabi to anywhere within the city. But now, I couldn't drive the rickshaw on VIP roads. The police threatened us. Sometimes they took away our mattress covers and demanded money. They never filed any case against us if we violate any law; rather they demand 200-300 taka for every mattress cover from us. They called this bribery as pocket money".*

Gendered urban space

This study also revealed that the appropriation of space is a gender based issue. About 57.0% of the female respondent who utilize public spaces in everyday life had to face many obstacles which restricted their movement within the space. From the in-depth interview, it was found that in most of the cases female garment workers had to face harassments by the strangers and sometimes by their male colleagues as well as by the stalkers of the neighborhood locality. Shayla, 21 years old garments worker from the Pallabi slum, shares her experiences in this regard:

> *"It is difficult to move after the evening comes. Stalkers are everywhere in this locality. If anyone moves alone on the streets in the evening, she will certainly be harassed by these stalkers".*

In a recent work in Sattola slum in Dhaka, Lata (2020a) found that women bear the triple burden of social stigma, religious barriers and patriarchy in accessing the public space to earn an income (Fattah and Walters 2020). Even the elderly women who earned a living for the

families' survival faced sexual and verbal harassment and other types of harassment and maltreatment. Besides, some women expressed that sometimes men treat them as sex workers because they occupied the street for doing business. A similar context is prevailed in the Indian society where women face specific constrains when it comes to accessing the urban space and other urban resources; young women, poor women, women of religious minorities and women with disabilities – they all are equally vulnerable (Lama-Rewal 2011).

Negotiation over the urban space

Urban space is socially constructed and, as a result, different stakeholders have different interests, needs and aspirations and a differential power to dominate the space. As the appropriation of public spaces for selling products is formally illegal in Dhaka (Lata 2020c), the urban poor had to negotiate with different agencies to continue their business within the slum and outside the slum. In this study, it was revealed that the urban poor people's negotiation began with this powerful elite who has money, musclemen and political affiliation. Sometimes, their negotiation process ended with giving a space fare in every month, and sometimes they had to give a donation to the line men and local *mastans*, as well as to police staff.
Shafiqul Islam, 38 years old, inhabitant of Pallabi Slum at Mirpur, living in this slum for the last 15 years, illustrated the mechanism process within the slum. He concurs as:

> *"I know this is a government land. But, in this slum, the local MP controlled everything. So we had to pay 600-800 taka as space fees in every month to the follower of MP so that we may survive in this slum".*

This study also reveals that people who have a good networking with the community leaders and the local gang can easily get access to space within the locality. Eshan (28), a food vendor from the Sattola slum at Mohakhali, said:

> *"In this slum, we have a committee. In that committee, we have community leaders. If anyone wants to do business and needs any space in this slum, he/she had to manage our leaders. If he allows him/her, then he/she can do business here. But he/ she must be a local resident of this slum".*

Lata and Walters (2016) have also seen that the residents of Sattola who have a strong kin network or social network are powerful. Apart from this, sometimes the slum dwellers willingly gave bribe to different channels in the name of tenure security. While talking with Enayet Hossain, a 30 years old street hawker and inhabitant of Mollar Bosti at Pallabi Slum, the authors found that he willingly gave 1500 taka in every month as space fees to the factory owners. According to him:

> *"I willingly give money to the factory owners as I am doing business in front of his factory. I know this is a public space, but I gave him money so that he may stand beside me at the time of eviction".*

However, the study reveals that among the informal workers about 63.04% had to give bribe to the police directly and about 18.18% had to give bribe to the local leaders for using the space as a matter of negotiation. Kamal Hossain, age 24, a rickshaw puller from Palabi Slum, shared his experiences in this regard:

> *"I had to give bribe to the Police for pulling the rickshaw in the VIP road. If we disagree to pay, they will snatch away our mattress covers".*

Furthermore, sometimes the urban poor had to pay fees to multiple channels so that they can do business without any hindrance. A fisherman from Hindu para Slum at Sattola, named

Kabir, described how much problematic is doing business in public spaces. In his statement:

> *"I am at risk of eviction. The space which I am using for doing business has ownership to five people. Currently, I am paying space rent to two owners. Very soon, I may have to pay to all of them. Besides, I am hearing that they are planning to build a multistoried building here. Then it would be tough for me to continue business here and getting a new space for doing business is very problematic and it requires huge money in Dhaka city".*

Apart from this, we discovered that, after the eviction, many evictees could reclaim their spaces by negotiating with the local leaders and by giving them bribe as they knew that the eviction was temporary. Although, the people who lacked proper channels and extra money had to leave their temporary places, so they returned back to their villages after the eviction. This mechanism has been described by Bashar Molla, aged 52, who was living at Hindu Para Slum in Sattola in Dhaka for the last 20 years:

> *"After the eviction, some people left this settlement and they started to live in other slums. Some are seen to live in peripheral areas like Savar and Gazipur. Only a few remained under the open sky because they had close connections with the local leaders and they knew that they could be able to reclaim their space by giving money to the local leaders and mastans".*

Claiming the right to the city

Kalpana's statement clearly denotes the condition of the urban poor – they are being continuously excluded from their right to participation and the decision making process over the production of space, as well as the community life:

> *"We don't have any right for the betterment of this community. MP Ilias Molla and his fellow men took all decisions here. They never discussed anything with us. Even when they increased the space rent, they never asked for our opinion".*
>
> *Kalpana Akhter, Houseowner at Pallabi Slum*

After doing the survey, the authors explored that about 82% slum dwellers think that they didn't have any rights in the decision making process over the development of slum communities. The study also reveals that about 76% slum dwellers never did any protest for claiming their right to the city and about 54% of them had no voting rights. Besides, their weak engagement with neighbourhood areas (54% had no connection) and the absence of leadership (16.7%), and the fear of local leaders and police harassment (18%) deterred them to claim their rights in and out of the settlements. Again, about 50% of the respondents feel that doing protests is unnecessary because of their temporality and patterns of work. On an interview with Mehedi Hasan, aged 36 from Pallabi Slum, the authors got the following response:

> *"We are temporary residents. So what is the necessity of doing a protest?"*

On the other hand, while talking with a local government official from Ward No-6, Mirpur-12, we have found similar notions about the urban poor's temporality and the reason they had limited opportunities for them. In his words:

> *"Most of the slum dwellers are illegal informal citizens. They came to the city for work and after the work they will return back to their villages. Besides, they are not enlisted as citizens by the city corporation. Even, they didn't pay any tax or the necessary bills to the city corporations. So, the government has nothing to do for them except giving them some humanitarian assistance".*

Furthermore, while talking with several slum dwellers, the authors generated the idea that the local leaders forbid them to make any protest because they gave them assurance to re-appropriate their spaces after the eviction. Didarul Islam, living in Sattola Slum for the last two decades, confirmed us: *"We don't need to do any protest because our local leaders gave us assurance to resettle again"*. Besides, an interesting finding generated from the quantitative survey showed that about 61% slum dwellers are satisfied by living in these places. In an interview with Enayet Hossain, aged 30, living in Pallabi Slum at Mirpur, he confirmed us that it is not possible to live in any better places than this, due to his little income:

> *"It is not possible to live any better places in the city because we have little income. So why will we make a protest?"*

Although in some cases it was found that the CBO committee is trying to play some specific roles in the resolution of any conflicting behaviour and of any need or demand of the slum community, but in the name of community development, these informal political leaders accentuate their crisis by depriving the urban poor from their communities.

Discussion

In Dhaka city, though the livelihood of the urban poor vastly depends on utilizing the public spaces like streets, parks, neighborhood localities, and transportation stations, the state proclaims them and their livelihood activities such as street trading as illegal. As a result, they cannot use any urban grounds on a permanent basis and they are everyday victims of dispossession and displacement. This affects their daily income and it also deprives them from their right to the urban space. From the right to the city perspective, as outlined by Lefebvre (1968), it can be argued that the poor of Dhaka city are unable to appropriate the urban spaces according to their needs. Rather, eviction, displacement, harassment for money, intimidation, uncertainty and even sexual harassment are everyday events for the street vendors, regardless of their gender and sex, when using the urban space. Moreover, as these people severely lack options for settling elsewhere and for other strategies of livelihood, as well as they have very limited power to resist the powerful groups due to lack of tenure security of their livelihood space, they have to adopt strategies to negotiate with them. Therefore, they negotiate with many local state and non state actors like the *mastans* and policemen by paying them money on a regular basis. It represents a circle of money relations among different middlemen, urban informal power holders and the urban poor, where the state plays an ambivalent and crucial role often by neglecting the real scenario and by continuing this dialect of eviction and repatriation of the urban poor by these unrecognized power holders. This relation is continued through a numbers of formal and informal agents. On one side, the state is denying these people as legal citizens of the city and it is thereby excluding them from the necessary rights over using the urban spaces. On the other side, the state is not evicting the poor from the city permanently and it has allowed many private organizations as well as intermediary actors to sustain the process. The local politicians, *mastans*, linemen and the police, all have a collective effort so that street vending to be continued by ignoring the higher commands and the necessity to keep the street clear from street trading (Lata et al. 2019). Similarly, with regard to the participation in the decision making of urban affairs from the RTC perspective, it is found that, more than two third of the slum dwellers believe that they do not have any right to participate in the decision making regarding their use of space, as well as other matters of their community life. Moreover, their absence of citizenship identity and voting rights, the less social connection with the neighbors, and the fear of local powerful actors restricted them to participate in any kinds of slum community affairs.

As a result, the urban poor people have accepted such socially embedded power relations arising out of the state's lack of proper policy concern and intention to provide a permanent solution to their problem. So that because many of them believe that they cannot protest as

they are not legal citizens of the city while the majority of slum dwellers never think to protest. Furthermore, the living slums in Dhaka city have offered them opportunities to work and secured settlements, as the majority have migrated to Dhaka from some other regions of the country for work and to settle their grounds for living (Hossain 2013). These distinctive geographical, social, as well as economic features of Dhaka have offered a peculiar character of the urban poor people as well. Although they are severely deprived from all kinds of state's social services, which are viewed as their rights to the city, they are not organized for demanding their rights to the city. While the existing literature showed the urban poor people's collective and organized efforts for bringing successful right to the city movements in many of the Latin American countries, like Mexico, Brazil, Chile, as well as in some European and South Asian countries (Machabanski 2013, Santos Junior 2014, Adler 2015, Málovics et al. 2019, Vesalon and Creţan 2019), in the case of the urban poor of Dhaka there is hardly any such potential of RTC movements. The lack of leadership, the temporality and the uncertainty of their existence in the city are some of the valid reasons for not claiming their rights. In Delhi, during the recent lockdown due to the Covid-19 pandemic, the government has been compelled to ensure free rations for every poor citizen after implementing a hardcore protest by the poor migrant people. But, in Dhaka, during this pandemic situation, despite having a good allocation from the government, the poor people have rarely availed that opportunities as a result of their unorganized efforts and lack of consciousness over their rights (Recio et al. 2020). Nevertheless, in some cases, the local word councilors have made good efforts to provide reliefs for the destitute and the ultra poor with the assistance of different NGOs. But, the existing urban policies regarding their citizenship are deterring them from accessing goods and services by the state.

From the exiting literature, we also found that wherever the urban poor achieved a successful right to the city movement, such as the case of Roma people in Szeged, Mexican poor people, MPL in Chile and street vendors in India, they were successful with the collective efforts of many non state actors like NGOs and also with the participation of many government officials. But, in Dhaka, the role of such organizations are highly constrained because of the existing powerful political classes whose interests are embedded in the urban space. Although CBO committees are found to be working in many community affairs, their role has been criticised for depriving the poor people from their community affairs. As Castells (2010) defines it, this condition of the local people is represented by social exclusion through which certain individuals and groups are systematically barred from the access to urban services and urban space. The centralization of decision making rights to the powerful class and the depriving local level people of weakened powers deter the higher levels of government and policy planners to claiming the right to the city for the poor in Dhaka (Banks 2008). The poor are always vulnerable because of their meagre livelihood conditions. So, they seek alternative options to negotiate and to secure their livelihoods than protesting on the existing situation (Bohle 2007, Hackenbroch et al. 2016), which further makes them more vulnerable. As a result, the poor people of Dhaka city also engage with everyday social-contract relations with hundreds of state and non-state actors instead of permanently protesting their rights and they rely on them for livelihood security.

Conclusions

Urban poor people, particularly those who are engaged in the street economy, are the victims of repressive state policies in Dhaka and in many cities in South Asia as well. While in many cities in the world, poor urban people have been successful in accomplishing right to the city movements, the urban poor in Dhaka have prosecuted substitute ways to organize social movements through a range of social relations of exchanging interests among a number of actors. Using the cases of Sattola and Pallabi, this study unfolds the context and the background of poor people's strategies and practices to negotiate with the local powerful

actors. The poor urban people are involved in everyday street politics over appropriating the urban space with other local actors instead of claiming their rights over that space, although such relations are only securing their livelihood access on a temporary basis. However, this impermanence of livelihood access through processes of displacement and dispossession has established a permanent system of social contacts where poor urban people are sustained within cities with the help of different state and non-state actors. Hence, these social relations are of great hindrance in producing pragmatic strategies to change the urban poor people's condition in cities. Therefore, the role of the civil society in organizing poor people and in increasing their consciousness regarding the rights to the city holds a great importance and it needs to be explored through further research. Furthermore, the government actors played a conciliatory role in changing the urban policies for the poor people in many cities and it also restrained significant potential in facilitating the right to the city movements in Dhaka city. Their roles and potentials in the context of Dhaka need to be assessed in future research.

Acknowledgements

We would like to thank the two anonymous reviewers and the editor of JURA for their helpful suggestions and advice for improving our paper.

References

ADLER D. (2015), *Do We Have a Right to the City?*, Jacobin, Retrieved from: www.jacobinmag.com.

AHMED I. (2014), *Factors in building resilience in urban slums of Dhaka, Bangladesh*, Procedia Economics and Finance 18, 745-753.

ANDERSON T. (2014), *Human development, the state and participation*, Development Studies Research 1 (1), 64-74.

AREFIN S. (2018), *The Real Estate and Capital Accumulation: An inquiry into Harvey's Model in Dhaka*, Peoples' Preface 2 (2), 153-165.

AREFIN S., RASHID T. (2018), *Access to Urban Services in the Wave of Neoliberalism: A Study of the Urban Poor in Dhaka, Bangladesh*, International Journal of Research and Innovation in Social Science 2 (11), 153-158.

BANKS N. (2008), *A tale of two wards: political participation and the urban poor in Dhaka city*, Environment and Urbanization 20 (2), 361-376.

BOHLE H.-G. (2007), *Geographies of Violence and Vulnerability an Actor-Oriented Analysis of the Civil War in Sri Lanka*, Erdkundle 61 (2), 129-146.

BRENNER N., MARCUSE P., MAYER M. (2012), *Cities for People, Not for Profit: Critical Urban Theory and the Right to the City*, Routledge, New York.

CASTELLS M. (2010), *End of Millennium, Volume 3*, Wiley-Blackwell, Chichester.

CENTRE FOR URBAN STUDIES (ed.) (1964), *London: aspects of* change, MacGibbon & Kee, London.

COLAU A. (2016), *After Habitat III: a stronger urban future must be based on the right to the city*, the Guardian, Retrieved from: www.theguardian.com.

CREȚAN R., O'BRIEN T. (2020), *Corruption and conflagration: (in)justice and protest in Bucharest after the Colectiv fire*, Urban Geography 41 (3), 368-388.

CROSSA V. (2009), *Resisting the entrepreneurial city: Street vendors' struggle in Mexico City's historic center*, International Journal of Urban and Regional Research 33 (1), 43-63.

ELDEN S. (2007), *There is a Politics of Space because Space is Political: Henri Lefebvre and the Production of Space*, Radical Philosophy Review 10 (2), 101-116.

ETZOLD B., KECK M. (2009), *Politics of Space in the Megacity Dhaka: Negotiation of Rules in Contested Urban Arenas*, UGEC Viewpoints 2, 13-15.

ETZOLD B., BOHLE H.-G., KECK M., ZINGEL W.-P. (2009), *Informality as agency –*

Negotiating food Security in Dhaka, Die Erde 140 (1), 3-24.

FATTAH K. N., WALTERS P. (2020), *"A Good Place for the Poor!" Counternarratives to Territorial Stigmatisation from Two Informal Settlements in Dhaka*, Social Inclusion 8 (1), 55-65.

FERNANDES E. (2007), *Constructing the 'Right to the City' in Brazil*, Social & Legal Studies 16 (2), 201-219.

GOVERNMENT OF BANGLADESH (2008), *Statistical Pocket Book, 2008*, Government of Bangladesh Bureau of Statistics, Dhaka.

GRILL J. (2012), *'Going up to England': Exploring mobilities among Roma from Eastern Slovakia*, Journal of Ethnic and Migration Studies 38 (8), 1269-1287

HACKENBROCH K. (2013a), *Negotiating Public Space for Livelihoods: About Risks, Uncertainty and Power in the Urban Poor's Everyday Life*, ERDKUNDE 67 (1), 37-47.

HACKENBROCH K. (2013b), *The Spatiality of Livelihoods – Negotiations of access to public space in Dhaka, Bangladesh*, Franz Steiner Verlag, Stuttgart.

HACKENBROCH K., HOSSAIN H. (2012), *The organized Encroachment of the Powerful- Everyday Practices of Public Space and Water Supply in Dhaka, Bangladesh*, Planning Theory of Practice 13, 397-420.

HACKENBROCH K., HOSSAIN S., ALTROCK U., SCHOON S., STERLY H. (2016), *Informality, urban governance and the state: negotiations of space in Dhaka and the Pearl River Delta*, International Development Planning Review 38 (3), 229-253.

HAQUE K. (2012), *The Political Economy of Urban Space: Land and Real Estate in Dhaka City*, Institute of Urban Governance Studies, BRAC University, Dhaka.

HARVEY D. (1973), *Social Justice and the City*, Blackwell, Oxford.

HARVEY D. (2003), *The Right to the City*, International Journal of Urban and Regional Research 27 (4), 939-941.

HARVEY D. (2004), *The 'new' imperialism: accumulation by dispossession*, Socialist Register 40, 63-87.

HARVEY D. (2007), *A Brief History of Neoliberalism*, Oxford University Press, Oxford.

HARVEY D. (2008), *The 'Right to the City'*, New Left Review 53 (Sep/Oct.), 23-40.

HARVEY D. (2009), *Is This Really the End of Neoliberalism?*, CounterPunch+, Retrieved from: www.counterpunch.org.

HOLSTON J. (2008), *Insurgent Citizenship: Disjunctions of Democracy and Modernity in Brazil*, Princeton University Press, Princeton and Oxford.

HOLSTON J. (2011), *Contesting Privilege with Right: the Transformation of Differentiated Citizenship in Brazil*, Citizenship Studies 15 (3-4), 335-352.

HOSSAIN S. (2011), *Informal dynamics of a public utility: Rationality of the scene behind a screen*, Habitat International 35 (2), 275-285.

HOSSAIN S. (2013), *Migration, urbanization and poverty in Dhaka, Bangladesh*, Journal of the Asiatic Society of Bangladesh 58 (2), 369-382.

HOSSAIN S., HACKENBROCH K. (2019), *Whose interest finally counts? The statutory production of urban space at the fringes of Dhaka, Bangladesh*, Planning Theory 18 (2), 167-190.

ISHTIAQUE A., MAHMUD M. S. (2011), *Migration objectives and their fulfillment: A micro study of the rural-urban migrants of the slums of Dhaka City*, Geografia: Malaysian Journal of Society and Space 7 (4), 24-29.

ISLAM N. (2005), *Dhaka Now: Contemporary Urban Development*, Bangladesh Geographical Society, Dhaka.

JHABVALA R. (2010), *Foreword*, in: Bhowmik S. K. (ed.), Street Vendors in the Global Urban Economy, Routledge, London.

LAMA-REWAL S. T. (2011), *Women's Right to the City: from safety to citizenship*, in: Zérah M.-H., Dupont V., Lama-Rewal S.-T. (eds.), Urban Policies and the Right to the City in India: Rights, Responsibilities and Citizenship, UNESCO, New Delhi, pp. 31-38.

LANCIONE M. (2017), *Revitalising the uncanny: Challenging inertia in the struggle against forced evictions*, Environment and Planning D: Society and Space 35 (6), 1012-1032.

LATA L. N. (2020a), *Gendered Urban Space in Bangladesh*, Global Dialogue 10 (2), 1-

4.

LATA L. N. (2020b), *Neoliberal Urbanity and the Right to Housing of the Urban Poor in Dhaka, Bangladesh*, Environment and Urbanization ASIA 11 (2), 218-230.

LATA L. N. (2020c), *To Whom Does the City Belong? Obstacles to Right to the City for the Urban Poor in Bangladesh*, Journal of Contemporary Asia, DOI: 10.1080/00472336.2020.1791934.

LATA L., WALTERS P. (2016), *The Politics of Space in Dhaka: Informality, Power and Negotiations in the Everyday Life of the Urban Poor*, Refereed Proceedings of TASA 2016 Conference - Cities & Successful Societies, 198-205.

LATA L., WALTERS P., ROITMAN S. (2019), *A Marriage of Convenience: Street vendors' everyday accommodation of power in Dhaka, Bangladesh*, Cities 84, 143-150.

LEES L., PHILLIPS M. (2018), *Handbook of gentrification studies*, Edward Elgar, Cheltenham.

LEFEBVRE H. (1968), *Le Droit à La Ville*, Anthropos, Paris.

LEFEBVRE H. (1991), *The Production of Space*, Blackwell, Oxford.

LEFEBVRE H. (1996), *The Right to the City*, in: Kofman E., Lebas E. (eds.), Writings on Cities: Henri Lefebvre, Blackwell, Cambridge, MA, pp. 147-159.

LEFEBVRE H. (2009), *Space: Social Product and Use Value (1979),* in: Brenner N., Elden S. (eds.), State, Space, World: Selected Essays, University of Minnesota Press, Minneapolis and London, pp. 185-195.

LEY D. (1996), *The New Middle Class and the Remaking of the Central City*, Oxford University Press, Oxford.

MACHABANSKI G. (2013), *The Chilean Experience: Struggling for the Right to the City in the Neoliberal Era*, University of Illinois, Retrieved from: http://hdl.handle.net/2142/45251.

MACKIE P. K., BROMLEY R. D. F., BROWN A. M. B. (2014), *Informal traders and the battlegrounds of revanchism in Cusco, Peru*, International Journal of Urban and Regional Research 38 (5), 1884-1903.

MÁLOVICS G., CREȚAN R., MÉREINÉ BERKI B., TÓTH J. (2019), *Urban Roma, segregation and place attachment in Szeged, Hungary*, Area 51 (1), 72-83.

MARCIL L., AFSANA K., PERRY H. B. (2016), *First Steps in Initiating an Effective Maternal, Neonatal, and Child Health Program in Urban Slums: the BRAC Manoshi Project's Experience with Community Engagement, Social Mapping, and Census Taking in Bangladesh*, Journal of Urban Health 93, 6-18.

MOHAN S. (2017), *Politics of Urban Space: Rethinking Urban Inclusion and the Right to the City***,** in: Lacey A. (ed.), Women, Urbanization and Sustainability: Practices of Survival, Adaptation and Resistance, Palgrave Macmillan, London, pp. 157-177.

MOHIUDDIN M. (2014), *The Real Estate Business in Dhaka City: Growth and Contribution to the Economy of Bangladesh*, IOSR Journal of Business and Management 16 (14), 58-60.

PARNELL S., PIETERSE E. (2010), *The 'Right to the City': Institutional Imperatives of a Developmental State*, International Journal of Urban and Regional Research 34 (1), 146-162.

PHADKE S. (2007), *Dangerous Liaisons. Women and Men: Risk and Reputation in Mumbai*, Economic and Political Weekly 42 (17), 1510-1518.

PLYUSHTEVA A. (2009), *The Right to the City and the Struggles over Public Citizenship: Exploring the links*, The Urban Reinventors Online Journal 3 (9), 2-17.

PURCELL M. (2002), *Excavating Lefebvre: The Right to the City and its Urban Politics of the Inhabitant*, GeoJournal 58, 99-108.

PURCELL M. (2003), *Citizenship and the Right to the Global City: Reimagining the Capitalist World Order*, International Journal of Urban and Regional Research 27 (3), 564-590.

RECIO R. B., CHATTERJEE I., LATA L. N. (2020), *Covid-19 reveals unequal urban citizenship in Manila, Dhaka and Delhi*, LSE Covid-19, Retrieved from: www.blogs.lse.ac.uk.

ROEVER S. (2016), *Informal trade meets informal governance: Street vendors and legal reform in India, South Africa, and Peru*, Cityscape: A Journal of Policy Development and Research 18 (1), 27-46.

ROKANUZZAMAN M., ALI M. A., HOSSAIN M. N., MIAH M. A. (2013), *Study on Livelihood Status of Slum Dwellers in the North Dhaka City Corporation*, Journal of Environmental Science and Natural Resources 6 (2), 89-95.

ROSS K. (1988), *The Emergence of Social Space: Rimabaud and the Paris Commune (Radical Thinkers)*, University of Minnesota Press, Minnesota.

ROY T., MARCIL L., CHOWDHURY R. H., AFSANA K., PERRY H. (2014), *The BRAC Manoshi Approach to Initiating a Maternal, Neonatal and Child Health Project in Urban Slums with Social Mapping, Census Taking, and Community Engagement*, BRAC, Dhaka.

SAMARA T. R., HE S., CHEN G. (2013), *Locating Right to the City in the Global South*, Routledge, New York.

SANTOS JUNIOR O. A. (2014), *Urban common space, heterotopia and the right to the city: reflections on the ideas of Henri Lefebvre and David Harvey*, Brazilian Journal of Urban Management 6 (2), 146-157.

SHARP J. P., ROUTLEDGE P., PHILO C., PADDISON R. (eds.) (2000), *Entanglements of power: Geographies of domination/resistance*, Routledge, London.

SIDDIQUI T. (2008), *Migration and gender in Asia*, United Nations, Retrieved from: www.un.org.

SMITH N., WILLIAMS P. (eds.) (1986), *Gentrification of the City*, Allen and Unwin, Boston.

SWAPAN M. S. H., ZAMAN A. U., AHSAN T., AHMED F. (2017), *Transforming Urban Dichotomies and Challenges of South Asian Megacities: Rethinking Sustainable Growth of Dhaka, Bangladesh*, Urban Science 1 (4), 31.

TONKISS F. (2005), *Space, The City and Social Theory: Social Relations and Urban Forms*, Polity Press, Cambridge.

UN-HABITAT (2008), *State of the World's Cities 2010/2011: Bridging the Urban Divide*, Earth Scan, London and Sterling, VA.

VESALON L., CREȚAN R. (2015), *'We are not the Wild West': anti-fracking protests in Romania*, Environmental Politics 24 (2), 288-307.

VESALON L., CREȚAN R. (2019), "*Little Vienna" Or "European Avant-Garde City"? Branding Narratives in a Romanian City*, Journal of Urban and Regional Analysis 11 (1), 19-34.

WORLD BANK (2007), *Dhaka: Improving living conditions for the urban poor*, World Bank, Dhaka.

WSUP (2017), *Scoping urban sanitation services in three countries*, WSUP, Retrieved from: www.wsup.com.

ZÉRAH M.-H., REWAL S. T. L., DUPONT V., CHAUDHURI B. (2011), *Right to the City and Urban Citizenship in the Indian Context*, in: Zérah M.-H., Dupont V., Lama-Rewal S.-T. (eds.), Urban Policies and the Right to the City in India: Rights, Responsibilities and Citizenship, UNESCO, New Delhi, pp. 1-11.

Initial submission: 29.04.2020
Revised submission: 15.12.2020
Final acceptance: 28.12.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 145 - 176
https://doi.org/10.37043/JURA.2021.13.1.10

QUALITATIVE STUDY ON THE SHORT-TERM ECONOMIC IMPACTS OF THE NEW BYPASS ROAD ON TSIMASHAM CORE AREA BUSINESSES, CHUKHA, BHUTAN

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Abstract: A relief route or bypass's impact on the town's economy is not significant for medium and large cities than in comparison to the small towns. Though there are positive impacts, such as less noise, traffic, and peace, business people in the town fear that it will impact their sales, and property value will decline. Research studies indicate that other factors affect the economy of a bypassed town in addition to the size of the population. The outcomes of the studies are neither consistent nor conclusive across locations; however, the most negatively impacted are small towns dependent on highway traffic. This paper seeks to study the economic impact on small towns through the study of Tsimasham, where Chukha-Damchu's new bypass road became operational with effect from July 18, 2018. Survey questionnaires were used to interview the business people in the Tsimasham core area. The findings confirm most of the earlier research results of small towns that businesses in the Tsimasham core area are adversely impacted. There are also other issues such as the lack of commuting options for the residents as public transport or taxis barely enter the town. This could be due to the geographical isolation of the town as it is located at a higher level than the new bypass road.

Key Words: *highway bypass, economic impact, small towns, Tsimasham.*

Introduction

The investment in efficient and safer roads has direct and indirect impacts on the local or regional economy (Andersen et al. 1993, Otto and Anderson 1995, Seggerman and Williams 2014). The road provides access to the outside world for merchandise and services. Transport investment does not always bring in a positive experience for all. A synopsis of studies in the 1970s and 1980s concludes that other factors affect economic growth at regional level, besides the highway (Andersen et al. 1993). The effects of transportation enhancement are not easy to forecast when the economic systems are well integrated. As part of the transportation network, highway bypasses are developed to shorten the travel distance and the time. Though it brings in several benefits to the bypassed town, there are also fears among the business people that it will impact their sales. Research studies have also shown that small towns dependent on bypass traffic are mostly adversely affected, often leading to a devastating situation. In Bhutan, recently, there has been news in the media on the businesses affected in the Tsimasham core area due to Chukha-Damchu's new alignment bypass road. This paper is on the economic impacts of the new bypass on the Tsimasham core area.

The Tsimasham Yenlag Thromde (satellite town) is located along Thimphu-Phuentsholing Highway in Chhukha District, Bhutan (Fig. 1). It is an administrative headquarters of the Chukha District and it has an area of 192.66 acres with a total population of 2135 (National Statistics Bureau 2018). It is about 81 km from Thimphu and about 91 km from Phuentsholing. Thimphu is the capital of Bhutan and Phuentsholing is the commercial hub located in the southern part of Bhutan and it has a border with the Indian town of Jaigaon. The other towns between Thimphu, Tsimasham, and Phuentsholing are Chukha, Darla, and Gedu towns.

The Tsimasham Satellite town comprises three pockets, namely the old Dzong (fortress) area, Tsimasham area, and Tsimalakha area, connected by the Thimphu-Phuentsholing Highway (Ministry of Works and Human Settlement 2015a). The three pockets of the areas are served by two small commercial cores located in Tsimasham and Tsimalakha, respectively. The study area for this research is the commercial core in the Tsimasham area, and herein it will be called the 'Tsimasham core area' (Fig. 2), as the bypass has been diverted from this area. The Tsimasham core area was dependent on highway traffic as the bus or other vehicles stop for meals and breaks before the new bypass. On July 18, 2018, a 29.19 km new bypass (Chukha-Damchu bypass) road opened for traffic, which shortened the distance between Phuentsholing and Thimphu by 19.5 km and the travel time by more than an hour. The new bypass is constructed from Damchu, which is 38 km from Tsimasham (towards Thimphu) to Chukha town, which is about 9 km from Tshimasham towards Phuentsholing (Ministry of Works and Human Settlement 2015b). There is a road connection from the old Dzong area to the new highway bypass. The new bypass construction entailed the removal of over 2500 meters of hard rock and it traversed over difficult topography as per Bhutan's former Prime Minister report during the road inauguration. Less than two weeks after opening the road for traffic, i.e. on July 30, 2018, there was a roadblock due to a continuous rainfall causing the boulders to fall on the road and another block in the following month. The roadblock was cleared and, during the block, the traffic was diverted half-way towards the old route as per the Kuensel report (Bhutan National Newspaper). The travelers have to travel cautiously, especially during the summer months. The road is proposed to be widened by 10-15 meters along with protection works to prevent mishaps, as per the official information from Project Dantak which was involved in the construction of the road.

Geographically, the satellite town is perched on the sloping mountain and the new highway bypass has been constructed at a level lower than the town level, leaving out completely the Tsimasham area. The Tsimalakha core area remains unaffected by the bypass road as it was not connected directly to Thimphu-Phuentsholing Highway. The Tsimasham town does look deserted during the site visit in December 2018, as there are almost no buyers or vehicles visible on the old highway route. As the total population is about 2135 people for the satellite town area, the population residing in the Tsimasham area is only little over 1000 people.

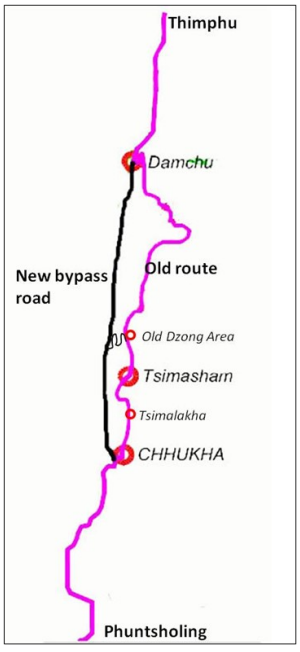
The study of the economic impact of the bypass on Tsimasham core area businesses is at an appropriate time as it includes an analysis on the period of less than a year since the opening of the bypass for traffic and the economic impact tends to occur within the first year (Parolin 2012). Moreover, this research paper will guide to proactively improve the existing situation of the commercial core through local government intervention or an urban development plan proposal and its implementation. This research paper will contribute to the existing knowledge base on the economic impacts of highway bypass on small towns that are geographically isolated and in proximity to another competing similar type of commercial core.

The paper consists of the introduction followed by the literature review of the economic impacts of the bypass on towns/cities along with other impacts. It will be followed by the methodology, results, and discussion, and finally the conclusions.

Literature Review

As a part of a transportation network, highway bypasses/highway relief routes are constructed to divert traffic from certain areas, mostly from the core of the town. The main reasons for the provision of the bypass are to reduce travel time, to improve traffic flow, and to minimize traffic accidents (Leong and Weisbrod 2000). Srinivasan and Kockelman (2000) highlight that planners identify the development of a bypass with mobility enhancement and as a contribution to the regional economy. Highways bring in new business opportunities, improve business

Fig. 1 - **Bhutan districts, showing the approximate location of the study area – Tsimasham**
Source: *Wikipedia (2019)*



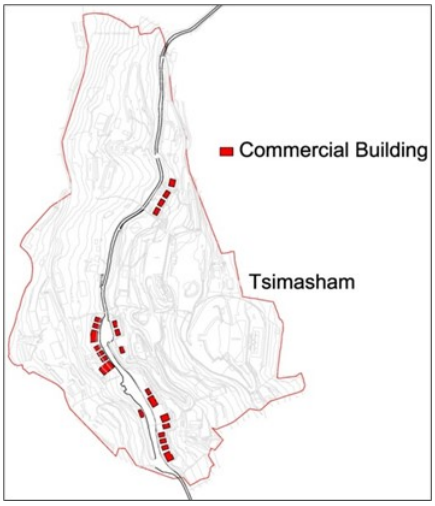


Fig. 2 - **Tsimasham core area with the new bypass road (L) and Tsimasham commercial buildings (R)**
Source: *Ministry of Works and Human Settlement (2019)*

access, reduce travel time, minimize traffic congestion, and enhance the quality of life (Transportation Research Board 1996, Handy et al. 2002). Despite the benefits, the majority of business people dread that the bypass will negatively impact their sales and the properties' value will decline (Babcock and Davalos 2004, Plaut and Deakin 2006, Parolin 2017). However, it was found that the travelers' purchases were very less (IADOT 1992, Pettit 2007). The majority of the business people were of the view that the bypass adversely affects sales and employment and that it had adverse impacts on the overall town (Babcock and Davalos 2004). Studies from the 1950s and the early 1960s prove that bypasses are economically and socially desirable, though there are momentary adversities that are minor in comparison to the benefits they bring (Missouri State Highway Department 1961, Winfrey 1969). Although the highway bypass affects the communities both positively and negatively, most of the communities eventually recognize that the bypass is vital and advantageous (Otto and Anderson 1995, Srinivasan and Kockelman 2000, Thompson et al. 2001, Handy et al. 2002, Phibbs et al. 2009, Nevada Department of Transportation 2018).

Most of the prior studies concentrated on the economic aspects of bypasses (Mills and Fricker 2011). Highway bypasses were seen to have a minimal negative influence on the overall economic activity of most of the communities (Yeh et al. 1998, Srinivasan and Kockelman 2000, Gaffney et al. 2017). Studies by Yeh et al. (1998), on 17 Wisconsin Communities bypassed by the State Highway since 1980, highlight that there is little proof that bypasses cause a negative impact on a community's economic growth. But it is not that the highway does not impact commerce to some extent. Traffic-related businesses are affected the most due to traffic diversion. In other sectors, Fricker and Mills (2009) found no major change in the population, employment, and retail business, in most communities, after the bypass construction. Conversely, the negative impact of a bypass on employment and payroll was discernible in the first 15 years after the opening of the bypass for some sectors, while it was not discernible for other sectors, even after 20-25 years. It further highlights that the impact of a bypass on employment and payroll is generally not expected before 15 years of the bypass being operational. Statistically, as per Babcock and Davalos (2004), the bypass did not have a substantial positive or negative effect on the overall employment of the bypassed towns. The studies in Kempsey and Frederickton discovered that the bypass has a considerably minimal negative impact on employment and gross annual return (Parolin 2014, Parolin 2017). Half of the businesses that experienced a decline in turnover had adjusted following the bypass operation through advertising, diversification, and improving services. Other businesses "adopted a wait and see attitude" (Parolin 2014: 3). There is no substantiation that the bypass has directly led to the closing down of businesses (Handy et al. 2002, Plaut and Deakin 2006), but it is evident that studies on the effects of highway bypasses are neither "uniform nor conclusive across locations" (Andersen et al. 1993: 145).

Researchers have indicated that there are often complicated factors that affect the economic activity at the local level and it is difficult to statistically conclude (Transportation Research Board 1996). Some of the influencing factors indicated in earlier studies were the nearness of the bypass city to another similar city or a larger city, the distance between the old route and the new bypass highway (Andersen et al. 1993), and urban demographics (Srinivasan and Kockelman 2000). Studies carried out in the United States in the early 1960s (45 bypass studies out of 70) were reviewed by Horwood et al. (1965) and they concluded that town size is probably the main indicator of economic changes brought in by the bypass. It was further added that though the town size was crucial in accessing the impacts of bypasses, it was not the only cause of the towns' future decay. A recent study cites additional factors like the national economy, geography, type of road alignment, and government policies (Handy et al. 2002). Among the factors, the geographical factor was found to be the most important element that has a significant impact on how the bypass will affect the community. Other factors are the 'urban design quality' of the bypassed town and the 'existing communities issues' (Phibbs et al. 2009: 7-8, Elias et al. 2006). Parolin (2012) concluded, through the study of three Australian

communities, that the level of dependence on the highway is a more important factor than the community size in finding the economic conditions after the bypass.

In terms of community size, the new bypass roads in medium and small-sized cities can bring devastating changes (Comer et al. 2000, Comer and Finchum 2001). On the contrary, large towns showed steady and constant improvement after the bypass. As per Yeh et al. (1998), the medium and large communities showed economic growth after the bypasses were opened (the definition of size was: 2000-5000 people in the medium community, more than 5000 people in a large community, and less than 2000 people in a small community). Cities with a population greater than 2000 people will gain larger benefits than negative impacts from the highway bypass (IADOT 1992). In another study on medium-size towns (Collins and Weisbrod 2000), the impacts of bypass highways are rarely either devastating or a boon to the area. The shift in traffic due to the bypass has resulted in shutting down or the relocation of some business but it has created new business opportunities along the new bypass route. The net economic impact of the community is relatively very less. The shifting of heavy traffic from the downtown areas has encouraged more local traffic thus resulting in little or no change in traffic volume (Collins and Weisbrod 2000) or even more than before in medium or large communities (Yeh et al. 1998, Parolin 2012, Douglas and Van Den Bos 2016). Large towns showed steady progress annually after the bypass, indicating that they can easily accommodate the changes caused by the bypass. The impacts are varied in medium-sized cities and small cities, and the impacts are mostly negative.

In the small towns, the effects of the bypass are also not clear from the literature (Plaut and Deakin 2006) or they have a negligible or inconclusive effect (Andersen et al. 1993, Srinivasan and Kockelman 2000, Babcock and Davalos 2004). Some studies found positive impacts, whereas others found negative or even devastating effects of a bypass on small towns. The inconsistent result from these studies is that it depends on the context of the study area (Plaut and Deakin 2006). The highway bypasses have affected travel-related business (fuel, food, accommodation provider) and they have seen an increase in annual sales for non-traffic related businesses. The small towns (under 2000 people) are more likely to be negatively impacted as they do not have diverse business sectors to operate as a destination (Yeh et al. 1998). In a small highway town of Karuah (population 1070 in 2001) in Australia, the bypass has adversely impacted its economy and, in the first year of the bypass being operational, 21 percent of the employment was lost (Phibbs et. al 2009). The impact of the bypass on Karuah town exists even after five years of the bypass being operational. The study of small towns of Iowa (New London, Olds, Denver, and Raymond) indicates that the bypasses are not the probable reason for the negative impact felt by the communities (Pettit 2007). Evidence from research studies and small towns like Littlefield indicate adverse consequences for businesses in towns with a population below 1000 (Transportation Research Board 1996). The effect of the bypass is the greatest for small populations and when a high percentage of total trade comes from traffic. In the small town of Berrima, the medium-term effects have been positive owing to an increase in the town's tourist appeal (Bureau of Transport and Communications Economics 1994). The bypass has caused a 7% increase in gross sales and a 2% increase in employment (Bureau of Transport and Communications Economics 1994). Whereas Mittagong's economy has suffered in the short term and the most adversely impacted were the petrol stations, the budget motels, and the take-away food shops (Bureau of Transport and Communications Economics 1994). The bypasses have reduced sales by 6 percent and employment by 3 percent in the short-term study (Bureau of Transport and Communications Economics 1994). In the community of Wentworth, there has been a decrease in community income and new businesses have replaced the former traffic-dependent businesses, thereby mitigating the negative economic impacts (Chase and Gustavson 2004). As in Kentucky, the bypass did not affect the overall employment or the inhabitants (Thompson et al. 2001). Moreover, it was found that the traffic volumes in the old route of small towns significantly declined, differing to

large and medium communities. In another study for a small town, the traffic has slightly decreased or it remained the same as before (Prekop and Dolejš 2016), thereby giving an inconclusive result.

The other geographical factors, besides the size of the community, are the geographical isolation and the relative location of the bypassed town to other communities. Geographical isolation was researched to be a potentially important factor that will impact the effect of a bypass on a community beyond the size of the community (Handy et al. 2002). Research studies explain that small towns in Southeastern Oklahoma have declined for some time and they showed very less signs of recovery. This is likely due to Southeastern Oklahoma being not easily accessible due to its terrain and bounded by interstate highways. Studies have indicated that isolated communities that draw the main portion of their business from the highway traffic will suffer from a decrease in business volume (IADOT 1992). The economic impact due to the presence of the metropolitan area in the proximity of the bypassed town has been largely positive though the larger city will attract customers owing to the diverse services and goods it provides. For a highway-dependent small bypassed town, the presence of a community of similar size has negatively affected the business because of competing businesses (Handy et al. 2002).

Small measures were carried out to alleviate the impact of the bypass on business in Karuah. The measures focused on the local market and increased marketing. However, there was no adjustment made in response and this is due to a lack of adequate financial resources and a perception that the recovery of town lies in the local council. The key to survival after the bypass construction is the effective and adaptive management of the business in combination with actions by the government as per Phibbs et al. (2009). The businesses that have adjusted in response to the bypass were found to have better results than the businesses that did not make any adaptation. Some firms adopted new business strategies such as new products and services. Or the integration of the bypass into the community, through land use planning and signage to direct traffic, made the communities stable (Chase and Gustavson 2004, Pettit 2007). It is imperative for the government to take the role to provide optimal adjustment, however, the small towns that are highly dependent on traffic will experience harm to the economy. In 2017 in Kempsey, about 8.8% of the businesses stated they continued to be negatively impacted by the bypass since the 2013 study (Parolin 2017), and their turnover improved by 2016 and it was expected to improve further. However, the majority of the business people indicated an increase in turnover by 38.9% after the bypass (Parolin 2017). These business people made business adjustments through marketing and sale in social media and internet technology (Parolin 2017). In total, the turnover figure was higher than the figures for 2012 (one year before the operation of the bypass, Parolin 2017). The streetscape revitalization program and the highway service center are the post bypass strategies adopted to mitigate the bypass adverse impacts (Parolin 2017).

Besides the impacts on commerce, there are further impacts. The bypass has an impact on aspects such as land value and land use in the community. It was found that the bypass has a positive impact on the value of land within one mile of the bypass in the Kokomo bypass study (Evans and Michael 1965). The impact depended on the distance from the bypass and the location of developed city areas. The land use within a mile of the bypass was transformed from agriculture to industrial, commercial, and residential land uses (Evans and Michael 1965). However, in the long run, the land values in the old route also increased substantially in Kokomo, thereby demonstrating that the bypass does not have a damaging effect on the property values along the old route (Evans and Michael 1965). In the case of Berrima, there have been an increase in tax revenues and land and property values in the medium term after the bypass (Bureau of Transport and Communications Economics 1994).

The key findings from the literature study are that the bypass development impacts the traffic-dependent businesses in the short-term, but it has very little or no major economic impacts overall (Chase and Gustavson 2004). Generally, it can be concluded that there will be an initial decline in total sales in small communities which will be followed by an increase with adjustment and diversifying the businesses. The highway-oriented business is adversely affected the most and many of these recover through adjustment towards the local trade. As per Berrima's experience, the tourism sector has improved due to an enhanced environment because of traffic diversion (Bureau of Transport and Communications Economics 1994). Communities do view that bypasses bring benefits overall and it does bring changes that have to be dealt with proactively (Yeh et al. 1998).

The research study on the economic impact of the bypass on Tsimasham Town is at an appropriate time since it is less than a year after the opening of the bypass, though it is too early to study medium and long-term impacts. This research will augment the existing knowledge base of the impacts of a bypass on the businesses of small towns which are in the proximity of other competing small business towns (not in the proximity of a larger city), being also geographically inaccessible while businesses are completely dependent on the pass-through traffic.

Methodology

The survey was carried out during the Tsimasham Satellite Town Structure Plan preparation's site visit and data collection. The Tsimasham core area consists of 23 buildings, and it also houses institutions such as the Royal Bhutan Police, Royal Safety and Transport Authority, Bhutan Power Corporation, Bhutan Telecom, and financial institutions besides other small businesses. Since there were just over 20 businesses in the town, almost all (20 businesses) have been surveyed except for a few (a cobbler shop) that were closed at that time. The business people in the Tsimasham core area were interviewed on 4th and 5th December 2018, using a structured survey questionnaire, since they are the stakeholders directly affected by the relief route and thus likely to provide insights on the economic impacts of the route. The institutions are not interviewed as it caters to the residents generally. The survey data was recorded in the questionnaire. The survey questionnaire is adapted from Parolin (2012). The emphasis was given on the qualitative impression of how the bypass affected their sales, the effects on employment, the post-bypass environment perception, and the duration of businesses. The impression of bypass' impacts on businesses was considered qualitatively since people are reserved to provide financial details; however, few of the shops provided their approximate daily sales before and after the bypass functioning. The question on the impact of sale was: 'Was your turn over affected by the opening of the bypass?', followed by: 'Less by how much?'. Since it was difficult to get the approximate value in currency, it was decided to ask for approximation in percentages, which will also give an idea of the impact to some extent. Some stated a decrease in sales by over 40% or some even by 95%. Following the impact on sales, other details such as years of business operation, type of business sector, and perception of the livability of Tsimasham after the bypass was recorded.

Businesses profile

There were just over 20 business establishments in Tsimasham and some of the spaces in the core area are rented by institutions and service providers (Fig. 3). At the time of the survey, 20 businesses were in operation and those were surveyed accordingly. Out of the 20 establishments, 7 were general shops, 2 groceries, 6 were hotel/restaurant, and one each of bar, sales (cloth shop), photo studio, beauty parlor, and meat shop. For the convenience, two of the general shop with the bar is clubbed into the category of the general shop.

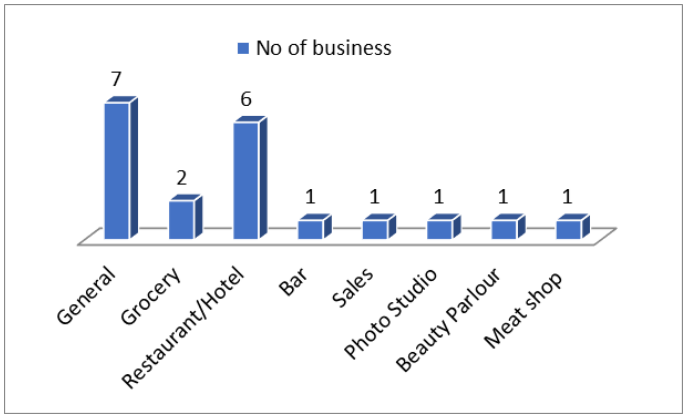


Fig. 3 - **Type of businesses in the Tsimasham core area**

Of the 20 businesses, 14 have been operating for less than 10 years; which consists of 7 businesses operating one year and below; and 7 operating above one year but below 10 years (Fig. 4). Out of the 7 businesses that were running the business for one year and below, the 6 were the new business taken over by the new people after the opening of the new bypass. The rest of the businesses were in operation for quite a long time. The 3 businesses were in operation for 10 years and above but below 20 years, and 2 have been in operation above 20 years. Only one business respondent said they were running the business for many years but could not provide the exact number of years, so they have been put under the 'do not know' category.

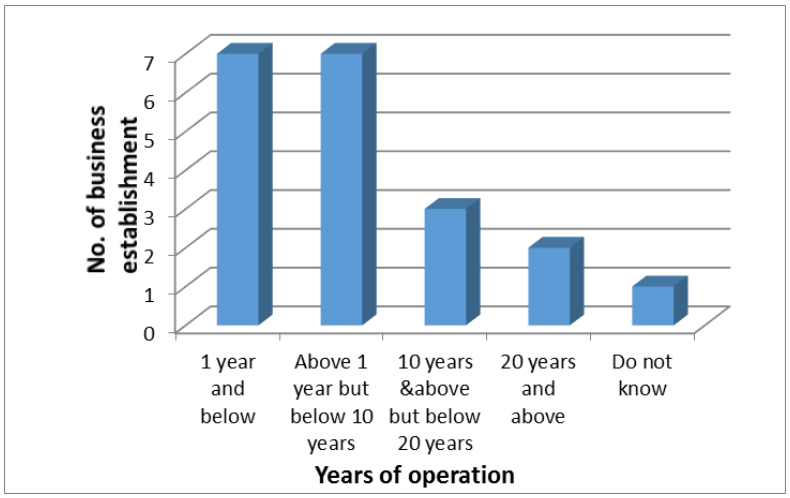


Fig. 4 - **Years of businesses operating in the Tsimasham core area**

Results and Discussion

The pocket containing the Tsimasham core area has a little over 1000 people and the businesses were dependent on highway traffic (Fig. 5). The research studies carried out to date confirm that highway-dependent towns with a population less than 2500 people are at higher risk of adverse economic impacts (Parolin 2011). Additionally, the Tsimasham Satellite town is geographically isolated due to the bypass construction as the town is located high atop, and the bypass is at a lower level. Geographically isolated or isolated communities that depend on the highway are adversely impacted the most (IADOT 1992, Handy et al. 2002). As per Freer (2017) and the Highway 97 Peachland study (Ministry of Transportation and Infrastructure 2020), the bypass which is located far from the core area (extend of diversion) diverts the traffic farther away, thereby impacting the business more. The Chukha-Damchu new bypass has been built very far from the town, thereby the bypass is taking all the traffic with it, given the shorter travel time to Phuentsholing or Thimphu. The Satellite town has wide-ranging institutions such as the District Administration office, hospital, schools, and other institutions. However, most of the institutions such as two schools, a hospital, and other offices are in the Tsimalakha area and they are served by the Tsimalakha core. The neighborhood node in Tsimalakha is not impacted as it used to serve only the residents and it was not directly connected to the Highway. The research study by Handy et al. (2002) emphasizes that the presence of a similar service-providing community in the neighboring area will adversely affect the bypassed community. Tsimasham is a highway dependent town and it is left deserted after the bypass. Also, Tsimalakha is competing for business with Tsimasham by catering to the majority of the people in the Satellite town.

Fig. 5 - **Tsimasham core area along the old route**
Source: *Author (2018)*

The results from the prior research studies of the economic effects of a bypass on small towns are neither clear nor conclusive, but some studies showed devastating effects on small towns. Though the literature studies have a different threshold of the population for small towns such as 1000 (Transportation Research Board 1996), 2000 (Yeh et al 1998), or 2500 people (Parolin 2011), it is evident that the impacts are more on the towns with a lesser population. Further, the impacts are dependent on the context of the area, the geographical location, the type of alignment, and the location to other towns/communities. It is quite clear from the studies that traffic dependent towns are adversely impacted the most due to the bypass.

Tsimasham town core catered to the highway passengers; consequently, the adverse impact on the traffic-related businesses (food, accommodation provider) is experienced. Out of the 20

establishments, 6 hotels or restaurants have been mostly catering to the travelers due to which they have responded to have impacted the most. It can also be concluded from the survey data that this sector has been affected the most as 3 out of the 6 hotels/restaurants have been already rented out to new people, though the type of business is as initially. The 8 out of the 20 businesses have been operating as grocery and general shops along with some bars and surprisingly none of these shops are rented out to new people during the time of the survey.

The 5 general and grocery shops have responded that the bypass has affected their business by less than 50% and two of them responded to have been affected beyond 50% while two responded that they do not know the impact (Table 1). The hotel/restaurant sector has responded that their businesses have been negatively impacted by more than 50% and 2 of the hotels/restaurants experienced a decrease in turnover by 95%. The other 3 hotels/restaurants were a few months in operation and they do not know about the impact on their return. The other business sectors such as the meat shop, the photo studio, and beauty parlors, which have been in operation for 3-5 years, responded to have felt the impact by less than 50%, thereby indicating that there has been an impact, but smaller in comparison to the hotel/ restaurant category. The bar and the cloth shop have been in operation for a few months and they did not know about the impact but one of them said that the sale is very minimal.

Table 1

Sales affected in approximate percentage

Sales affected less (by %)	General Shop	Grocery	Restaurant/Hotel	Others
81-100%	-	-	**2**	-
51-80%	1	1	-	-
21-50%	**4**	1	1	**3**
10 -20%	-	-	-	-
Do not know	2	-	3	2
Total	**7**	**2**	**6**	**5**

The small businesses in the Tsimasham core area are mostly operated by 1 or 2 people. Out of the 20 businesses, 12 shops were operated by one person, 5 operated by 2 people, 2 operated by 3, and one operated by 5 people. Only one of the shops has put off staff after the bypass. This indicates that the bypass has not affected the employment status in the town, which confirms with the literature studies' findings in the case of Kentucky (Thompson et al. 2001). However, it has been noted that it is too early to confirm as such on the employment aspect, as it has just been over 4 and half months after the new bypass operation. Fricker and Mills (2009) have indicated that the impact on employment for some sectors will not be visible before 15 years of the bypass being operational.

35% (7) of the respondents were positive about the impact of the bypass on the environment and they described Tsimasham as peaceful, with less noise, less air pollution, and a tranquil place to reside (Fig. 6). On the contrary, 40% (8) of the business people describe Tsimasham as a deserted town and a dejected place to live. The 3 of the respondents did not have any view and 2 of the respondents highlighted that they encounter problems to commute as the public transport or even the taxis do not pass through the town. These findings are different from earlier research studies, where the majority of the people viewed post bypassed environments positively. In the Tsimasham core town area, only over one by forth view the post bypassed environment positively. It is a predicament to say what is called the improved environment in a small town, which gives a deserted look with empty streets.

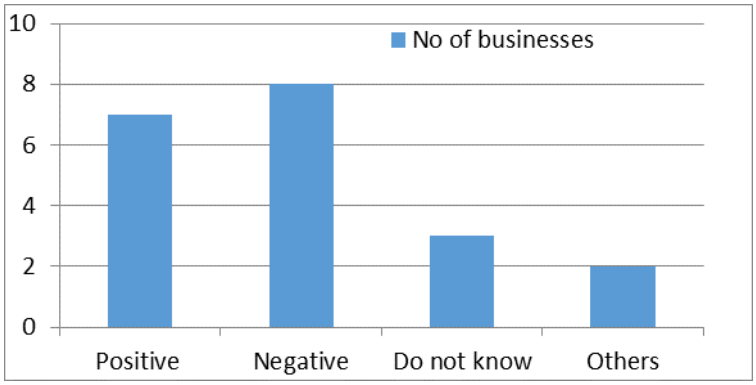


Fig. 6 - **Tsimasham core area post-bypass environment perception**

The short-term economic impacts of the highway bypass on the small town are quite evident as in the Tsimasham core businesses. The study was carried out within 4-5 months of the opening of the new bypass route. The businesses have suffered losses due to the diversion of traffic and due to which old businesses have been replaced with new ones. Once a bustling town, it has transformed into a quiet and empty town with even a lack of travel options for the residents. Having said that, there is a possibility of revival with new business research and survey and understanding the local strengths to adjust with the current situation. The diversification of business would be necessary to cater to larger catchment areas like the surrounding villages and to provide unique services in comparison to the nearby commercial core in Tsimalakha so that people have a pulling factor to come to the town. Isolated and located high on the terrain, very far from the new bypass route, and with the other nearby towns (Chukha, Gedu, and Darla) providing similar services, there is a need to come up with a unique marketing base. Since it also serves as a headquarter to the District, there is potential to provide sales/services catering to the residents and people from the nearby villages and at least the local catchment population will remain constant as long as offices/other financial institutions operate in the area. The local government and the business community people have to come together to chart up a new plan for Tsimasham and to build on its innate strengths to come up with something new and unique.

Conclusions

The research studies' results are neither uniform nor conclusive and it was also emphasized that other factors contribute to the post bypass environment. However, the bigger cities have more advantages as it can transition owing to their diverse business base as well as the huge catchment population. The economic impacts on small towns that are dependent on traffic are devastating, however, there are studies where it has been able to revert or enhance further. The towns that cater services to the pass-through traffic are more likely to be adversely impacted (California Department of Transportation 2006). Accordingly, it can be concluded that the new bypass has adversely affected the businesses in the Tsimasham core area due to which the travel-related services such as hotels/restaurants have been rented out to the newcomers. It is also evident from the peace and the almost no traffic in the core that there are minimal or no business going on. This can be due to the geographical isolation of the Tsimasham area, whereby the commuters must drive up to avail goods and services. This could be the reason due to which even the taxis are not available for the businesses and for the residents to commute. These are the short-term impacts as the study has been conducted less than a year after the bypass being in operation in July 2018. Intermediate and long-term

bypass economic impacts have to be carried out in the future. According to Parolin (2011), the involvement of the local government would play a major role in bringing in the change or at least to mitigate the impacts on the businesses through major economic interventions or developmental projects. Having said that for the revival of the business, there is a need to improve the services or to bring in a variety of businesses to attract people from the surrounding towns and even within the catchment area that houses institutions such as schools, the District Administration, and other financial institutions. As per the extensive research studies, the negative impacts of a bypass on the economy of the town are short-term though exception holds for small towns dependent on the bypass traffic, which have a difficult time transitioning after the bypass. With the intervention from the local government and the proposal of economic development activities and the provision of different levels of services and goods, it will be possible to revive the community and its businesses in the long run. In doing so, the economy in the long run for all the different sized communities will be positively impacted (Parolin 2012).

Acknowledgments

The author would like to thank Mr. Gyembo Dorji, an urban planner from the Department of Human Settlement, MoWHS, Thimphu, for assistance with the survey of the business people in the Tsimasham core area.

References

ANDERSEN S. J., MAHMASSANI H. S., HELAAKOSKI R., EURITT M. A., WALTON C. M., HARRISON R. (1993), *Economic Impact of Highway Bypasses*, Transportation Research Record 1395, 144-152.

BABCOCK M. W., DAVALOS J. A. (2004), *Case Studies of the Economic Impact of Highway Bypasses in Kansas*, Journal of the Transportation Research Forum 43 (1), 55-75.

BUREAU OF TRANSPORT AND COMMUNICATIONS ECONOMICS (1994), *The Effects on Small Towns of Being Bypassed by a Highway: A Case Study of Berrima and Mittagong*, Australian Government Publishing Service, Canberra.

CALIFORNIA DEPARTMENT OF TRANSPORTATION (2006), *California Bypass Study: The Economic Impacts of Bypasses, Vol. 1: Planning Reference*, California Department of Transportation, Retrieved from: www.planningtools.transportation.org.

CHASE M., GUSTAVSON K. (2004), *Economic Impacts of Highway Bypass Development on Communities*, Department of Transportation and Public Works. Province of Nova Scotia, Retrieved from: www.novascotia.ca.

COLLINS M., WEISBROD G. (2000), *Economic Impact of Freeway Bypass Routes in Medium Size Cities*, Economic Development Research Group, Retrieved from: www.planningtools.transportation.org.

COMER J. C., FINCHUM G. A., COLEMAN A. K. (2000), *A Methodology Using Geographic Information Systems to Evaluate Socioeconomic Data Concerning Impacts of Highway Bypasses in Oklahoma*, Proceedings of the Oklahoma Academy of Science 80, 79-89.

COMER J. C., FINCHUM G. A. (2001), *Business Impacts of Highway Bypasses*, Papers and Proceedings of the Applied Geography Conferences 24, 235-243.

DOUGLAS N., VAN DEN BOS P. (2016), *Modelling the Traffic and Economic Impacts of a Heavy Vehicle Bypass*, Linking people, places and opportunities: 27th ARRB Conference, 1-11.

ELIAS W., HAKKERT S., PLAUT P., SHIFTAN Y. (2006), *The Influence of a Bypass Road on Urban Development and Safety*, Association for European Transport (AET), London.

EVANS E. G., MICHAEL H. L. (1965), *Impact of Kokomo Bypass from 1950 to 1964*, Purdue University, Retrieved from: www.docs.lib.purdue.edu.

FREER M. (2017), *The impact of highway bypasses on small towns*, Carthage College, Retrieved from: www.dspace.carthage.edu.

FRICKER J. D., MILLS J. B. (2009), *Effects of Bypasses*, Indiana Department of Transportation and Purdue University, Retrieved from: www.docs.lib.purdue.edu.

GAFFNEY J. L., BUNKER J. M., DAWES L. A. (2017), *An Investigation into the Need for Highway Bypass Developmen*t, Australasian Transport Research Forum 2017 Proceedings, 1-17.

HANDY S., KUBLY S., ODEN M. (2002), *Economic Impacts of Highway Relief Routes on Small Communities: Case Studies from Texas*, Transportation Research Record 1792 (1), 20-28.

HORWOOD E. M., ZELLNER C. A., LUDWIG R. L. (1965), *Community consequences of highway improvement*, National Cooperative Highway Research Program Report 18, Washington, D.C.

IADOT (1992), *A Literature Review of Urban Bypass Studies*, Iowa Department of Transportation, Retrieved from: www.publications.iowa.gov.

LEONG D., WEISBROD G. (2000), *Summary of Highway Bypass Studies*, Economic Development Research Group, Retrieved from: www.rms.nsw.gov.au.

MILLS J. B., FRICKER J. D. (2011), *Integrated Analysis of Economic Impacts of Bypasses on Communities: Panel Data Analysis and Case Study Interviews*, Transportation Research Record 2242 (1), 114-121.

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE (2020), *Highway 97 - Peachland Transportation Study*, Peachland, British Columbia, Retrieved from: www2.gov.bc.ca.

MINISTRY OF WORKS AND HUMAN SETTLEMENT (2015a), *Annual Information Bulletin*, Policy and Planning Division, Retrieved from: www.mowhs.gov.bt.

MINISTRY OF WORKS AND HUMAN SETTLEMENT (2015b), *Approved Dzongkhags and Yenlag Thromde Boundaries by 5th Session of Second Parliament in the Joint Sitting on 10th June 2015*, Department of Human Settlement, Retrieved from: www.mowhs.gov.bt.

MINISTRY OF WORKS AND HUMAN SETTLEMENT (2019), *The Project for Formulation of Comprehensive Development Plan for Bhutan 2030. Vol. III*, Retrieved from: www.gnhc.gov.bt.

MISSOURI STATE HIGHWAY DEPARTMENT (1961), *Economic Effects of an Interstate Highway Bypass: Lebanon, Missouri*, Division of Highway Planning, Retrieved from: www.mostate.libguides.com.

NATIONAL STATISTICS BUREAU (2018), *2017 Population & Housing Census of Bhutan*, National Statistics Bureau of Bhutan, Thimphu.

NEVADA DEPARTMENT OF TRANSPORTATION (2018), *Potential Effects of Highway Bypasses on Local Communities*, Nevada Department Of Transportation, Retrieved from: www.nevadadot.com.

OTTO D., ANDERSON C. (1995), *The Economic Impact of Rural Highway Bypasses: Iowa and Minnesota Case Studies*, Midwest Transportation Center, Iowa State University, Retrieved from: www.archbold.com.

PAROLIN B. (2011), *Economic Evaluation of Town Bypasses: Review of Literature*, Transport for NSW Government: Roads and Maritime Services, Sydney.

PAROLIN B. (2012), *Economic Evaluation of Town Bypasses*, Transport for NSW Government: Roads and Maritime Services, Sydney.

PAROLIN B. (2014), *Pacific Highway Bypass Economic Impacts Kempsey*, Unisearch Expert Opinion Services – UNSW Global, Retrieved from: www.kempsey.nsw.gov.au.

PAROLIN B. (2017), *Kempsey Post Bypass Impacts: Monitoring Study*, Kempsey Shire Council, Retrieved from: www.kempsey.nsw.gov.au.

PETTIT R. (2007), *Economic Impacts of Highway Bypasses on Communities in Iowa*, Compendium of Student Papers Presented at the Transportation Scholars Conference, Iowa State University, Ames, IA.

PHIBBS P., HEIDRICH A., COONEY C. (eds.) (2009), *The Karuah Highway Bypass: Economic and Social Impacts. The 5-year report*, University of Sydney, Retrieved from: www.rms.nsw.gov.au.

PLAUT P. O., DEAKIN E. (2006), *Economic and Travel Impacts of Bypass Roads: A Comparative Study of Israel and the U.S.*, University of California, Berkeley, Retrieved from: www.escholarship.org.

PREKOP M., DOLEJŠ M. (2016), *Do Bypass Routes Reduce Noise Disturbances in Cities? Case Study of Cheb (Western Bohemia, Czech Republic)*, Geographia Technica 11 (2), 78-86.

SEGGERMAN K., WILLIAMS K. (2014), *Managing the Indirect Impacts of Bypasses on Small and Medium-Sized Communities in Florida*, Transportation Research Record 2453 (1), 46-53.

SRINIVASAN S., KOCKELMAN K. M. (2000), *The Impacts of Bypasses on Small- and Medium-sized Communities: An Econometric Analysis*, Journal of Transportation and Statistics 5 (1), 57-69.

THOMPSON E., MILLER J., ROENKER J. (2001), *The Impact of a New Bypass Route on the Local Economy and Quality of Life*, Kentucky Transportation Center, University of Kentucky, Retrieved from: www.uknowledge.uky.edu.

TRANSPORTATION RESEARCH BOARD (1996), *Effects of Highway Bypasses on Rural Communities and Small Urban Areas*, Research Result Digest 210, 1-22.

WINFREY R. (1969), *Economic Analysis for Highways*, International Textbook Company, Scranton, PA.

YEH D., GANNON M., LEONG D. (1998), *The Economic Impacts of Highway Bypasses on Communities*, WisDOT Economic Planning and Development Section, Retrieved from: www.archives.bape.gouv.qc.ca.

Initial submission: 24.06.2019
Revised submission: 07.05.2020
Final acceptance: 29.05.2020

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Journal of Urban and Regional Analysis,
vol. XIII, 1, 2021, p. 177 - 193
https://doi.org/10.37043/JURA.2021.13.1.11

YOUTH UNEMPLOYMENT: A SERIOUS PROBLEM FOR YOUNG ITALIANS NEET AND A COMPARISON WITH THE SOCIAL EXCLUSION CONDITION

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Abstract: The spread of the NEET (young people not in education, employment and training) phenomenon in Italy is largely due to the recession that has exacerbated the structural problems of the labor market, worsening job opportunities and contractual conditions, particularly for young people. We analyze how the level of youth unemployment (YUR) influences the number of young NEETs, both as a direct cause and through the risk of discouraging young people, considering the endogeneity issue. We also analyze the role of YUR and other control variables characterizing the youth condition on the social exclusion rate, since the NEET status is comparable to a form of social exclusion. More information comes from the comparison between two divergent macro-areas: the wealthy Center-North and the less developed South of Italy. The results show that the causes of the two phenomena are different in the years of recession. YUR has a predominant effect on NEET, particularly in the less developed area.

Key Words: *NEET, youth unemployment, social exclusion, regional dualism, North-South divide*.

Introduction

The growing NEET phenomenon in advanced economies raises important questions for scholars on how to slow down the inactivity status of young people (Odoardi 2020). In general, the increase in the number of youth NEET in the postcrisis years is due to a series of concomitant causes, including the difficulty of adapting rapidly to broader socioeconomic changes (Rahman 2007), new lifestyles imposed by the society (Furlong 2008) and the prolonged youth unemployment that affects the transition period at the end of the studies (Quintini and Manfredi 2009), as analyzed in the economic literature.

Italy is a country widely affected by this problem with important social and economic implications (Eichhorst and Neder 2014). The inactivity of young people is explained by the difficulties in the labor market (Bruno et al. 2014), especially for the occupational levels (Scarpetta et al. 2010) and mainly in some less favored regions (Bacher et al. 2017). The labor market in Italy is also characterized by a low recognition of higher education, that does not guarantee a better job security (Sergi et al. 2018), and by a low-tech economic specialization (European Union 2013) that does not favor and encourage investment in human capital.

Our aim is to analyze the role of the unemployment on the NEET phenomenon in Italy, using regional data and controlling for several aspects characterizing the habits and the socioeconomic background of young Italians – influencing the transition to adulthood in a recessionary period – by detailing the analysis in the two main divergent macro-areas, i.e., Center-North and South. In addition, knowing that YUR can be considered a substantial part of the NEET problem, we also take into account the endogeneity problem that could exist between the two variables, thus assuming the possibility of observing YUR as a source of discouragement for those affected and for those who might be affected, favoring the inactivity of young people.

Above all, the focus on YUR is due to its predominant role in contributing to the NEET risk in many countries. This contribution is suggested by the large share of the NEET rate explained by the spread of unemployed young people (Carcillo et al. 2015). In this framework, we must consider that Italy is affected by serious problems in the labor market (Pastore 2015), especially in the "poor" South (Demidova et al. 2015). Our research question is as follows: Considering the strong differences in the Italian macro-areas and thus in the local labor markets, what is the effect of YUR on the NEET rate in the postcrisis years in the Center-North and in the South?

We analyze the Italian regions for several reasons. (*i*) The consideration of two historically divergent contexts (Salvemini 1955) allows us to compare two areas that diverge in economic and social terms (Daniele and Malanima 2007, Odoardi and Muratore 2018), as Italy represents one of the most studied cases of the "North-South divide" (Odoardi and Muratore 2019). (*ii*) Despite a profound gap in the NEET rates at the expense of the less developed southern regions[1)], accompanied by a poorer economic performance and a lower endowment of human capital, we observe the highest relative increase in the central-northern area[2)] during the worst years of economic recession. (*iii*) Italy is a country in which the NEET phenomenon is rapidly growing, probably influenced by the scarce attention paid to the investments in human capital (traditionally poor, Wolff 2000), which places Italian workers as poorly educated and less prepared in comparison to other advanced economies (OECD 2018), while they are affected by a serious problem of unemployment and youth precariousness (Armano and Murgia 2014, Mussida and Sciulli 2018). (*iv*) In Italy, the relevance of the local labor markets to a young person's status gains importance in the light of a low social mobility (Di Pietro and Urwin 2003), which we expect that could lead disadvantaged young people to adopt the inactivity status. (*v*) The analyzed period can help to reveal important policy indications for the most at-risk contexts due to the serious effects of the recessionary period on the regional labor markets (Bruno et al. 2014), which contribute to the increase in precariousness, unemployment and, in general, the deterioration of the socioeconomic condition for many young people at risk of NEET (Bell and Blanchflower 2011).

The economic literature explains the NEET phenomenon to be influenced by, in addition to the aforementioned changes in the society and individual problems, the family cultural and economic background (Gorard 2010, Alfieri et al. 2015), which can encourage young people to find a job or to continue their studies. We control this aspect by using variables suggested by the economic literature. Other original aspects of our work are the consideration of different aspects that characterize the Italian context (e.g., taking into account the difficult economic conditions that impose a delay in the creation of a new family, Cavalli and Galland 1996), with a focus on the postcrisis period, and the risk of reverse causality between NEET and YUR.

The current need to decrease the number of inactive young people, knowing that the inactivity status brings long-term social and economic consequences (Ferrie 2001), drives us to investigate remedies from different points of view. In fact, if weaknesses from the point of view of education (also observable in experience and work skills) can make social inclusion more problematic (Bynner and Parsons 2002), it seems useful to compare NEET to the phenomenon of social exclusion in the search of remedies addressed to young people at risk of becoming NEET (Thompson 2011). With this aim, the second step of our investigation starts from the fact that the NEET issue can be observed as a sort of "weak version" of social exclusion (Serracant 2014). The variables considered in the analysis of young people's inactivity are used to search for the causes that lead to the risk of being socially excluded. The aim is to observe whether, in the Italian case, similarities are present in the causes leading to the two phenomena, which

1) The 2017 NEET rates (15-24 years) are approximately 15% in the Center-North regions and more than 27% in some South regions (Istat data).

2) The increase of the NEET rate (15-24 years) from 2007 (before the crisis) to 2013-2014 (peak) was more than 7 percentage points in the Center-North and approximately 5 in the South (Istat data).

would presuppose similar policy interventions to limit the two social problems.

The paper is arranged as follows. The following section proposes a brief reconstruction of the NEET issue with a focus on Italy, the role played by YUR, and the connections with the risk of social exclusion. Next, we describe the methods used in the panel data analysis, followed by the presentation of the variables. We compare the results of different methods and we conclude with some policy implications in the last two sections.

A brief explanation of the NEET Phenomenon

Young people who are no longer included in a school or training course and who are not even involved in a work activity are referred to as NEETs. This acronym identifies a heterogeneous group of young people based on the common condition of "being outside" of the educational system and the labor market, where the long-term nature of a such condition may exacerbate difficulties in the reintegration process. A first attempt to define this population was provided by Istance et al. (1994) with the term "Status0"; it was only in the late 1990s that the NEET concept was formally introduced in the UK (Social Exclusion Unit 1999) and it became a key indicator of youth disengagement for other European countries and the Organisation for Economic Co-operation and Development (Marshall 2012, Carcillo et al. 2015). More recently, the NEET rate has been more widely used and reported, e.g., to refer to the target population of the "Youth Guarantee" program (up to 24 years old), regarding Europe (European Union 2013), and national programs such as the "Garanzia Giovani" program (up to 29 years old), by the Ministry of Labor and Social Policies (2014), for Italy.

A review of the literature indicates that the increased attention on the NEET concept has occurred despite some criticisms. The main problem is heterogeneity, which refers to the number of different situations included in the standard NEET group (Furlong 2006), and the identification of various subgroups, even if they are not mutually exclusive. This problem is aggravated by the economic effects of the recent financial crisis; the heterogeneity of the vulnerable groups that compose NEET entails the risk of inaccuracy in the definition of the NEET label (Italia Lavoro 2011).

The NEET status is linked to the role of national institutions (e.g., influencing the "school to work" transition, Istrate et al. 2019), structural and social conditions (e.g., parents' social class, economic status, gender, ethnicity) and other factors related to the personal characteristics of involved young people (Hodkinson and Sparkes 1997, Bynner 2005). In addition, several studies suggest that educational levels and personal skills have marked influences on the probability of becoming NEET (Yates and Payne 2006, Pemberton 2008, Alfieri et al. 2015). However, even if upper levels of education seem to preserve young French and Germans from becoming NEET (the risk of becoming NEET is respectively 4.87 and 3.67 times lower for graduates), such risk is amplified in Italy (1.90) and Spain (1.66) (Ciccarelli and Fabrizi 2017). In contrast, the probability of remaining in the NEET condition decreases with the increasing of age for young Italians, while this is not the case for Germany. In other countries that provide economic and social coverage, the NEET condition tends to be determined by purely family needs, such as the condition of parenthood (9.15 times higher in Germany and 3.79 in the UK) (Ciccarelli and Fabrizi 2017).

From YUR to NEET: a picture of italian youth

One of the most critical socioeconomic issues in Italy since the 2000s is the high unemployment rate. Data from Istat (Italian National Institute of Statistics) reveal levels of the unemployment rate higher than the precrisis values (from 6.1% in 2007 to approximately 12% in 2013-2017), up to reach over 20% in the southern area in 2014. This critical issue, with severe social implications, has contributed to a progressive increase in the NEET rate since the

beginning of the crisis in 2007-2008, reaching a peak in 2013-2014. Starting in 2015, the NEET rate began to decline in conjunction with some traces of economic recovery, while remaining steadily above the precrisis values. In 2017, the condition of NEET was lower between people aged 15-19 (11.9%) – mostly still being students – but it reached 31.5% among people aged 25 -29.

The situation of young Italians remains worrying due to some national characteristics. First, they suffer the lack of a flourishing labor market, with high and persistent levels of youth unemployment, atypical employment and brain drain (Fratesi and Percoco 2014, Fullin and Reyneri 2015). During the long years of the economic crisis, the problematic access of young Italians to the labor market has inevitably increased the portion of youth with medium-high educational qualifications in the condition of NEET, with a recovery that, in any case, is still absolutely insufficient even for young graduates. In recent years, young Italians have been exposed to hard transitions from school to work, and they have had to cope with a high level of outsiderness, a phenomenon that is also connected to the rapid aging of the Italian working population (Johnson and Zimmermann 2008, Emmenegger et al. 2012, Sergi et al. 2018).
Previously, starting from the mid-1990s, the trends in the Italian labor market and its modernization led to an increased number of employed people (Fellini 2015), but with the progressive stagnation of work productivity, such positive trends had reversed (Comito et al. 2014). Since the onset of the crisis, the growth of labor market outsiders has dramatically emerged, where only a shrinking portion of youth have access to the labor market. In addition, young people who work are often temporarily employed and underpaid, with the lack of future perspectives in working improvement (i.e., the transition to better jobs in the future, Chung et al. 2012).

Following Standing (2011) and Sergi et al. (2018), the increased youth unemployment and precarization arise from a progressive flexibilization of job contracts. This is due to the weakness of the Italian economic and productive structure and to social policies that were dangerous for the young generations (Barbieri et al. 2014). Similar to Spain and Greece, increased disillusionment in Italian working conditions leads young people to be disappointed regarding the limits of their ambitions and goals. Most of them live at home with their parents, but unlike youth in other countries, they are considered unwilling to make sacrifices and they face the stereotypes of "*mammoni*", lazy, spoiled, "choosy" and "*bamboccioni*" (Bello and Cuzzocrea 2018). In this framework, the former Minister Fornero's speech (in 2012) advised young Italians: "Non bisogna mai essere troppo "choosy". Meglio prendere la prima offerta e poi vedere da dentro e non aspettare il posto ideale" ("Never be too "choosy". Is it better to start with the first available job – to be able to observe from the inside – than to wait for the ideal job").

These criticisms rarely match the scientific analysis because they reflect only sensations or limited available cases (Genda 2007). According to Saraceno (2015), the growing number of Italian NEETs reflects emergent poverty based upon strong territorial and class differences. Compared to Spain, Germany and France, the probability of NEET is higher in Italian poor families that face severe economic difficulties.

In addition, the macro-area differences in Italy are remarkable. According to Istat data, the incidence of NEETs in the southern area is more than double that in the central and northern regions. In the South, the NEET group interested in entering or re-entering the labor market (77.0%) is larger than the groups in the North (60.8%) and the Center (67.5%, on Istat data 2017). Thus, Italian NEETs often suffer economic disadvantages, which is in stark contrast to the possible view of them as "choosy". The main reason behind this distorted view of youth is the compensative structure of the Italian welfare system that in some cases does not help in reaching independence (Esping-Andersen 1999). In addition, when public transfers decrease, Italy is a country characterized by a high level of family economic transfers (Ciccarelli and

Fabrizi 2017). A large part of NEETs live in the family's nest, and they are often members of large families: these facts enable NEETs to continue their "wait-and-see" stance (Ciccarelli and Fabrizi 2017).

Another aspect must be considered in the depiction of young Italians at risk of inactivity. In the same breath, intergenerational caregiving becomes an antidote to social exclusion, particularly for young adults in NEET conditions (Gaspani 2019). In spite of the youth's hardship deriving from the forced renouncement of work, young Italians are preserved by an informal familiarized care model (Naldini 2003): first, because it provides young people both material and emotional backing (Tomassini et al. 2003, Gaspani 2019) and, second, because Italy's family-oriented culture assigns young women a time-intensive role in housework activities (Bianchera and Arber 2007), e.g., a double probability of not participating in work, study or training is present for women (Ciccarelli and Fabrizi 2017).

Despite the strong attachment of young Italians to the family, the persistence of unemployment can also generate tensions and conflicts among family members, arising from economic deprivation and the absence of employment prospects (Patton and Donohue 2001). Even if the family is able to protect young people, it also entails challenges with respect to other social relations.

Fig. 1 shows data on the 2000-2017 YUR and NEET rates for the 5 Italian areas according to the Eurostat grouping. The Northwest, Northeast and Center areas correspond to our Center-North group, and the South and Islands areas correspond to our South group (also known as *Mezzogiorno*). The data highlight that the three central and northern groups report similar values, as do the southern regions and major islands on the other side, thus forming two more extensive homogeneous groups. The two macro-areas are highlighted to the right (southern area, higher values of both variables) and to the left (central-northern area) of the Italian average data.

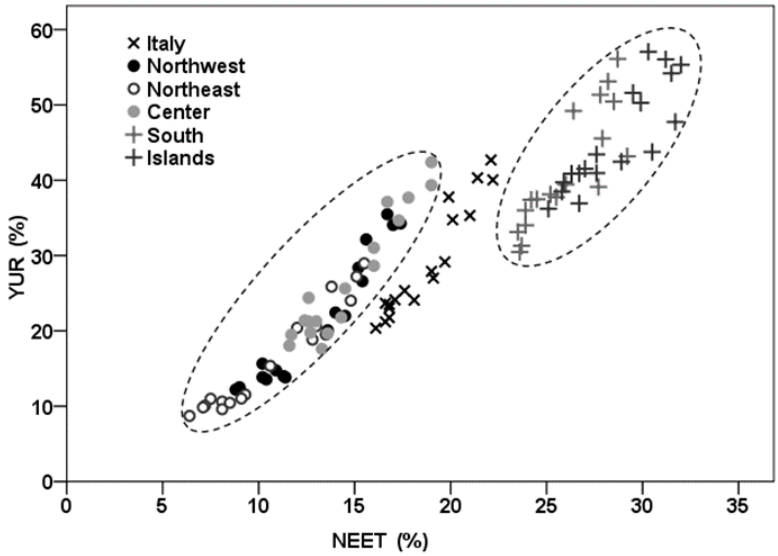

Fig. 1 **– NEET rate and YUR for the 5 Italian areas (each point corresponds to one year, 2000-2017)**
Source: *Authors' elaborations on Eurostat (NEET rate) and Istat (YUR) data*

Methodology

We study the effects of some independent variables on the NEET rate in the Italian regions and autonomous provinces. We use fixed effects (FE) models, and we perform a two-stage least squares (2SLS) regression to prevent the risk of endogeneity. Our equation can be written as:
(1)

$$lnNEET_{it} = \beta_1 lnYUR_{it} + \beta_2 lnSOCIAL_{it} + \beta_3 lnGDP_{it} + \beta_4 lnICT_{it} + \beta_5 lnFAMILY_{it} + \beta_6 lnCONTRACT_{it} + \beta_7 lnEDUCATION_{it} + \alpha_i + \varepsilon_{it}$$

In equation (1), NEET is our dependent variable, and the regressors are presented and explained in the following section. The subscript i represents the 21 regions and autonomous provinces, analyzed for the period 2010-2017 (t). $\beta_1, \dots, \beta_7$ are the parameters estimated in the section of the results, α_i is the unknown intercept for each region, and ε_{it} is the error term. The same regressors are used in a second analysis, in which NEET is replaced with EXCLUSION (the social exclusion rate).

Considering the possibility of endogeneity concerning YUR and the NEET rate, in the 2SLS model, YUR is transformed and replaced with a consistent estimator to avoid inconsistent estimates. We consider the unemployment rate (UR) and the long-term unemployment rate (LTUR) as instruments referred to as YUR, which are connected in representing the labor market performances in the Italian regions (Brada and Signorelli 2012). Additionally, the LTUR has an influence on the labor market performance, particularly in Europe, since “some part of cyclical unemployment is turning into structural unemployment” (Brada and Signorelli 2012: 237).

With the aim of controlling for overidentifying restrictions, we present the Hansen’s (1982) J test after the results in Table 3 and Table 4. We also present the first-stage F statistic with the aim of testing for the strength of the instruments (the values of this statistic are above 10, Staiger and Stock 1997).

Furthermore, we test the presence of multicollinearity among the regressors considering the variance inflation factor (VIF). In our regional groups, the highest VIF are 3.13 for the Center-North and 5.34 for the South (less than the threshold of 10), the mean VIFs are 2.37 and 3.07, respectively, and the lowest value of tolerance is 0.1873.

Data

In this paper, the NEET rate and the social exclusion rate are the two dependent variables (Table 1). The same regressors used in the analysis of the NEET condition at regional level are also considered in a second analysis on the social exclusion risk. Similarly, we consider, in both analyses, the problem of endogeneity of our key variable, YUR.

Numerous studies and definitions exist on the social exclusion phenomenon (Silver 1994). The social exclusion rate refers to people who, mainly for economic or cultural reasons, do not feel integrated or do not have access to the social activities typical of their society or social group (Bhalla and Lapeyre 1997). Social exclusion can be considered connected to the NEET condition since the loss of years of education or lack of work experience can lead to typical weaknesses that make social integration difficult, as discussed by Bynner and Parsons (2002: 302): “In this sense, NEET experience, unaccompanied by other factors, may well be not much

more than a staging post on the downward path to the bottom of the labor market and social exclusion".

The factors that influence the inactivity of young Italians are many; our regressors consider some aspects of the social background and they are used to test the robustness of the results. The youth unemployment rate (variable: YUR) is a measure of how much the economic crisis of 2007-2008 has hit the labor condition of young people in several advanced economies. Italy has been one of the most affected countries in which not even a high education can help the unemployed young people to find jobs (Scarpetta et al. 2010), in contrast to the findings in other European countries (Istrate et al. 2019).

We consider that social capital (intended as social networks, shared values and trust in the society, SOCIAL) can have a role in opposing the inactivity of young people, for example, favoring the search for work (Kraak 2013) and encouraging the continuation of studies (Fuller 2014). We consider volunteer work as a proxy of social capital (Harper 2002). In addition, social capital is an important aspect in explaining the Italian North-South dualism, and, in particular, we highlight its shortage in the southern area of the country (Putnam et al. 1993).

The GDP per capita (GDP) is a measure of households' wellbeing that influences the risk of becoming NEET, offering more opportunities for young people in the wealthiest families (Bynner and Parsons 2002).

Similarly, we consider the population with a secondary or tertiary educational level (EDUCATION) a proxy of the educational level of parents (Odoardi 2020) and, thus, a measure of abilities, e.g., in orienting children towards cultural understanding (Sullivan 2001) and in favoring the acquisition of skills related to school performance. Consequently, the aforementioned abilities of parents influence the risk of becoming NEET (Bynner et al. 2000).

Proxies of income and parents' human capital represent the broader cultural and economic background of households which has a well-known impact on the studies and working careers of children (Alfieri et al. 2015).

Another aspect influencing inactivity through both the search for work and study concerns the way modern information and communication technologies are used. We consider the rate of homes with broadband connections (ICT) as a proxy of the use of ICTs (information and communications technologies). Among young NEETs, the possibility of using ICTs can be a strength enabling them to keep skills updated or look for a job (Cecchini and Raina 2002, Barbas et al. 2017).

We include data on the percentage of young unmarried Italians aged 18-34 living in their parents' house (FAMILY), as a proxy of an Italian habit of leaving the family of origin late with respect to other countries, and therefore postponing by choice, as well as because of the general economic conditions, the passage to adulthood (Aassve et al. 2001, Alfieri et al. 2015, Mussida and Sciulli 2018).

Finally, we include a measure of the spread of part-time model contracts (CONTRACT). We consider this variable to be indicative of the level of precariousness in the labor market, which is a well-known cause of temporary unemployment and it induces discouragement in the search for work, leading to inactivity (Furlong 2008, Standing 2011), especially for young people (Chung et al. 2012).

For our analysis, we consider two homogeneous groups of regions, namely, Center-North and South. This division (Fig. 2) comprises two well-known divergent areas (Brida et al. 2014).

The economic literature widely debates the numerous social, cultural and economic gaps (Salvati 2013) between the North area and the South, or *Mezzogiorno*, which represents the less developed area of the country since the unification in 1861 (Capello 2016). Historically, the regions of the northern area have always been the richest economically, thanks to the opening to foreign trade favored by natural resources and the proximity to European markets (Toniolo 2013), and they have enjoyed a greater endowment of human capital and social capital (Bigoni et al. 2016). In contrast, the southern area has been characterized by an economy based on agriculture for a long time, and despite the numerous extraordinary public interventions for promoting industrialization, the presence of inefficiencies and clientelism has marked its weaker path of development (Felice 2007).

Table 1

Variables descriptions and sources

	Variable	*Definition*	*Source*
1	NEET	NEET rate, young people (15-24 years) neither in employment nor in education and training (%)	Eurostat
2	EXCLUSION	People at risk of poverty or social exclusion (%)	Istat (our elabora-tions)
3	YUR	Youth unemployment rate, persons aged 15-24 seeking employment on the labor force (in the	Istat
4	SOCIAL	People aged 14 and over who have been work-ing for free for voluntary associations or groups	Istat
5	GDP	Gross Domestic Product *per capita*, constant	Istat
6	ICT	Share of households with internet broadband access (in % of total households)[a]	OECD
7	FAMILY	People (18-34 years) unmarried, living in a family	Istat
8	CONTRACT	Part-time employment incidence (% part-time employees over total employment)	OECD
9	EDUCATION	Population aged 25-64 with secondary or tertiary education (levels 3-8 ISCED2011[b], %)	Eurostat
10	UR	Unemployment rate, people aged 15 and over seeking employment vs. the labor force in the	Istat
11	LTUR	Long-term unemployment rate, share of people seeking employment for more than 12 months	Istat

[a]Due to missing data, 2010-2011 values for two regions (Emilia-Romagna and Marche) are replaced with the national average.
[b]International Standard Classification of Education

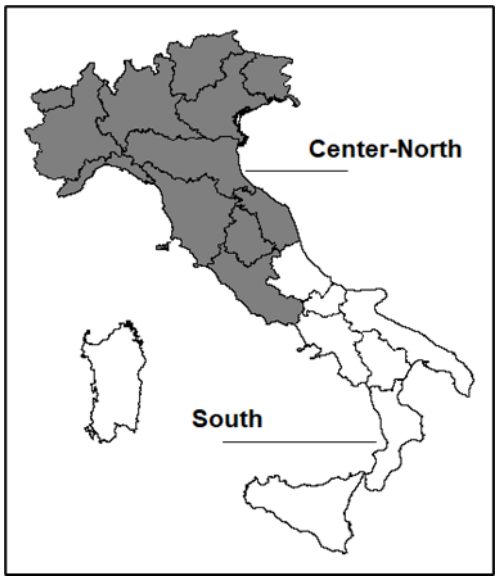

Fig. 2 **– The two groups of Italian regions**

In particular, the Center-North group is composed of 11 regions (Aosta Valley, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Liguria, Lombardy, Marche, Piedmont, Tuscany, Umbria, Veneto) and 2 autonomous provinces[3)](Bolzano and Trento). The South group is composed of 8 regions (Abruzzo, Apulia, Basilicata, Calabria, Campania, Molise, Sardinia, Sicily).

Table 2

Summary statistics for the two macro-areas in Italy

	Center-North					South			
Variable	Min	Max	Mean	Std. Dev.		Min	Max	Mean	Std. Dev.
Dependent variables									
NEET	7.70	20.50	14.77	2.66		13.70	34.00	25.28	5.02
EXCLU-SION	8.41	30.70	18.87	4.47		26.44	57.75	41.74	8.20
Independent variables									
YUR	6.50	49.00	27.53	8.83		26.52	65.14	46.54	8.74
SOCIAL	6.20	27.30	13.08	4.53		5.00	11.20	7.29	1.58
GDP	21,889.39	38,550.37	30,109.96	4,032.22		15,309.73	23,530.68	18,303.58	2,266.99
ICT	48.00	83.00	68.08	11.36		34.00	81.00	60.08	12.96
FAMILY	38.10	68.00	57.55	5.05		60.00	75.70	67.15	2.96
CON-TRACT	12.80	24.00	18.42	2.27		10.60	20.90	16.19	2.46
EDUCA-	50.40	71.10	62.62	4.41		44.50	65.10	53.11	5.58
Instrumental variables									
UR	2.69	12.51	7.72	2.20		8.39	23.42	16.22	4.14
LTUR	0.51	7.60	3.63	1.53		4.08	15.90	10.08	3.31

Source: *Authors' elaborations based on Eurostat, Istat and OECD data*

3) In Fig. 2, the two autonomous provinces are not divided, and their region (Trentino-Alto Adige) is present.

In Table 2, we show the summary statistics for the abovementioned groups of regions, demonstrating the differences between the richest regions of the Center-North and the less developed South.

The average income of the South is approximately 60% of that of the richest regions. In addition, the new technologies that are less widespread, the proxy value of the social capital that is approximately half of that of the Center-North, and the lower share of adults with advanced education show structural gaps capable of influencing the two areas differently. From these gaps, we expect evident differences in explaining the dependent variables – NEET and EXCLUSION – i.e., two social problems for which we observe almost double average values in the South compared to the Center-North.

Results and Discussion

We present the results of the FE and 2SLS models in Tables 3 and 4, followed by the tests. Table 3 shows the relevant effect of YUR in both areas, highlighting the stronger effect in the South, where the FE model underestimates its relevance. The major relevance of the YUR is evident in the regions where it afflicted over 50% of young people during the negative peak of 2013-2015 (Istat data), i.e., all southern regions except Abruzzo and Molise.

Table 3

FE and 2SLS regressions (dependent variable: lnNEET)

	Center-North		**South**	
	FE	2SLS	FE	2SLS
lnYUR	0.459*** (0.064)	0.258*** (0.098)	0.632*** (0.088)	0.805*** (0.127)
lnSOCIAL	-0.073 (0.083)	-0.122 (0.101)	-0.055 (0.064)	-0.072 (0.056)
lnGDP	-0.305 (0.473)	-1.084** (0.510)	0.298 (0.322)	0.703* (0.409)
lnICT	0.105 (0.124)	0.198* (0.116)	-0.048 (0.080)	-0.063 (0.071)
lnFAMILY	0.098 (0.146)	0.169 (0.157)	-0.166 (0.216)	-0.317 (0.209)
lnCONTRACT	-0.421* (0.227)	-0.407* (0.229)	-0.110 (0.129)	-0.156 (0.102)
lnEDUCATION	-0.195 (0.408)	-0.234 (0.476)	0.065 (0.434)	-0.004 (0.497)
Constant	5.694 (4.778)		-1.087 (3.214)	
R^2	0.6023		0.6992	
First-stage F statistic (lnYUR)		56.74 [0.0000]		15.18 [0.0000]
Hansen J statistic p-value		0.3422		0.3797
Obs.	104	104	64	64

*Note: ***, **, * statistically significant at the levels of 0.01, 0.05 and 0.10*
Source: *Authors' elaborations based on Eurostat, Istat and OECD data*

We also observe unexpected effects of households' socioeconomic and cultural backgrounds. The proxy of parents' human capital does not have an effect in opposing youth inactivity in the considered period. The missing effect of parents' education could be linked to the relatively low level of Italian human capital compared to other advanced economies (OECD 2017b) and the fact that few students have parents with high educational qualifications (OECD 2017a), therefore failing to trigger positive implications. The sign of GDP is negative in the Center-North, as expected, by favoring mainly better education opportunities, while a higher economic status favors the NEET condition in the southern area. The effect of GDP in the South could be linked to the presence of irregular work.

The spread of part-time contracts does not discourage young people; indeed, the possibility of finding this type of work, although not the ideal job, probably limits the spread of young NEETs in the Center-North. FAMILY is not influential on the status of NEET, probably because the delay in the transition to adulthood and to independence is typical of the Italian society (Cook and Furstenberg Jr. 2002). In fact, the need to stay in the parents' nest is due to the household acting as auxiliary "welfare" to young Italians (Cuzzocrea 2014). Finally, the low but positive sign of ICT (Center-North) suggests a distorted use of new technologies among the inactive young people.

The results in Table 4 suggest that there are a few points in common between the NEET issue and the social exclusion issue in the considered period. YUR loses its role, which was

Table 4

FE and 2SLS regressions (dependent variable: lnEXCLUSION)

	Center-North		**South**	
	FE	2SLS	FE	2SLS
lnYUR	0.066 (0.092)	0.113 (0.124)	-0.089 (0.147)	-0.299 (0.224)
lnSOCIAL	0.029 (0.119)	0.041 (0.132)	0.074 (0.107)	0.095 (0.106)
lnGDP	-0.164 (0.678)	0.019 (0.758)	-1.176** (0.538)	-1.667*** (0.641)
lnICT	0.174 (0.177)	0.152 (0.158)	-0.035 (0.134)	-0.017 (0.095)
lnFAMILY	0.154 (0.210)	0.138 (0.218)	0.763** (0.361)	0.947** (0.374)
lnCONTRACT	0.744** (0.326)	0.741** (0.330)	0.017 (0.215)	0.074 (0.256)
lnEDUCATION	-1.355** (0.585)	-1.346** (0.542)	0.311 (0.724)	0.396 (0.687)
Constant	6.399 (6.852)		11.089** (5.365)	
R^2	0.3257		0.2303	
First-stage F statistic (lnYUR)		56.74 [0.0000]		15.18 [0.0000]
Hansen J statistic p-value		0.5240		0.7277
Obs.	104	104	64	64

*Note: ***, **, * statistically significant at the levels of 0.01, 0.05 and 0.10*
Source: *Authors' elaborations based on Eurostat, Istat and OECD data*

predominant in the previous analysis, and the GDP has an effect, as expected, but it is significant only in the South, where the lowest average wealth and income probably make an increase in income necessary to carry out the activities in which young people participate in their society.

The tendency to remain in the family nest with increasing age – perhaps to exploit its economic sustenance and benefits (Mencarini et al. 2017), but not facing the transition to adulthood – pushes youth towards social exclusion in the South. The relative growth of part-time contracts (in the total labor contracts), on the one hand, offers employment opportunities but, on the other hand, it does not guarantee the possibility of integrating and fully performing social interactions (Center-North). CONTRACT is also not relevant in the South, in the second analysis. This is a confirmation of the different performances of the two local labor markets (Cracolici et al. 2007), although in an unfavorable broader context of growing flexible contracts (Barbieri and Scherer 2009), which makes it difficult for young people to obtain jobs with permanent contracts and a good pay.

Parents' advanced education, representing abilities in managing their children's study paths and search for work, is relevant only in the Center-North, i.e., the area that enjoys a higher level of human capital. In the South, this effect is not observed, as in no case do we notice a significant role of social capital. The strengthening of social ties and networks is irrelevant in Italy, perhaps not necessary in the North, and it could be ineffective in the South due to its severe scarcity in this area (Putnam et al. 1993), and it thus does not trigger the propagation of positive effects.

Few common variables explain the two phenomena simultaneously (CONTRACT in Center-North and GDP in the South), and they always have the opposite sign between Tables 3 and 4.

Conclusions

The NEET problem is a serious socioeconomic issue affecting many advanced economies. Italy is, in many ways, a representative case of this situation. This country is plagued by a severe postcrisis recession, strong unemployment, especially among young people, and few resources dedicated to the development of human capital. In addition, Italy represents a strong case of the so-called "North-South problem", since the richest regions of the North have an average income almost double that of the less developed South. However, in both macro-areas, the problem of young NEETs is strong and rapidly increasing, causing growing concern about the future conditions of the young people involved or at risk.

In this framework, we have focused on youth unemployment that is an important cause of the NEET phenomenon for several reasons. First, it affects the youth labor market and the difficulty of finding a job. Moreover, when considering the risk of reverse causality between YUR and NEET, YUR becomes a factor discouraging young people and pushing them to inactivity. In addition, considering the postcrisis years, we must consider the influence of the business cycle on YUR (Dietrich and Möller 2016). In fact, a more sensitive response of YUR (with respect to UR) is observed in Europe in the recent financial crisis (Brada et al. 2014).

The effect of YUR on NEET is detected by both the FE and the 2SLS model, and, as expected, the effect is greater in the South, where youth unemployment has reached over 40% in some recent years (Istat data). The discouragement effect, which we presume to observe mainly by the 2SLS approach (compared with the coefficient of the FE model), indicates that the fear is stronger in the South, where many young people are aware of the difficulties in finding a job which highly qualified people also face.

We have compared these results by testing the same regressors on the social exclusion rate, with the aim of finding similar causes and therefore setting possible common policy interventions. NEET is connected to social exclusion, and for several reasons, the inactive young tend to become socially excluded. The inability to fully participate in social activities, however, proves to be different from the inactivity conditions of young people typical of the NEET condition, at least in the recessionary years tested in our analysis. In particular, income plays a fundamental role in the poorest regions of the South, where high unemployment makes it difficult for young people to create a new family, and remaining in the family nest contributes to their isolation from the society. In the Center-North, the more efficient labor market provides major employment opportunities**,** but with contracts that are often inadequate for a lifestyle that allows a full social integration. However, in this framework, the average cultural background of parents seems to have positive effects (probably by favoring the educational path and the active search for work) only in the most developed regions.

Other structural weaknesses emerge. Young Italians are not able to exploit new technologies to keep their education up to date or to find a job, while local human capital and social capital are not always able to trigger virtuous circles to help young people. The new contracts that are often aimed at young people, such as part-time contracts, may not be the best solution, but at least in the Center-North, they offer job opportunities. The so-called new precariat (Standing 2011) is, in fact, a risk for young people driven to accept temporary and low-paid jobs, causing uncertainty in future conditions (Chung et al. 2012).

From the comparison between the inactivity status of young people and social exclusion, we can affirm that a structural improvement of the labor market, with particular attention to the job opportunities for young people, is a fundamental step in all regions. However, the gravity of the Italian context means that public interventions may not be sufficient in the absence of joint expansive policies (Pastore 2015).

In particular, it seems that only an economic recovery can have any relevance in the South. However, the return to growth cannot guarantee better working conditions in the light of European Union's austerity measures (Brada et al. 2014), so even a marked growth may be ineffective in addressing issues such as NEET or YUR (Bruno et al. 2014).

This work contributes to raising awareness of the relationships between two increasingly serious phenomena, common to less resilient countries. Although limitations are found in the availability of data, which do not allow direct comparisons with the precrisis periods, this study sets a basis for the development of future research that can exploit the knowledge of microdata to outline targeted policy interventions. Furthermore, future research will analyze the results of the already started policies (e.g., "Garanzia Giovani" program in Italy).

References

AASSVE A., BILLARI F. C., ONGARO F. (2001), *The impact of income and employment status on leaving home: evidence from the Italian ECHP sample*, Labour 15 (3), 501-529.

ALFIERI S., SIRONI E., MARTA E., ROSINA A., MARZANA D. (2015), *Young Italian NEETs (not in employment, education, or training) and the influence of their family background*, Europe's Journal of Psychology 11 (2), 311-322.

ARMANO E., MURGIA A. (2014), *The precariousnesses of young knowledge workers: a subject-oriented approach*, Global Discourse 3 (3-4), 486-501.

BACHER J., KOBLBAUER C., LEITGÖB H., TAMESBERGER D. (2017), *Small differences matter: how regional distinctions in educational and labour market policy account for heterogeneity in NEET rates*, Journal for Labour Market Research 51, 4.

BARBAS M., BRANCO P., LOUREIRO A., MATOS P. (2017), *NEETin with ICT*, Universal Journal of Educational Research 5 (4), 537-543.

BARBIERI P., CUTULI G., SCHERER S. (2014), *Giovani e lavoro oggi. Uno sguardo sociologico a una situazione a rischio*, Sociologia del lavoro 136, 73-98.

BARBIERI P., SCHERER S. (2009), *Labour market flexibilization and its consequences in Italy*, European Sociological Review 25 (6), 677-692.

BELL D. N. F., BLANCHFLOWER D. G. (2011), *Young people and the Great Recession*, Oxford Review of Economic Policy 27 (2), 241-267.

BELLO B. G., CUZZOCREA V. (2018), *Introducing the need to study young people in contemporary Italy*, Journal of Modern Italian Studies 23 (1), 1-7.

BHALLA A., LAPEYRE F. (1997), *Social exclusion: towards an analytical and operational framework*, Development and Change 28 (3), 413-433.

BIANCHERA E., ARBER S. (2007), *Caring and sleep disruption among women in Italy*, Sociological Research Online 12 (5), 200-2013.

BIGONI M., BORTOLOTTI S., CASARI M., GAMBETTA D., PANCOTTO F. (2016), *Amoral familism, social capital, or trust? The behavioural foundations of the Italian North-South divide*, The Economic Journal 126 (594), 1318-1341.

BRADA J., MARELLI E., SIGNORELLI M. (2014), *Young people and the labor market: key determinants and new evidence*, Comparative Economic Studies 56 (4), 556-566.

BRADA J. C., SIGNORELLI M. (2012), *Comparing labor market performance: some stylized facts and key findings*, Comparative Economic Studies 54, 231-250.

BRIDA J. G., GARRIDO N., MUREDDU F. (2014), *Italian economic dualism and convergence clubs at regional level*, Quality & Quantity 48, 439-456.

BRUNO G. S. F., MARELLI E., SIGNORELLI M. (2014), *The rise of NEET and youth unemployment in EU regions after the crisis*, Comparative Economic Studies 56, 592-615.

BYNNER J. (2005), *Rethinking the youth phase of the life-course: the case for emerging adulthood?*, Journal of Youth Studies 8 (4), 367-384.

BYNNER J., JOSHI H., TSATSAS M. (2000), *Obstacles and opportunities on the route to adulthood: Evidence from rural and urban Britain*, The Smith Institute, London.

BYNNER J., PARSONS S. (2002), *Social exclusion and the transition from school to work: the case of young people not in education, employment, or training (NEET)*, Journal of Vocational Behavior 60 (2), 289-309.

CAPELLO R. (2016), *What makes Southern Italy still lagging behind? A diachronic perspective of theories and approaches*, European Planning Studies 24 (4), 668-686.

CARCILLO S. FERNÁNDEZ R., KÖNIGS S., MINEA A. (2015), *NEET youth in the aftermath of the crisis: Challenges and policies*, OECD Publishing, Paris.

CAVALLI A., GALLAND O. (eds.) (1996), *Senza fretta di crescere. L'ingresso difficile nella vita adulta*, Translated by Della Porta B., Liguori, Naples.

CECCHINI S., RAINA M. (2002), *Warana: the case of an Indian rural community adopting ICT*, Information Technology in Developing Countries Working Paper, Retrieved from: www.papers.ssrn.com.

CHUNG H., BEKKER S., HOUWING H. (2012), *Young people and the post-recession labour market in the context of Europe 2020*, Transfer: European Review of Labour and Research 18 (3), 301-317.

CICCARELLI A., FABRIZI E. (2017), *Family background and persistence in NEET status*, Rivista Italiana di Economia, Demografia e Statistica 71 (1), 29-40.

COMITO V., PACI N., TRAVAGLINI G. (2014), *Un paese in bilico. L'Italia tra crisi del lavoro e vincoli dell'euro*, Ediesse, Rome.

COOK T. D., FURSTENBERG JR. F. F. (2002), *Explaining aspects of the transition to adulthood in Italy, Sweden, Germany, and the United States: a cross-disciplinary, case synthesis approach*, The Annals of the American Academy of Political and Social Science 580 (1), 257-287.

CRACOLICI M. F., CUFFARO M., NIJKAMP P. (2007), *Geographical distribution of*

unemployment: an analysis of provincial differences in Italy, Growth and Change 38 (4), 649-670.

CUZZOCREA V. (2014), *Projecting the category of NEET into the future*, in: Council of Europe and the European Commission, Perspectives on youth. Volume 1: 2020 – what do YOU see?, Council of Europe Publishing, Strasbourg Cedex, pp. 69-82.

DANIELE V., MALANIMA P. (2007), *Il prodotto delle regioni e il divario Nord-Sud in Italia (1861-2004)*, Rivista di politica economica 97 (2), 267-316.

DEMIDOVA O., MARELLI E., SIGNORELLI M. (2015), *Youth labour market performances in the Russian and Italian regions*, Economic Systems 39 (1), 43-58.

DI PIETRO G., URWIN P. (2003), *Intergenerational mobility and occupational status in Italy*, Applied Economics Letters 10 (12), 793-797.

DIETRICH H., MÖLLER J. (2016), *Youth unemployment in Europe – business cycle and institutional effects*, International Economics and Economic Policy 13, 5-25.

EICHHORST W., NEDER F. (2014), *Youth unemployment in Mediterranean countries*, IZA Policy Paper 80, Retrieved from: www.iza.org.

EMMENEGGER P., HÄUSERMANN S., PALIER B., SEELEIB-KAISER M. (2012), *The age of dualization: the changing face of inequality in deindustrializing societies*, Oxford University Press, Oxford.

ESPING-ANDERSEN G. (1999), *Social foundations of postindustrial economies*, Oxford University Press, Oxford.

EUROPEAN UNION (2013), *European Economy: Macroeconomic Imbalances – Italy 2013*, European Commission, Brussels.

FELICE E. (2007), *Divari regionali e intervento pubblico: per una rilettura dello sviluppo in Italia*, Il Mulino, Bologna.

FELLINI I. (2015), *Una "via bassa" alla decrescita dell'occupazione: il mercato del lavoro italiano tra crisi e debolezze strutturali*, Stato e mercato 105 (3), 469-508.

FERRIE J. E. (2001), *Is job insecurity harmful to health?*, Journal of the Royal Society of Medicine 94 (2), 71-76.

FRATESI U., PERCOCO M. (2014), *Selective migration, regional growth and convergence: evidence from Italy*, Regional Studies 48 (10), 1650-1668.

FULLER C. (2014), *Social Capital and the role of trust in aspirations for higher education*, Educational Review 66 (2), 131-147.

FULLIN G., REYNERI E. (2015), *Mezzo secolo di primi lavori dei giovani. Per una storia del mercato del lavoro italiano*, Stato e mercato 105 (3), 419-468.

FURLONG A. (2006), *Not a very NEET solution: representing problematic labour market transitions among early school-leavers*, Work, Employment and Society 20 (3), 553-569.

FURLONG A. (2008), *The Japanese hikikomori phenomenon: acute social withdrawal among young people*, The Sociological Review 56 (2), 309-325.

GASPANI F. (2019), *Young adults NEET and everyday life: time management and temporal subjectivities*, Young 27 (1), 69-88.

GENDA Y. (2007), *Jobless youths and the NEET problem in Japan*, Social Science Japan Journal 10 (1), 23-40.

GORARD S. (2010), *School experience as a potential determinant of post-compulsory participation*, Evaluation & Research in Education 23 (1), 3-17.

HANSEN L. P. (1982), *Large sample properties of generalized method of moments estimators*, Econometrica 50 (4), 1029-1054.

HARPER R. (2002), *The measurement of Social Capital in the United Kingdom*, Office for National Statistics, Retrieved from: www.oecd.org.

HODKINSON P., SPARKES A. C. (1997), *Careership: a sociological theory of career decision making*, British Journal of Sociology of Education 18 (1), 29-44.

ISTANCE D., REES G., WILLIAMSON H. (1994), *Young people not in education, training or employment in South Glamorgan*, South Glamorgan Training and Enterprise Council, Cardiff.

ISTRATE M., HOREA-SERBAN R., MUNTELE I. (2019), *Young Romanians' transition*

from school to work in a path dependence context, Sustainability 11 (5), 1254.

ITALIA LAVORO (2011), *I giovani NEET in Italia. Un'analisi territoriale*, Bollettino No. 25, Italia Lavoro, Rome.

JOHNSON P., ZIMMERMANN K. F. (eds.) (2008), *Labour markets in an ageing Europe*, Cambridge University Press, Cambridge.

KRAAK A. (2013), *State failure in dealing with the NEET problem in South Africa: which way forward?*, Research in Post-Compulsory Education 18 (1-2), 77-97.

MARSHALL K. (2012), *Youth neither enrolled nor employed*, Perspectives on Labour and Income 24 (2), 1-15.

MENCARINI L., PAILHÉ A., SOLAZ A., TANTURRI M. L. (2017), *The time benefits of young adult home stayers in France and Italy: a new perspective on the transition to adulthood?*, Genus 73 (1), 6.

MINISTRY OF LABOR AND SOCIAL POLICIES (2014), *Piano di attuazione italiano della Garanzia per i Giovani*, Ministero del Lavoro e delle Politiche Sociali, Retrieved from: www.garanziagiovani.gov.it.

MUSSIDA C., SCIULLI D. (2018), *Labour Market Transitions in Italy: the Case of the NEET*, in: Malo M. A., Moreno Mínguez A. (eds.), European Youth Labour Markets: Problems and Policies, Springer, Cham, pp. 125-142.

NALDINI M. (2003), *The family in the Mediterranean welfare states*, Routledge, London.

ODOARDI I. (2020), *Can parents' education lay the foundation for reducing the inactivity of young people? A regional analysis of Italian NEETs*, Economia Politica 37, 307-336.

ODOARDI I., MURATORE F. (2018), *The Italian regional dualism: A MARS and panel data analysis*, The Review of Regional Studies 48 (3), 323-346.

ODOARDI I., MURATORE F. (2019), *The North-South divergence in Italy during the Great Recession*, The Manchester School 87 (1), 1-23.

OECD (2017a), *Education at a glance 2017: OECD indicators*, OECD Publishing, Paris.

OECD (2017b), *Education policy outlook – Italy*, OECD Publishing, Paris.

OECD (2018), *Education at a glance 2018: OECD indicators*, OECD Publishing, Paris.

PASTORE F. (2015), *The European Youth Guarantee: labor market context, conditions and opportunities in Italy*, IZA Journal of European Labor Studies 4, 11.

PATTON W., DONOHUE R. (2001), *Effects on the family of a family member being long term unemployed*, Journal of Applied Health Behaviour 3 (1), 31-39.

PEMBERTON S. (2008), *Tackling the NEET generation and the ability of policy to generate a 'NEET' solution—Evidence from the UK*, Environment and Planning C: Government and Policy 26 (1), 243-259.

PUTNAM R. D., LEONARDI R., NANETTI R. Y. (1993), *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton, NJ.

QUINTINI G., MANFREDI T. (2009), *Going separate ways? School-to-work transitions in the United States and Europe*, OECD Social, Employment and Migration Working Papers 90, OECD Publishing, Paris.

RAHMAN K. M. (2007), *NEETs' challenge to Japan: causes and remedies*, Japanstudien 18 (1), 221-244.

SALVATI L. (2013), *'North of the south' or 'south of the north'? Revisiting the spatially-complex economic divide in Italy*, Journal of Urban and Regional Analysis 5 (1), 65-76.

SALVEMINI G. (1955), *Scritti sulla questione meridionale (1896-1955)*, G. Einaudi, Torino.

SARACENO C. (2015), *Il lavoro non basta. La povertà in Europa negli anni della crisi*, Feltrinelli, Milan.

SCARPETTA S., SONNET A., MANFREDI T. (2010), *Rising youth unemployment during the crisis: How to prevent negative long-term consequences on a generation?*, OECD Social, Employment and Migration Working Papers No. 106, OECD Publishing, Paris.

SERGI V., CEFALO R., KAZEPOV Y. (2018), *Young people's disadvantages on the labour market in Italy: reframing the NEET category*, Journal of Modern Italian Studies 23 (1), 41-60.

SERRACANT P. (2014), *A brute indicator for a NEET case: genesis and evolution of a problematic concept and results from an alternative indicator*, Social Indicators Research 117, 401-419.

SILVER H. (1994), *Social exclusion and social solidarity: three paradigms*, International Labour Review 133 (5-6), 531-578.

SOCIAL EXCLUSION UNIT (1999), *Bridging the gap: new opportunities for 16-18 year olds not in education, employment or training*, The Stationery Office, London.

STAIGER D., STOCK J. H. (1997), *Instrumental variables regression with weak instruments*, Econometrica 65 (3), 557-586.

STANDING G. (2011), *The precariat: The new dangerous class*, Bloomsbury Academic, London.

SULLIVAN A. (2001), *Cultural capital and educational attainment*, Sociology 35 (4), 893-912.

THOMPSON R. (2011), *Individualisation and social exclusion: the case of young people not in education, employment or training*, Oxford Review of Education 37 (6), 785-802.

TOMASSINI C., WOLF D. A., ROSINA A. (2003), *Parental housing assistance and parent-child proximity in Italy*, Journal of Marriage and Family 65 (3), 700-715.

TONIOLO G. (ed.) (2013), *The Oxford Handbook of the Italian Economy Since Unification*, Oxford University Press, Oxford.

WOLFF E. N. (2000), *Human capital investment and economic growth: exploring the cross-country evidence*, Structural Change and Economic Dynamics 11 (4), 433-472.

YATES S., PAYNE M. (2006), *Not so NEET? A critique of the use of 'NEET' in setting targets for interventions with young people*, Journal of Youth Studies 9 (3), 329-344.

Initial submission: 24.09.2019
Revised submission: 08.03.2020
Final acceptance: 29.05.2020

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