

# **DETERMINANTS OF ENTREPRENEURSHIP AND INNOVATION**

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**Volume 13 Issue 2**

**2017**

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## From the Editors

We are pleased to present to you the latest edition of JEMI (Issue 2nd) in which entrepreneurship problems are dealt with from different research perspectives using quantitative and qualitative methods. This diverse approach well reflects the entrepreneurial character that takes place at every level and is influenced by external and internal environmental factors.

The article by Ruslan Harasym, Jacek Rodzinka, and Tomasz Skica is an interesting look at the process of setting up new businesses through the prism of local government. The authors are trying to link the size of local government with its impact on entrepreneurship, exploring the positive and negative factors that influence the process of starting a business. The context of the research is the determinants of the functioning of enterprises in Poland, which determine the shape of local economies. It is worth noting the authors' approach to quantifying the size of self-government administration.

Mohammad Zarei's article is a neat combination of competition from the tournament theory and corporate entrepreneurship, highlighting the distinctive shape of competition between employees and entrepreneurs. While the issue of competition has been relatively well recognized in entrepreneurial literature, it is worth observing this process at the level of corporate entrepreneurship, as proposed by the author. The creation of a model for entrepreneurial tournaments in large organizations is still open to debate but, on the basis of grounded theory, the attempt becomes quite successful in this article.

Somewhat in opposition to the previous article - the reflections according to S. Hossein Jalali are focused on the capabilities and selection of strategic alliance partners. The author abstracts a bit from the resource potential of the partners to the potential of the alliance in the short, medium and long term, as these determine technological or market opportunities. This is not rivalry, but cooperation based on the deliberate selection of partners within strategic alliances of differing duration.

The inseparable aspect of entrepreneurship research is innovation. The article by Alessandra Tognazzo and Paola Angela Maria Mazzurana under the title Friends doing business ... is an interesting study of the dynamics of friendship in a founding team in a technology-based start-up study. The

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main factors determining the process of generating creative ideas and implementing innovations are, according to the authors, the cohesiveness of the group and reciprocity of exchange. The added value is that the research is longitudinal.

In turn, the role of users in the innovation process is the focus of Maria Roszkowska-Menkes's article. Her research is on the literature research study, in which the author attempts to identify and analyze major research trends in this area, research gaps and directions for future research. This is an area that, due to the dynamic nature of the innovation process, is justified, and its grounded recognition will allow even more matching of products and services to end-users' needs.

Lamyaa EL BASSITI's paper introduces a new concept of "Innovation Interoperability" and introduces new constructs that underpin the systematic approach to innovation, defining the relationship between them. The author through the Generic Modular Ontology, which consists of three interconnected sub-ontologies, refers to the key dimensions of successful innovation in an open environment.

The latest article by Apar Gosavi looks at businesses through the prism of information and communication technology, in which the Internet becomes an inseparable part of the functioning of every human activity, including the functioning of businesses. India is becoming one of the countries most saturated by new technologies, which have created a range of services based on high technology. Here, the research question is twofold: whether women as business owners use the Internet more often than their male counterparts, and if so, whether it affects productivity and sales volumes.

We would sincerely like to thank the authors for the articles they have contributed to this issue of JEMI. Their cooperation in taking into account the comments of the reviewers has enabled them to further improve the submitted articles. We also very much appreciate the contribution of the reviewers for their commitment, often multiple, which has enhanced the quality of the entire editorial process and the final version of this JEMI issue. We hope the articles presented here will be of interest to readers and researchers all over the world, and that they become another small building block in future scientific and practical research.

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# The Size of Local Government Administration at a Municipal Level as a Determinant of Entrepreneurship

*Ruslan Harasym<sup>1</sup>, Jacek Rodzinka<sup>2</sup> and Tomasz Skica<sup>3</sup>*

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## **Abstract**

*This article's aim is to examine a dependency between local government administration at a municipal level and the level of local entrepreneurship. This paper attempts to answer the question of whether the size of the local government administration has features of stimulant or de-stimulant in the process of setting up a business. In other words, does the size of public administration at a local level (municipal level) have a positive or negative impact on creating new business entities? This is important due to at least a couple of reasons. First of all, the current research achievements are not extensive, when it comes to the publications that link entrepreneurship and the size of local government administration. Secondly, the problem of entrepreneurship determinants constitutes still topical and not fully investigated (or explained) aspects of local economy development. Thirdly and finally, the authors of this article have proposed and copyrighted an approach to the quantification of the size of local government administration, modifying commonly used measures of local public administration. Thus, this article fits not only into the explanation of the entrepreneurship phenomenon and its determinants, but also contributes to the development of knowledge about dependencies between the size of local self-government and the entrepreneurship level. It expands the knowledge resource on analyzed dependencies and re-orientes current approaches to similar research.*

**Keywords:** *territorial self-government; local public administration; self-government administration; size of local self-government; entrepreneurship; new business entities.*

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## INTRODUCTION

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The problem of entrepreneurship, and its stimulants and de-stimulants, is an object of continuous research. The variety of observed approaches to design research of the related factors, in which different authors seek the impact on entrepreneurship, seems to drain this research area, as an object of empirical analysis. Nevertheless this statement is precipitate and a conclusion formulated in this way is overstated. Despite the extensive research that is dedicated to entrepreneurship, this problem is still not fully covered and explained. As a result, it still remains topical and attractive from the point of view of the design of the research that is aimed to both identify and describe factors that determine (in both a positive and negative sense) the entrepreneurship level.

Of particular significance in explaining the phenomenon of entrepreneurship is the role played in this process by public administration. Knowledge about the transfer of a public authority's activity, as well as its scope and character, for the processes of initiating and setting up a business activity, is not only common, but also multi-dimensional. The following authors raised this issue in their articles: Vesper (1983), El-Namaki (1988), Westhead (1990), and Goodman, Meany and Pate (1992) indicated the following areas of stimulation of entrepreneurship by the government (public administration) and the following accompanied channels of support: provision of venture capital funds, tax-based incentives, as well as government procurement programs and protection of proprietary ideas and innovations. These authors refer also to the following areas of authorities' activity on entrepreneurship support: government agencies' support, fostering of entrepreneurship by educational institutions, as well as the minimization of barriers to entry. Gnyawali and Fogel (1994) distributed the accents in a different way and analyzing environmental conditions of entrepreneurial activities, grouped them into five dimensions, including: financial assistance, non-financial assistance, entrepreneurial and business skills, and socio-economic conditions; they also considered government policies and procedures, which stressed the role of public authorities in the process of stimulating economic initiatives.

Research, taking into account the activity of public authorities in their efforts to support entrepreneurship, has also been done in the areas beyond the above-mentioned forms and channels of support. An example that can be used is the research of Smallbone and Welter (2001), who analyzed the impact of activity of central level public administration on the development of small-to-medium enterprises (SMEs). The authors mentioned the following tools and forms of impact of entrepreneurship that are available for public

authorities: impact on stability of the macroeconomic business environment, properly directed legislation activity, programs of entrepreneurship support, formation of an institutional environment for companies, as well as the formation of entrepreneurial behaviors in society by, inter alia, the educational system. Minniti (2008) considers the role of government policy in formulating the institutional environment for companies and concentrates on identification of these public authorities' policies, which affect entrepreneurship support in the most productive (effective) way. Shane (2009) concentrates his considerations on start-ups and proves that the involvement of public authorities in support of such initiatives should not have an "automatic" nature. Due to the fact that not every start-up translates into economic growth and job creation, the approach of authorities to support economic activities should have a selective nature and an orientation towards ventures and pro-growth companies. Valdez and Richardson (2013) analyze institutional determinants of macro-level entrepreneurship and prove that regulative institutions are related to entrepreneurial activity. Whereas Fuentelsaz, González, Maicas and Montero (2015), studying the impact of formal institutions on entrepreneurship, evaluate elements of the entrepreneurship environment by referencing the classification of Gnyawali and Fogel (1994) that covers property rights, business freedom, fiscal freedom, labor freedom, financial capital and educational capital. According to the authors' opinion, the goal of public authorities' policy aimed at supporting entrepreneurship, should be to ensure the efficiency of market mechanisms by eliminating market failures and administrative restrictions for setting up and developing a business.

Despite the fact that the presented calculation is not exhaustive and present in the literature to explain the dependency linking the activity of public authorities (administration) with entrepreneurship, it draws attention to some important regularity. Firstly, approaches adopted in the literature attempting to explain the entrepreneurship phenomenon are made through the prism of authorities' activities and relate mainly to the activity of public administration at the central level, as well as its role in the process of creating the institutional and regulatory environment in the area of initiating and running a business. Secondly, even if what is present in the literature attempts to refer to the level of activity of local government, the subject of analysis and related arrangements are most commonly those instruments of entrepreneurship support and/or the effects of actions of local authorities that support entrepreneurship, not the relation between the size of local government (as stimulants or de-stimulants) with the level of entrepreneurship. The following authors proved these observations: Bania and Dahlke (2014), Dyrda (2014), Dropek (2014), as well as Grycuk and Russel

(2014), Korolewska (2014), or Rapacz and Jareman (2014). These articles classify and group instruments of entrepreneurship support that are available for local government administration, and assess their effectiveness and usefulness in the activities of public authorities that are aimed at stimulating the development of the local economy. At the same time these articles stress that, apart from the identification of the effectiveness of these forms of support, much depends on the size of local government administration.

Today, there is no doubt about the fact that there is a negative impact from the excessive growth of regulations, and consequent readjustment of the economy to entrepreneurship (cf., inter alia, Klapper, Laeven and Rajan, 2006; Van Stel, Storey & Thurik, 2007; Parker, 2007; Djankov, La Porta,

Lopez-de-Silanes and Shleifer, 2002). The same situation can be observed in the case of better conditions of entrepreneurship with proper (i.e. adjusted to real needs of businesses) support from the government side (in a regulative, institutive and fiscal sense). A pointless discussion can also be observed in the case of equipping self-government authorities by legislation, understood as tools that self-governments use in order to create conditions for setting up new businesses and stimulating their growth (cf., inter alia, Walenia 2014, Skica & Bem, 2014). Finally, there is a commonly known position in accordance to which an introduction of solutions aimed at entrepreneurship stimulation by the existing legal order, as well as making them available for creators of the local socio-economic reality (local governments), is not identical to their effective use (cf., inter, alia Motoyama & Viens, 2015). Even the exemplary solutions introduced to support economic activity do not always correspond to a level of entrepreneurship development that is adequate when compared to the scale of the applied forms of support. In both presented situations, their background has separate justification. As in the first case, the causative factor might be badly executed local government policy on entrepreneurship support (Skica, Bem & Daszyńska-Żygadło, 2013), insofar as in the second situation this factor might be a low level of social capital (Westlund & Bolton, 2003) which, even in the assumption of properly constructed frameworks of support, will result in only partitive outcomes in the form of entrepreneurship development.

As indicated in the conducted analysis, the background of problems in the relationships between public administration (and the related activity focused on economic entities) and entrepreneurship, can have at least three centers. The first of them may be the wrong policies of public authorities (on both a central and local level) in actions taken to support entrepreneurship. A policy carried out in the wrong way might be conditioned by the misunderstanding of the actual needs of entrepreneurs, their wrong diagnoses, improper choice of support instruments and finally ignoring the signals coming from

the environment and indicating the real expectations of forms of support. The second background was independent (exogenous) factors in relation to the activity of public administration. In this group, the authors included inter alia low social potential, passivity of the community on the offered forms of support, as well as institutional barriers and inadequate socio-economic infrastructure. Finally, the third component of the base of the problems associated with the development of entrepreneurship is the lack of dialogue between public authorities and entrepreneurs. These indicated problems complement the previously presented diagnosis. No dialogue corresponds with the ignorance of the local environment needs, and thus the improper creation of supporting policies. At the same time, the lack of opportunity to get recipients of these actions to express themselves on the above topic results in a shortage of feedback in the direction of the authorities on the consequences of the actions taken by them (cf., Smallbone, 2007, p. 203). This situation causes a bilateral defect of relations between the regulator and the receiver of regulation, which in turn translates into a lack of a linear dependency between the activity of public authorities on applied support and the level of entrepreneurship.

The presented findings proved a basic regularity. The approaches occurring in the literature to research on the relation of public administration-entrepreneurship concentrates on the effects of actions of the public authorities (on a central and local level) on the processes of entrepreneurship stimulation. The attempts at analyzing entrepreneurship in the contexts of public authorities' presents the aspect of public administration size as a stimulant or de-stimulant of entrepreneurship to a relatively small extent (cf., inter alia, Aidis, Estrin & Mickiewicz, 2012; Casero, Auni6n, Escobedo & Mogoll6n, 2015). Considering the above, the purpose of this article is to examine the impact of the size of public administration in Poland on the level of entrepreneurship. Due to the fact that the creator of entrepreneurship development is the local government that uses the attributes of its authority and implements the established rules into economic practice, this article is devoted to a review of relations along the lines of: size of local government at the local level (municipal) in Poland - level of entrepreneurship.

The section "Introduction" justifies the designing process of scientific research that was dedicated to explain the phenomenon of entrepreneurship from the perspective of its relations with the size of the local government administration. In the section "Literature review" the authors will present the analysis of the historically applied approaches to quantify the size of local government administration. It is essential for the next phase of scientific research that is set as modeling the relations between the size of public administration and entrepreneurship. In the section "Data, methods and

model specification”, the authors presented variables that were applied in the research and these were selected in accordance with the “Literature review” section’s analysis of historical research that used size of local government administration as an independent variable. In the next step, the authors will discuss the applied research method. This section finishes with a modeling of interdependency that is presented in the article’s title. Finally, the section “Results” brings obtained results closer, whereas their description is presented in the section “Discussion and Conclusions”.

## LITERATURE REVIEW

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The argument that was presented in the previous part of this article justifies launching the analyses to review current literature approaches to measure the size of the public administration on a local level. Such a solution on the one hand enables a diagnosis of currently used measurements and on the other hand will open up opportunities for proposing alternative solutions to measure the size of the local government administration. It should be stressed that the approach presented below provides an overview of the current literature on measures of administrative structures dedicated to various aspects of activity of the public sector as well as its economic functions. This solution offers the possibility of selecting measures of size of public government beyond the standard attempts to link the activity of public authorities and entrepreneurship.

### Quantification of local administration size

The literature review proves decidedly that the most frequent measures of public administration size in total (including local government administration) are: level of spending and number of employees. This position is proved in the following publications: Heller and Tait (1983), Weiher and Lorrence (1991), as well as Mackenzie (1991), use the ratio of employment in self-government units as a measure of local administration size. On the other hand Hemming (1991) and Kalseth and Rattso (1995) describe the size of local administration using the level of its total spending. Baqir (1999) describes the size of public administration structures using two measures. The first is the comparison of total expenses and total income of the entity, while the second is the number of employees in local government per capita of the local government unit under investigation.

A different point of view on the measurement of the size of public administration on a local government level was expressed in the article of

Ivanov, Tchavdarova, Savov and Stanev (2002). The authors present the size of the local public administration using three methods. The first approach is a separation of the total expenditure of resources used for maintenance of the unit. The second method is based on relating the expenditure on administration to the total expenditure of local government. The third method divides expenditure on administrative matters by the number of residents of the examined territorial unit. Using these approaches, the authors obtained a measure of the costs of territorial administration functioning. Sellers, Barnes, Hoffmann-Martinot and Shipper (2003) as well as Higgins, Young and Levy (2006), apart from financial measures, indicate employment as the measure of size of the local government administration. The mentioned exponent of size of the local government administration is considered from the point of view of both the number of people employed in the local government unit and in relation to total employment in the public administration (on the central and local government unit) of a given country.

Explanation of size of the local government administration by the expenditure measures is also used by Garrett and Rhine (2006). They carry out the measurement of administration (on both central and local government level) using its spending per capita, and at the same time they verify the factors responsible for their level and the change (their increase or decrease). Simultaneously, as a measure of the administration size, the authors indicate the share of employment in its structures in relation to the total employment in the territorial unit (local, supra-local, etc.). Phillips and Chen (2007) take a different approach to measure the size of the local government administration. They propose the share of expenditure of local government into total public spending (government and self-government) on consumption, as well as the share of spending on local government administration in the total expenditure of a territorial unit. The authors extend the traditionally used spending measures by the analysis of the local government income in relation to public expenditure on consumption. Dollery and Robotti (2008) and in analogy to Ivanov et al. (2002) use the ratio called cost of public service provision on the examined territorial unit. This ratio is calculated as the amount of expenditure made by the self-government on public services per capita. In addition to the measures indicated above the authors, in order to specify the size of local government, use the ratio of the number of employees in local government to the area (territorial dimension), occupied by the administrative unit.

In the article of Labonte (2010), we can find a kind of synergy of the main measures of a public administration size, which were mentioned above. The author, in order to determine its size, uses both the total amount of expenditure incurred by public administration (on respectively a central or

local level), the amount of expenditure per capita, as well as employment in its structures. However, in contrast to the above-mentioned articles, M. Labonte extends the methodology for measuring the size of government administration and local government administration by the value of generated revenues (but not income) of budget. Modification of the previously discussed measures can be also found in the articles of Boex (2011) and Boex (2012). The author, besides the measurement of a public administration structures' size through incurred expenses, proposes for this purpose to apply the degree of expenditure decentralization, defined as the value of the funds spent by individual governments on their own tasks (excluding spending on tasks assigned by the central government). At the same time J. Boex, similarly to M. Labonte, emphasizes the desirability of expressing the size of local government administration through budget revenues. The author proposes to use for this purpose the revenue side of the budget. In his opinion, the postulated measure finds justification in the lack of adequacy between the cost of realization of the public tasks that are allocated to local governments and the efficiency of sources of income that are allocated to them.

The review of approaches to measure the size of the public administration structures presented above is not exhaustive. Pevcin (2012), in research on the size of administration, refers to the total expenditure per capita incurred by self-governments at the local level for the realization of tasks that are allocated to them. Anderson (2011), indicates employment in particular units of territorial division as a measure of local government structures. A similar position is found in the articles of Bardes, Shelley and Schmidt (2014), as well as Garand, Ulrich and Xu (2013). On the other hand Salvino (2007) describes the size of local government through the prism of the two other variables. The first is self-government tax incomes referred to as personal income, while the second is the share of individual incomes of self-governments in personal incomes. Aidis, Estrin and Mickiewicz (2010) expressing the size of public administration on a national level, used the category size of the government sector (government spending) in the economy contributed by the Heritage Foundation, as well as the ratio of government expenses to GDP, i.e. the ratio proposed by the World Bank. Finally, Casero et al. (2015), measured the size of the government (public administration) using the variable size of government extracted from the Economic Freedom of the World (EFW) and the Index of Economic Freedom (IEF) published by the Heritage Foundation.

This classification, despite the diversity of approaches to measure the size of the structures of public administration (at central and local level), does not exhaust the possibilities of their quantification. As a result, and despite the plurality of the presented approaches, the review that was made by the

authors maintains a place to propose alternative measures and approaches that are aimed at expressing the size of a public administration.

### **Size of public administration vs. entrepreneurship**

Analysis of the literature indicated leading approaches to the attempts to quantify the size of public administration structures on both central and local levels. It clearly demonstrated that research on the measurement of the size of the administrative structures is strongly turned towards the central level. Analogically, a review of research dedicated to relationships between the size of the public authorities (government) and entrepreneurial activity, proved that attempts to explain this phenomenon are not made at the local level. Combining entrepreneurial activity with the size of public authorities (administration), along with a variety of approaches to its expression, focuses on public administration of the whole country, possibly on the administration of the central level (government level), without referring to the level of local authorities.

Nyström (2008), proves that the smaller the government sector, the greater the entrepreneurship. Bjornskov and Foss (2008) prove that a bigger public sector tends to decrease entrepreneurship. On the other hand, Aidis, Estrin and Mickiewicz (2010), state that there is a significant and robust negative relationship between the size of the state sector and entrepreneurship. Results of the research of Casero et al. (2015) provide empirical proof of an inverse relationship between the size of government and entrepreneurship, but only for efficiency-driven economies and innovation-driven economies.

In turn, the results from other research indicate that in order to assess the relationships between the level of entrepreneurial activity and the size of the public administration (government size), the level of economic development of the country is important. What is vital and regardless of the level of economic development of the country, there is no doubt that the smaller size of the public administration (government) has a positive effect on entrepreneurship, but many different levels of economic development correspond with other factors that justify smaller size of public administration structures to stimulate entrepreneurship.

According to Heckelman (2000), in the situation of underdeveloped countries, the small size of the public administration (government) stimulates entrepreneurship, due to the lack of solutions that cover society from the social side through transfers, subsidies and other forms of support. Larroulet and Kouyoumdjian (2009) show that in developing countries a small government sector (small size of the public administration) promotes the

emergence of new entrepreneurs. The causative factor here is opportunity-based entrepreneurship. On the other hand, in highly developed countries a smaller size of the public administration (government), determines the entrepreneurship due to a smaller range of regulations related to setting up new businesses (a higher level of economic freedom). In these countries, the market is not exceedingly protected by the state, and the economy is dominated by state-owned companies and public investment (Acs and Szerb, 2007). At this point it should be noted that in the case of highly developed countries, it is easy to observe the so-called “welfare trap”. As was proved by Henrekson (2005), a strong welfare state can reduce the incentives for necessity entrepreneurs. A similar position was expressed also by Koellinger and Minniti (2009).

If we move the results of analyses on the examined dependency on the level of the most commonly used measures that express the size of the public administration (government size), based on differently configured public spending, we get a much broader spectrum of information about the relationships between the analyzed variable and entrepreneurship. It should be stressed that the results of research combine and compare the level of entrepreneurship with the size of the public administration (public authorities) on a central level, not a local one. If we take the level of the realized spending as a measure of the size of the administrative structure, we will note that according to Holder (2009) higher spending translates into weaker constraints of budgetary spending and may cause reorientation of expenditure policy motives from social security to political purposes, thereby inhibiting entrepreneurship. Moreover and Parker (2004) states that a large state sector, due to its fiscal policy may even stop entrepreneurship development. Relatively high social spending eliminates the need for taking any initiatives aimed at raising revenues, by subsidizing them effectively. Nica (2014), states that entrepreneurship is negatively correlated with shares of general government final consumption expenditure and government expense out of GDP. On the other hand Islam (2015) stresses a negative relationship between total government consumption expenditure and entrepreneurial activity.

The conducted analysis confirms the research findings made so far. The ongoing study does not take into account the problems of impact of the size of administration (size of government) on local level to the level of entrepreneurship. At the same time attempts to quantify the size of the public administration structures are made predominantly in relation to public administration of an entire country, or eventually to the central administration

(i.e. the government administration). The main exponent of the size of their structures is thereby public spending, which is configured in various ways. Measures of administration structures, which are based on the number of employed public officials, are not matched with entrepreneurial activity.

## DATA, METHODS AND MODEL SPECIFICATION

The authors used for the analysis data from the sources of Local Data Bank (LDB) provided by Central Statistical Office of Poland (GUS). The geographical range of the analysis covered 2481 communes in Poland.

During the preparation of data for analysis, the authors took the output dependent variable (the number of newly registered enterprises) and divided it by the population of working age. The output independent variables were in turn divided by the total population. A further analysis was carried out on the basis of logarithmic annual data collected at the level of individual communes (2003-2013) that was later on arranged in the panel.

In the model presenting the impact of expenditure on salaries of civil servants on entrepreneurship, the authors used the following variables:

- 1) A dependent variable that describes the level of entrepreneurship in the area of examined communes:
  - `Innowo_zarejes` – number of newly registered businesses;
- 2) Independent variables:
  - `Inl_stud` - number of higher education students/total population (log);
  - `Inpodm_og` - number of business entities/total population (log);
  - `Inludnosc_poprod` - population at post-working age/total population (log);
  - `Inludnosc_pprod` - population at pre-working age/total population (log);
  - `Inwyd_wyn_urze` - expenditure on salaries of public officers/total population (log);
  - `Inwyd_gmin_adm` - expenditure of communes on administration/total population (log);
  - `Inwyd_poz_plac` - non-wage expenditure of communes/total population (log).

Table 1 shows descriptive statistics of variables included in the model.

The data analysis conducted by using a correlation coefficient showed the strong relations that occurred between particular variables. The strongest interrelation with the dependent variable had the following ratios: number of

business entities/total population (0.7928), population at post working age/total population (0.3607) and number of higher education students/total population (-0.3247), but in the last case the correlation was negative.

**Table 1.** Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min.	Max.
1. Innowo_zarejes	12.394	-4.611423	0.4060614	-6.784457	-0.2068736
2. InI_stud	24.622	-0.3384069	1.5155655	-7.184738	3.418671
3. Inpodm_og	27.248	-2.727968	0.3844043	-3.869826	-0.2732933
4. Inludnosc_poprod	27.248	7.226309	0.8093044	5.123964	12.86515
5. Inludnosc_pprod	27.204	-1.602767	0.4690802	-2.591457	-0.3192866
6. Inwyd_wyn_urze	14.866	5.220366	0.2998009	4.239679	7.276773
7. Inwyd_gmin_adm	19.817	5.669386	0.3623588	2.915838	8.186209
8. Inwyd_poz_plac	14.732	4.823158	0.4183566	-0.0549102	8.105982

Presented below, Table 2 shows correlation coefficients of variables included in the model.

**Table 2.** Correlation matrix

	1.	2.	3.	4.	5.	6.	7.	8.
1. Innowo_zarejes	1.0000							
2. InI_stud	-0.3247	1.0000						
3. Inpodm_og	0.7928	-0.4064	1.0000					
4. Inludnosc_poprod	0.3607	-0.4517	0.4595	1.0000				
5. Inludnosc_pprod	-0.0080	0.1365	-0.0936	-0.1144	1.0000			
6. Inwyd_wyn_urze	-0.1010	0.2218	-0.0544	-0.5085	0.0619	1.0000		
7. Inwyd_gmin_adm	-0.0881	0.1693	-0.0118	-0.4217	0.0100	0.8333	1.0000	
8. Inwyd_poz_plac	-0.0226	0.1271	0.0250	-0.3311	0.0036	0.6332	0.9081	1.0000

The strongest relationship between independent variables occurred in the case of the following pairs of variables: expenditure of communes for administration/total population and the non-wage expenditure of municipalities/total population (0.9081); expenditure on salaries of public officers/total population and expenditure of municipalities for administration/total population (0.8333); expenditure on salaries of public officers/total population and the non-wage expenditure of communes/total population (0.6332); population at post-working age/total population and expenditure on salaries of public officers/total population (-0.5085); number of business entities/total population and the population at post-working age/total population (0.4595); population at post-working age/total population and expenditure of communes on administration/total population (-0.4217); number of higher education students/total population and number of business entities/total population (-0.4064).

In the next step, the variables were used to estimate models that have the following algebraic characteristic:

1) models calculated based on observations for types of communes (urban, rural and urban-rural):

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \mu \dots\dots\dots (\text{Model 1})$$

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_gmin\_adm}) + \mu \dots\dots\dots (\text{Model 2})$$

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_poz\_plac}) + \mu \dots\dots\dots (\text{Model 3})$$

2) models calculated based on observations for urban communes:

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_gmin\_adm}) + \mu \dots\dots\dots (\text{Model 2.1})$$

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_poz\_plac}) + \mu \dots\dots\dots (\text{Model 3.1})$$

3) models calculated based on observations for rural communes:

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_gmin\_adm}) + \mu \dots\dots\dots (\text{Model 2.2})$$

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_poz\_plac}) + \mu \dots\dots\dots (\text{Model 3.2})$$

4) models calculated based on observations for urban-rural communes

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_gmin\_adm}) + \mu \dots\dots\dots (\text{Model 2.3})$$

$$\text{Innowo\_zarejes} = \beta_0 + \beta_1 (\text{Inl\_stud}) + \beta_2 (\text{Inpodm\_og}) + \beta_3 (\text{Inludnosc\_poprod}) + \beta_4 (\text{Inludnosc\_pprod}) + \beta_5 (\text{Inwyd\_wyn\_urze}) + \beta_6 (\text{Inwyd\_poz\_plac}) + \mu \dots\dots\dots (\text{Model 3.3})$$

Estimation of parameters in panels with a fixed effect was conducted using Stata 14 software. Detailed results of regression analysis are presented in the next part of this article.

## RESEARCH METHODS

Results of parameter estimation for particular models are presented in Table 3.

**Table 3.** Regression results

Independent variables	Model 1	Model 2	Model 2.1	Model 2.2	Model 2.3	Model 3	Model 3.1	Model 3.2	Model 3.3
lnI_stud	0.0281** (0.0107)	0.0281** (0.0107)	0.0531* (0.0237)	0.0319* (0.0148)	0.0012 (0.0183)	0.0281** (0.0108)	0.0534** (0.0238)	0.0323* (0.0149)	0.0000 (0.0184)
lnpodm_og	2.0484*** (0.0893)	2.0491*** (0.0893)	2.1980*** (0.3501)	2.0761*** (0.0881)	1.8798*** (0.1292)	2.0466*** (0.0899)	2.1933*** (0.3536)	2.0741*** (0.0885)	1.8731*** (0.1297)
lnludnosc_poprod	0.2218** (0.0815)	0.2225** (0.0815)	0.6209** (0.2262)	0.1044 (0.1050)	0.3702* (0.1601)	0.2146** (0.0821)	0.6244** (0.2265)	0.1014 (0.1059)	0.3393* (0.1594)
lnludnosc_pprod	-0.3512** (0.1167)	-0.3509** (0.1168)	0.0300 (0.2960)	-0.4379** (0.1465)	-0.2297 (0.2194)	-0.3521** (0.1181)	0.0279 (0.2993)	-0.4336** (0.1478)	-0.2524 (0.2183)
lnwyd_wyn_urze	-0.0684* (0.0345)	-0.0683 (0.0366)	-0.1720** (0.0820)	-0.0959* (0.0485)	0.0986 (0.0655)	-0.0715* (0.0354)	-0.1667* (0.0809)	-0.0950* (0.0461)	0.0827 (0.0652)
lnwyd_gmin_adm		-0.0004 (0.0157)	0.0186 (0.0317)	0.0018 (0.0215)	-0.0083 (0.0250)				
lnwyd_poz_plac						0.0007 (0.0092)	0.0186 (0.0171)	-0.0036 (0.0119)	0.0098 (0.0171)
Constant	-0.8725	-0.8724	-3.6540	0.2686	-3.2629	-0.8107	-3.7089	0.3150	-3.0959
N obs	12,329	12,321	1,514	7,793	2,989	12,204	1,504	7,726	2,949
N group	2,475	2,473	304	1,563	601	2,464	303	1,559	597
F	229.04	206.15	54.35	144.38	67.83	202.28	54.24	141.67	67.17
R <sup>2</sup>	0.2276	0.2276	0.4800	0.2009	0.2435	0.2270	0.4797	0.2001	0.2435

Robust standard errors in parentheses; \*\*\* p<0.001; \*\* p<0.01; \* p<0.05.

The authors presented the above 9 models. In models 1, 2 and 3 the research adopted 2475 observations for urban, rural and rural-urban communes. This number is smaller than the total number of communes in Poland, due to the fact that the calculations were made only on these units (communes), for which all data were available for the selected variables. Models 2.1, 3.1 took into account the 304 communes, models 2.2, 3.2, in turn, took into account the 1563 rural communities, while models 2.3 and 3.3 were calculated on 601 urban-rural communes.

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For all models, the authors calculated the F-Fischer-Snedecor statistics, as its calculated value indicates the correctness of the models' specification. The determination coefficients for all models ranged from 0.2001 to 0.4800, which indicates a relatively good fit of models.

In Model 1, the authors adopted the following independent variables: number of higher education students/total population, number of business entities/total population, population at post-working age/total population, population at pre-working age/total population, expenditure on salaries of public officers/total population. The strongest impact on the dependent variable was observed in the case of the following variables: number of business entities/total population (2.0484), population at pre-working age/total population (-0.3512), as well as population at post-working age/total population (0.2218).

In order to build Model 2 the authors took the same variables as in Model 1 and added one additional variable, i.e. expenditure of communes on administration/total population. In general, it does not affect the ratios for particular variables. The strongest impact occurred in the case of the following variables: number of business entities/total population (2.0491), population at pre-working age/total population (0.3509), population at post-working age/total population (0.2225). A newly-adopted variable was found as the one with a very small negative impact on the dependent variable (-0.0004).

Model 3 adopted the same explanatory variables as in Model 1 and one additional variable called non-wage expenditure of communes/total population. Also in this case, the particular ratios did not drastically change. The newly-added variable has an impact on the dependent variable to a limited extent (0.0007).

Model 2.1 was calculated only for urban communes and adopted the following explanatory variables: number of higher education students/total population, number of business entities/total population, population at post-working age/total population, population at pre-working age/total population, expenditure on salaries of public officers/total population and expenditure of communes on administration/total population. The strongest impact on dependent variable was observed in the case of the following ratios: number of business entities/total population (2.1980), population at post-working age/total population (0.6209), expenditure on salaries of public officers/total population (0.1720). The remaining variables had low importance.

In Model 3.1, the authors adopted the same variables as in Model 2.1, with the one exemption of variable called non-wage expenditure of communes/total population, which replaced the variable called expenditure

of communes on administration/total population. When it comes to ratios of particular variables, this replacement had not any significant importance. The variable called non-wage expenditure of communes/total population had low impact on the dependent variable (0.0186).

Model 2.2 was calculated only for rural communes and took into consideration the following explanatory variables: number of higher education students/total population, number of business entities/total population, population at post-working age/total population, population at pre-working age/total population, expenditure on salaries of public officers/total population and expenditure of communes on administration/total population. The strongest impact on explanatory variable had the following variables: number of business entities/total population (2.0761), population at pre-working age/total population (0.4379), population at post-working age/total population (0.1044), expenditure on salaries of public officers/total population (-0.0959). The other variables had very small importance.

In Model 3.1, the authors adopted the same variables as in Model 2.1, with the one exemption of the variable called non-wage expenditure of communes/total population, which replaced the variable called expenditure of communes on administration/total population. This change had no impact on ratios of particular variables. The variable called non-wage expenditure of communes/total population had a small impact on the dependent variable (-0.0036).

Model 2.2 was calculated for urban-rural communes and took into consideration the following explanatory variables: number of higher education students/total population, number of business entities/total population, population at post-working age/total population, population at pre-working age/total population, expenditure on salaries of public officers/total population and expenditure of communes on administration/total population. The strongest impact on the dependent variable was observed in the case of the following variables: number of business entities/total population (1.8798), population at post-working age/total population (0.3702), population at pre-working age/total population (-0.2297), expenditure on salaries of public officers/total population (0.0986). The remaining variables had small importance.

In Model 3.1, the authors adopted the same variables as in Model 2.1, with the one exemption of the variable called non-wage expenditure of communes/total population, which replaced the variable called expenditure of communes on administration/total population. When it comes to ratios of particular variables, this replacement had no significant importance. The variable called non-wage expenditure of communes/total population had a small impact on the dependent variable (0.0098).

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## DISCUSSION AND CONCLUSION

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Analysis of correlation relationships proved that in the case of all communes the dependent variable was impacted in a positive and strong way by the following variables: number of business entities/total population (0.7928) and population at post-working age/total population (0.3607). Strong, but negative impact on the variable called number of newly registered businesses was observed in the case of the variable number of higher education students/total population (0.3247).

Analysis of independent variables proved strong relationships between examined expenditure variables including: expenditure on salaries of public officers/total population, expenditure of communes on administration/total population and non-wage expenditure of communes/total population. As these relationships are not a surprise, what is interesting is the negative dependency between the variable called number of higher education students/total population and number of business entities/total population and population at post-working age/total population. Results of the examined dependency suggest that the smaller the number of students residing in the commune, the larger the number of business entities.

Regression analysis allowed the authors to draw very interesting conclusions. In the case of all analyzed communes, the largest impact on the dependent variable number of newly registered businesses had the variable called number of business entities/total population. In parallel, it deserves to be mentioned that the target impact was observed in the case of urban communes (2.1980), a bit smaller in rural communes (2.0761), and the smallest in urban-rural communes (1.8798).

The independent variable called population at post-working age/total population has the largest influence on the dependent variable in urban-rural communes (0.6209), slightly smaller in the case of urban-rural communes (0.3702), and smallest in relation to rural communes (0.1044). In turn, the variable called population at pre-working age/total population has greatest importance in rural communes (-0.4379), smaller in the urban-rural communes (-0.2297), and totally marginal in urban communes (0.0300). It is worth mentioning that in the case of municipalities the coefficient has a positive sign.

Finally, the variable called expenditure on salaries of public officers/total population had a strong impact on the dependent variable, when it comes to urban communes (-0.1720) and only a bit weaker in urban-rural communes (0.0986) and rural communes (-0.0959).

The conducted analysis in division on generic categories of communes revealed relatively significant differences in the influence of independent variables on the dependent variable, i.e. number of newly registered businesses/total population at working age. The variable population at pre-working age/total population has large importance in rural and urban-rural communes, whereas marginal in urban communes, where this ratio additionally occurs with a positive sign. The variable called expenditure on salaries of public officers/total population is the most significant in urban communes, has the smallest importance and additionally a positive sign in urban-rural communes, yet it has decidedly the smallest meaning in rural communes. The variable called number of higher education students/total population is the most important in urban communes, slightly less significance in rural communes and totally marginal importance in urban-rural communes.

The main objective of this article is to answer the question of whether the size of public administration at the local level (communal level), has a positive or a negative effect on the creation of new businesses. Analysis of the literature showed that the local government is undoubtedly the creator of enterprise development because it is endowed with attributes of power and implements the established rules into economic practice. There are various types of measures adopted, as a measure of the size of the public administration in general, including the size of the local administration. In the case of this article, there are three indicators adopted as a measure of the size of the public administration: 1) expenditure on salaries of public officers/total population; 2) expenditure of communes on administration/total population; 3) non-wage expenditure of communes/total population. The correlation analysis between adopted measures of the size of public administration did not show a strong relationship between them and the entrepreneurship that is represented in this model, as a number of newly registered businesses/total population at working age. The strongest relationship with the dependent variable was observed for the variable called expenditure on salaries of public officers/total population (-0.1010), a slightly smaller one with the variable called expenditure of communes on administration/total population (-0.0881), whereas it was marginal in the case of variable non-wage expenditure of communes/total population (-0.0226). Attention has to be drawn to an important and interesting fact – the correlation between dependent variable and all three explanatory variables is meager, but in all cases occurs with a negative sign, which indicates a limited (inconsiderable) but negative impact of local administration's size on the level of entrepreneurship.

Regression analysis allowed the authors to draw similar conclusions to those that were given in correlation analysis. The strongest impact on the entrepreneurship level is exerted by the variable called expenditure on salaries of public officers/total population. The remaining examined variables have limited importance; nevertheless the variable called non-wage expenditure of communes/total population has small positive relationships.

By varying the communes by the type, it can be determined that expenditure on salaries of public officers/total population shows the strongest impact on the dependent variable in urban communes (-0.1720), similarly but with opposite signs in the case of rural communes (-0.0959) and in urban-rural communes (0.0986). In urban-rural communes, increasing expenditure on salaries of public officers has a positive impact on the level of entrepreneurship.

Taking into consideration that the variable called expenditure of communes on administration/total population has a very small importance, it should be noted that in the case of urban communes (0.0186) and rural communes (0.0018) the ratios take positive signs but in the case of urban-rural communes a negative sign (-0.0083). This can testify that in the urban-rural communes in the structure of local budgets, the authorities should not increase this type of expenditure, if the self-government's priority is to increase the entrepreneurship level.

The variable called non-wage expenditure of communes/total population had a small impact on entrepreneurship. In the case of urban and urban-rural communes, the ratios were positive, at respectively (0.0186) and (0.0098), and when it comes to the value of this ratio in rural communes, it was equal to (-0.0036).

Based on the conducted research, the authors can state that there is a relationship between the size of local government administration and entrepreneurship. Broadly speaking, the increased size of the administration negatively affects entrepreneurship. The biggest impact on the number of new enterprises was observed in urban communes, where the variable called expenditure on salaries of public officers/total population relatively strongly influenced entrepreneurship. The correlation had a negative sign, suggesting that the increase in expenditure on salaries of public officers has a negative impact on the level of entrepreneurship. In the case of other variables presenting size of administration and remaining types of communes, the relationships were not as strong as in the case of the variable called expenditure on salaries of public officers/total population.

The presented research findings are an emanation of the dependence resulting from budgetary practice. Higher spending on salaries results in a higher value of current expenditure, and thus the higher their share

in total budget expenditure. The more the commune spent on current expenditure, the lower the level of capital expenditure (including current expenditure). The effect of higher current expenditure is lower than the level of capital expenditure, which could contribute to creating conditions for the development of entrepreneurship. In addition, the higher the level of current expenditure, the lower is the rate of free cash in the communes, i.e. capital that allows entities to engage in activities other than the current tasks (related to the implementation of tasks assigned to the commune in the statutory sense), i.e. investment activities.

There is one more issue that should be emphasized and was suggested by the results of the conducted calculations. Higher spending on wages can mean not only higher salaries for a smaller number of public officers, but also a larger number of officers themselves - and this may cause difficulties in determining the "owner" of individual tasks at the office, i.e. an indication of the structure of the office – official/officials or even investigators or departments that are responsible for policy supporting entrepreneurship. This is the cause of obfuscation in competence, which can be translated into both limited innovativeness in activities aimed at entrepreneurship's stimulation and their lower effectiveness. Lack of clear assignment of such tasks to a particular department (officer/group of officers) may cause two situations. Firstly, the task can be allocated to all officers that deal with any tasks from the "area of entrepreneurship" and the officials will be trying to solve the problem individually (some actions may be inconsistent or incompatible). Secondly, the task will not be clearly allocated to a particular investigator (department/official or group of officials), which causes a situation of their marginalization or displacement of priorities of its implementation.

Finally, taking into consideration the above arrangements it has to be stated that a large number of public officers corresponds with a complex structure of the office, which could result in, among other things, difficulties in the flow of information on the realized tasks, or the nature and forms of involvement in efforts to stimulate local economic development - between the public officers, investigators or even departments. This in turn may result in a lack of coordination in the support of entrepreneurship within the structures of the office and in effect lowers the effectiveness of support that is based on separate activities (often independent). This conclusion comes from practical experience. The specificity of Polish local government is development policy that is not very coordinated internally (and thus inconsistent). Efforts to create conditions to support entrepreneurship are often initiated in the structure of the offices in an independent way by various investigators and departments. As a result, the achieved effects are much smaller than the potential. A common problem is not only individualism of

actions, but the lack of their internal coherence combined with coordination that is concentrated on one center located in the decision-making structure of the office. An effect of this condition are the relatively rare decisions that are taken by communes and aimed to create comprehensive programs of entrepreneurship development, which should organize the policy of support in order, considering both instruments and those responsible for their implementation and monitoring investigators and departments. The showcase of such a communal “model” of policy supporting entrepreneurship are singular, activities aimed at entrepreneurship, problems in the flow of information within the structures of office, and unclear communication policy along the lines of: office – entrepreneur.

All of the above factors combined together make up the negative connotation of the relationship between the size of public administration at local government level and the local entrepreneurship. This article shows the multidimensionality and complexity of the examined phenomenon. This fact leads the authors to believe that the actions taken and individually implemented solutions to improve entrepreneurship will bring similar half-hearted results. In addition to the proven fact of negative dependency along the lines of: size of local government - entrepreneurship, it is also necessary to realize the true scale and diversity of the factors that make up the result of this relationship. Only if governments understand that, besides the obvious (shown in the results of this study) cause of a weaker development of entrepreneurship, which is the size of local government, has a much broader base, will it be possible to initiate effective action to stimulate new business initiatives. Reduction (and in the most optimistic minimum scenario - not growth) of the size of the administrative structure is thus a necessary condition, but not sufficient for building the foundations for a fully effective entrepreneurship stimulation.

### **Acknowledgements**

The article was prepared based on the results of a project that was financed from the funds of the National Science Centre given by decision number DEC-2013/11/B/HS4/01022.

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### **Abstract (in Polish)**

Niniejszy artykuł przyjmuje za cel zbadanie zależności pomiędzy rozmiarem administracji publicznej szczebla lokalnego, a poziomem przedsiębiorczości w poddanych badaniu jednostkach samorządu gminnego w Polsce. Opracowanie stanowi próbę odpowiedzi na pytanie, czy rozmiar administracji samorządowej ma charakter stymulacyjny, czy destymulacyjny w procesie zakładania działalności gospodarczej. Innymi słowy, czy rozmiar administracji publicznej na szczeblu lokalnym (gminnym), wpływa pozytywnie, czy negatywnie na tworzenie nowych podmiotów gospodarczych. Podjęte w artykule zagadnienie jest istotne co najmniej z kilku powodów. Po pierwsze, obecny dorobek naukowy nie obfituje w publikacje łączące przedsiębiorczość z rozmiarami administracji samorządowej. Po drugie, zagadnienie determinant przedsiębiorczości, stanowi wciąż aktualny i nie w pełni zbadany (wyjaśniony), aspekt rozwoju lokalnych gospodarek. Finalnie, po trzecie, autorzy w ramach niniejszego tekstu proponują autorskie podejście do kwantyfikacji rozmiaru administracji samorządowej, modyfikując stosowane powszechnie miary lokalnej administracji publicznej. Mając na uwadze przytoczoną argumentację, niniejszy artykuł nie tylko wpisuje się w wyja-

*śnianie „zjawiska” przedsiębiorczości i jego determinant, ale również przyczynia się do budowania wiedzy o zależnościach pomiędzy rozmiarem samorządu lokalnego a poziomem przedsiębiorczości. Artykuł wypełnia tym samym lukę w aktualnym podejściu do badań nad związkiem na linii: przedsiębiorczość – rozmiar administracji samorządowej. Rozszerza on zasób wiedzy o analizowanych zależnościach i reorientuje dotychczasowe podejścia do badań, z efektów działania władz publicznych służących wspieraniu inicjatyw gospodarczych, na rozmiar administracji samorządowej jako czynnik wpływający na poziom przedsiębiorczości.*

**Słowa kluczowe:** samorząd terytorialny; lokalna administracja publiczna; administracja samorządowa; rozmiar samorządu lokalnego; przedsiębiorczość; nowozakładane podmioty gospodarcze.

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# Entrepreneurial Tournaments: Towards Disclosing the Rivalry Process Among Corporate Entrepreneurs

*Mohammad Zarei<sup>1</sup>*

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## **Abstract**

*The notions and motivations of inter-organisational rivalries among employees have to some extent been highlighted by classical theories of management such as tournament theory. However, employees' and entrepreneurs' competitions are fundamentally different in pattern. Based on the doctrine of entrepreneurship, entrepreneurial competitions are essential for a productive economy. Even so, there have been few in-depth holistic attempts to understand the rivalry process among corporate entrepreneurs. During the last three decades, various fragmented studies have been conducted from different standpoints to clarify the process of corporate entrepreneurship (CE). Nevertheless, considerable room remains for developing a model of the rivalry process with respect to entrepreneurial activities within large and complex organisations. Hence, the main contribution of the research can be claimed as investigating and formulating the rivalry process. For this purpose, a systematic qualitative grounded theory methodology (GTM) was used. During a five-month period, corporate entrepreneurs from one of the chief Iranian research institutes were systematically interviewed. Based on the research results, in addition to endorsing the existence of such a rivalry process among corporate entrepreneurs, the GTM model extends the literature of CE by examining the previously unaddressed part of the process, i.e., disclosing the corporate entrepreneurs' implemented strategies, among other blocks of the theory.*

**Keywords:** *corporate entrepreneurship; entrepreneurial competition; entrepreneurial tournaments; tournament theory; grounded theory methodology.*

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## **INTRODUCTION**

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Launching an array of strategies to exploit individuals' intangible assets, or so-called *human capital*, has been a bottleneck for enterprises. A rich human capital is related to generating further value (Prajogo & Oke, 2016)

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and furthermore, it is vital for sustainable competitive advantage (Haanes & Fjeldstad, 2000; Hall, 1993; Pearson, Pitfield & Ryley, 2015; Petrick, Scherer, Brodzinski & Quinn, 1999). In this regard, stimulating corporate entrepreneurship (CE) is recommended as an important goal (Covin & Miles, 1999; Teng, 2007), for which the first step is to understand how the entrepreneurial process functions.

Highlighting the entrepreneurial process is vital since firstly, economic ideologies claim that the market, as the heart of the economy, is governed by chains of *cause* and *effect*, which are moderated by entrepreneurs, and as a result, entrepreneurial behaviours should be carefully studied (Kirzner, 2017). Secondly, almost half of all entrepreneurial initiatives are doomed to failure. Monk (2000) pointed out that, within the first five years, the failure rates among USA businesses with five or fewer employees and with five to 99 employees were 68% and 48%, respectively. Therefore, scrutinising the entrepreneurial process with the aim of diagnosing impediments to progress and creating fruitful entrepreneurial ventures, is crucial.

Due to the above-mentioned necessities, corporate entrepreneurs' behaviours and processes have been examined in various ways over the last decades. Some of these initiatives are briefly discussed as follows. As one of the pioneers in understanding the process, Burgelman (1983) integrated the literature on entrepreneurship in organisations from a strategic viewpoint and provided a conceptual integration of CE. The study drew attention to the main prerequisites for fruitful CE, such as organisational structure and learning. In another attempt, McFadzean, O'Loughlin, and Shaw (2005) tried to synthesise the information gathered from previous literature using a holistic approach, in search of a clarification of the connections between corporate entrepreneurial activity and the innovation process. The research led to the development of a framework, based on which corporate entrepreneurs were considered to be in mutual relationships with three principal variables: strategic, external and internal variables. Among the internal variables, several factors are considered, for example: personal fitness, knowledge and experience, opportunity, initial encouragement, need for reassignment and change, resources, planning horizons, support and so on. Hayton (2005), in pursuit of a theoretical explanation for the effect of HRM in providing a proper atmosphere for emerging CE, developed two interdependent themes: encouragement of discretionary entrepreneurial contributions and acceptance of risk. CE has also been investigated in the governmental sector. For instance, Kearney, Hisrich, and Roche (2007), by developing a model of CE within the public sector, suggest that corporate entrepreneurs' characteristics such as innovation, risk-taking and proactivity are influenced by two leading surrounding environments: external and organisational contexts. In addition,

the roles of some components have been emphasised as important for encouraging fruitful CE, for example: the political component, complexity, control, rewards and motivations and so forth. Kuratko (2007), by proposing an extensive model of CE shows how the process of CE functions, including external triggers, strategies, organisational factors, managerial factors, individual elements, outcomes and consequences. Salary increases and promotions, for instance, are mentioned as the managerial outcomes of the process.

Knowledge of CE is to some extent fragmented, and despite our expanding awareness of CE (Ireland, Covin & Kuratko, 2009), holistic studies with a focus on the connection between the divided parts may provide ways to assemble the fragments; for this reason, researchers have lately attempted studies of entrepreneurship using a process approach, (e.g., De Lurdes Calisto & Sarkar, 2017; Mavi, Mavi & Goh, 2017). However, none of the above-mentioned models or studies has considered how corporate entrepreneurs within an organisation compete with one another.

The current research presumes that despite the existence of competition amongst corporate entrepreneurs in an organisation, such entrepreneurial competitions or tournaments have not been maturely defined or investigated; they have merely been mentioned by a few authors, (e.g., Low, Venkataraman & Srivatsan, 1994).

It is generally assumed that competition occurs to obtain resources (Barney, 2001; Chapman & Valenta, 2015; Dierickx & Cool, 1989; Koenig, 2002; Milinski & Parker, 1991; Rodrigues, Duncan, Clemente, Moya-Laraño & Magalhães, 2016), and especially to obtain scarce or valuable resources (Barney, 2001). A number of authors have investigated competition among employees, (e.g., Haan, Offerman & Sloof, 2015; Lazear, 1989; Van Ours & Ridder, 1995), and as a result, the motivational factors in such competitions have been revealed: for instance, winning prizes. In this regard, Gill and Prowse (2014) found that competition in a promoted tournament for winning a prize is a ubiquitous phenomenon in the labour market. Delfgaauw, Dur, Sol and Verbeke (2013), by observing 128 Dutch retail chain stores, deduced that conducting a sales competition among employees has a significant effect on sales growth, and that employees are not motivated only by the aim of gaining more rewards, but also, by winning the competition, as predicted by so-called tournament theory. Lazear and Rosen (1981) in the early 1980s coined the term “tournament theory” in the context of labour microeconomics. The theory was advanced for the purposes of illuminating the differences between individuals’ wages and marginal productivity. Based on the theory, employees of an organisation at the same level participate in competitions or tournaments for promotion, and they engage in a rivalry

process to further their career. At the end of each tournament there will be only one winner, who will be greatly rewarded – the so-called *winner-takes-all* outcome. Although there will be only one winner, interestingly, other employees enthusiastically engage in the tournaments.

On the one hand, the theory does not offer further explanation about the rivalry process amongst employees (Azevedo, Akdere & Larson, 2013). On the other hand, there are unique dissimilarities between employees and corporate entrepreneurs or even between one corporate entrepreneur and another. Zahra and Covin (1995) and Zahra (1993) have comprehensively considered these differences. Apart from the above-mentioned issues, academics still hope to generate a general theory of entrepreneurial competition by conducting further research to examine the entrepreneurs' strategies and their consequences (Miles, Paul & Wilhite, 2003).

Takii (2009) argues that because entrepreneurs simultaneously recognise similar opportunities, they constantly find themselves in a *dynamic competition* based on grasping those opportunities. Current research with a multidisciplinary approach goes further and applies tournament theory to CE, assuming that corporate entrepreneurs in an organisation participate in a series of rivalry tournaments, in a similar way to the employees. The rivalry tournaments between corporate entrepreneurs in an organisation are triggered by a combination of organisational and personal requirements. In addition, the research supposes that at the end of each entrepreneurial tournament there will be just one winner, a corporate entrepreneur who will be highly compensated and probably given an opportunity for promotion.

If the above-mentioned hypotheses are accurate, we still know little about the process of entrepreneurial tournaments, and even less about the strategies that are applied by corporate entrepreneurs to win these tournaments. Thus, the four main hypotheses of this research are presented as follows:

- 1) What factors trigger entrepreneurial tournaments within an organisation?
- 2) Secondly, what factors affect the processes of entrepreneurial tournaments?
- 3) Thirdly, what strategies are used by corporate entrepreneurs to win entrepreneurial tournaments?
- 4) Fourthly, what are the outcomes and the advantages and disadvantages of participating in entrepreneurial tournaments?

The remaining sections of the paper are organised as follows: First, the literature on the concept of entrepreneurship is reviewed together with the literature from which the notion of CE and its elements is derived. Second, tournament theory is discussed as the theoretical foundation of the study and its aims, and entrepreneurial tournaments are illustrated. Third,

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statistical populations and the method of gathering data are explained in the methodology section. In the final section, the results and their implications are presented.

## LITERATURE REVIEW

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### Entrepreneurship

While the term “entrepreneurship” was coined for the first time by Richard Cantillon, the concept itself is as old as the first trading between tribes and villages, going back more than 250 years ago (Austin, Stevenson & Wei-Skillern, 2006). Klein and Bullock (2006) argue that entrepreneurship is theoretically rooted in the theory of economic development proposed by Schumpeter (1911; 1939), the explanations of profit and the firm given by Knight (1921), the market process discussed by Kirzner (1973; 1979; 1992) and the theory of technological adoption and diffusion proposed by Schultz (1975; 1979; 1982). In one sense, entrepreneurship is seen as the respected heritage of the Austrian school of economics, which emphasised the study of the actions of individuals. Based on this school of thought, the market is a dynamic process that is determined by entrepreneurs. Kuratko (2005) defines the term as a dynamic process of vision, change and creation, which requires passion and energy in the direction of creating and implementing new ideas. Furthermore, an entrepreneur accepts risk, needs to think creatively and requires a sufficiency of resources and an efficient mechanism for recognising opportunities. In fact, despite the general idea that entrepreneurship is all about launching a new enterprise, entrepreneurship is actually about “creating value” via a systematic process that is often misunderstood. Therefore, it can be studied in terms of various themes, for instance: social entrepreneurship (Austin, Stevenson & Wei-Skillern, 2006; Zarei, Zarei & Ghapanchi, 2017), SME entrepreneurship (Liñán & Chen, 2009; Zarei, Jamalian & Ghasemi, 2017), international entrepreneurship (McDougall, 1989), governmental entrepreneurship (Purwaningsih, 2015), high-tech entrepreneurship (Zarei, Mohammadian & Ghasemi, 2016; Zhou & Peng, 2008) and last but not least, corporate entrepreneurship (Kuratko, Hornsby, Naffziger & Montagno, 1993; Shepherd, Covin & Kuratko, 2009; Zahra, 1991).

### Corporate entrepreneurship (CE)

From time to time, CE is expressed as organisational venturing. It was terminologically defined in the middle of the 1990s (Sharma & Chrisman, 1999). CE is generally defined as the activities that an established enterprise

(Douglas & Fitzsimmons, 2013; Zahra, 2015) undertakes to enhance the organisation's production, innovation, risk-taking and proactive response to environmental forces (Castrogiovanni, Urbano & Loras, 2011), and hence, CE can be seen as a series of initiatives undertaken in order to capture a unique business opportunity (Miles, Paul & Wilhite, 2003). Nowadays, the vital role of corporate entrepreneurs during the process of CE is widely recognised (Zahra & Covin, 1995), and as a result entrepreneurial behaviours are promoted in organisations, as well (Antoncic & Hisrich, 2001; Hornsby, Kuratko & Zahra, 2002).

A corporate entrepreneur is an individual who has engaged in distinguished and remarkable enterprises, such as: improving the financial performance of an organisation, renovating activities, enhancing organisational change, taking risk, innovating throughout the organisation, acting competitively, recognising opportunities, chasing new products or markets (Zahra & Covin, 1995; Zahra, 1993), creating new businesses, reformulating strategies (Zahra, 1993) and strategic renewal (Dess & Lumpkin, 2005). The two main criteria for distinguishing corporate entrepreneurs are established entrepreneurial intention (EI), and entrepreneurial orientation (EO).

### **Entrepreneurial intention (EI)**

The Global Entrepreneurship Monitor (GEM) defines EI as the percentage of individuals who expect to start businesses within the next three years (Amoros & Bosma, 2013). Douglas and Fitzsimmons (2013) argue that the EI of corporate entrepreneurs is to some extent different from other kinds. Accordingly, it would be more precise if the intentions of corporate entrepreneurs were separately investigated. It is notable that the self-reliance of corporate entrepreneurs also differs from that of other types of entrepreneurs. In this regard, corporate entrepreneurs are eager to accept direction and guidance from their superintendents, but SME entrepreneurs tend to be more self-reliant.

### **Entrepreneurial orientation (EO)**

Many authors believe that EO has become a central concept in the domain of entrepreneurship. Thus, EO can be seen as a key issue for a firm's success and as having a positive impact on the firm's performance (Anderson & Eshima, 2013; Wang, 2008; Wiklund & Shepherd, 2003; 2005). Lumpkin and Dess (2001) define EO as the process of strategy-making. Anderson and Eshima (2013) refer to EO as a behavioural tendency and a strategic decision-making practice. Two fundamental dimensions that characterise EO are: i) aggressive

behaviour toward competitors and ii) proactive responses to the marketplace (Zarei, Alambeigi, Zarei & Karimi, 2017).

### **Defining an entrepreneurial tournament**

Since the main aim of the research is to formulate the rivalry process among corporate entrepreneurs by focusing on inter-organisational tournaments, it is necessary to have a clear image of an entrepreneurial tournament based on the literature. However, a complete definition of a “corporate entrepreneurial tournament” is one of the outputs of the research. Consequently, in this section, the nature of entrepreneurial competitions and entrepreneurial tournaments will be briefly discussed.

### **Entrepreneurial competitions**

Haanes and Fjeldstad (2000) discuss three levels of resource competitions: i) entrepreneurial competition, ii) contractual-level competition and iii) operational competition. In the first level of competition some qualities are desirable and need to be acquired by entrepreneurs, for instance, know-how in basic technology, the ability to learn from ongoing projects, the ability and willingness to experiment and the ability to solve new problems and come up with innovative solutions. Schumpeter (1934) discusses the fact that entrepreneurial competitions combine resources in a new way. Kling (2010, p. 70) points out that the majority of economic progress comes from entrepreneurial competitions. Thus, entrepreneurial competitions are necessary for a dynamic and productive industry. Miles, Paul and Wilhite (2003), by debating Baumol’s (1990) idea of entrepreneurial competition, argue that the theory of entrepreneurial competition is fundamentally distinguished from the theory of price competition, since the output from an entrepreneurial competition is the introduction of a new product, process or organisational form – with the aim of enhancing the probability of creating and capturing value. In the entrepreneurship literature, competition refers to a contest among entrepreneurs; however, the notion of inter-organisational competition between corporate entrepreneurs has been neglected.

### **Entrepreneurial tournaments**

There is no mature definition for the term “entrepreneurial tournament”. Nevertheless, the term has been partially quoted by a small number of authors during the past 20 years, (e.g., Christensen, Ulhøi & Madsen, 2000; Gattiker & Ulhøi, 2000; Kling, 2010; Low, Venkataraman & Srivatsan, 1994), though not in a systematic manner or with a specific intent. For instance,

Low, Venkataraman and Srivatsan (1994) tried to enhance the classroom experience of entrepreneurship using solid theory. The research aimed to investigate the usefulness of an entrepreneurial game for both research and teaching. The authors found that similar opportunities are simultaneously identified by different entrepreneurs and, since one successful result tends to bring about another, so other entrepreneurs are deprived of access to resources. As a result, there is a continuous dynamic competition amongst entrepreneurs to increase revenue and obtain resources. In other words, entrepreneurship seems to be a continual *competitive tournament*. Gattiker and Ulhøi (2000) believe that an adequate network is a requirement for obtaining secure resources within an *entrepreneurial tournament*. Kling (2010, p. 69) argues that both power and wealth are involved in *winner-takes-all tournaments*, because, based on the theory, a small difference in performance results in a large difference in reward, especially within an ecosystem where there are few valuable positions and the best player achieves the most outstanding success.

### **Tournament theory**

Since the aims of this study were initially established based on the principles of tournament theory, the theory is briefly presented here.

In tournament theory, the single criterion of the *compensation principle* – similar to operative performance – cannot by itself describe executives' levels of pay. Describing this phenomenon was problematic for both classical and neoclassical economists. In fact, such strategic compensation behaviours derive from several paradigms and theories, for instance: marginal productivity theory, agency theory, human capital theory, institutional theory and, last but not least, tournament theory (Gomez-Mejia, Berrone & Franco-Santos, 2015, p. 120). Why a CEO is so highly paid in comparison with other employees was a question that attracted the attention of labour economists, and as a result, after some investigation, Lazear and Rosen (1981) introduced the concept of tournament theory. The theory presumes that an organisation's employees, at the same rank, could be seen as rivals who compete with each other for promotion. The winner of the competition or tournament will perhaps be chosen as the next CEO of the organisation. Furthermore, the theory supposes that employees could be further motivated by greater rewards. Therefore, the organisation tries to create incentives (DeVaro, 2006). The winner of the tournament will be rewarded and her/his efforts during the tournament will be compensated, depending on the profit that she/he has generated for the organisation. Assigning a higher prize motivates employees to engage in the tournament more eagerly and to struggle more enthusiastically. In this regard,

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Eriksson (1999) submitted the theory to experimental testing by analysing 2,600 Danish executives. The research endorses the prediction of the theory in terms of the existence of a positive relationship between the tournament's prize and the number of participants. Not always, but commonly, a very high reward is considered to be one of the main drivers of winning a tournament. However, the theory offers no further explanation of the rivalry process (Azevedo, Akdere & Larson, 2013), and this is the aspect that the current research tries to address by focusing on corporate entrepreneurs.

## RESEARCH METHOD

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The scope of the research was restricted to the individual level, and neither teams nor departments were considered. A qualitative methodology was chosen for addressing the aims of the research. In the current research, Strauss and Corbin's (1990) version of grounded theory (GT) is used. During the 1960s Glaser and Strauss (1967) introduced the grounded theory methodology (GTM) as a response to the need for developing a systematic procedure for exploring phenomena in the domain of sociology. Urquhart and Fernández (2013) allude to different points of view adopted by Glaser (1992) and Strauss and Corbin (1990) concerning the coding paradigm and line-by-line coding procedures, which resulted in different versions of the method. The GTM examines individuals' experiences and knowledge of a *process* with the aim of generating theory and providing a rational explanation of the process. The data in the GTM are commonly gathered by conducting interviews, via phone calls, online or face-to-face. The GTM is not commonly considered as a methodology for developing existing theories or opinions, due to the fact that the GTM tries to generate a novel theory from the grounded data. It is notable that in the current research, tournament theory has been used to develop hypotheses, not to form the theory. In addition, tournament theory offers no explanation at all for the rivalry process.

The GTM starts with asking broad-spectrum general queries of the statistical population, about the process that is being investigated. The statistical sample consists of individuals who have been recognised as appropriate for the aim of the research as they have experienced the processes and phenomena involved. The interviews are followed by open-ended questions and, based on the GTM approach, questioning should be continued until *saturation* is reached, e.g., a degree of knowledge about the phenomenon such that no new content or categories are generated by conducting more interviews (Bowen, 2008). Depending on the complexity of

the process, saturation can be achieved at the 25<sup>th</sup> interview or thereafter. In the present study, theoretical saturation was achieved at the 32<sup>nd</sup> interview.

The content of the questions should be around the key issue and its related subjects. For instance, asking questions aimed at identifying the elements that have led to the emergence of the phenomenon – *core phenomenon*, investigating how and why the process is influenced – *causal conditions*, what actions have been taken by participants to deal with the situation – *strategy*, or even scrutinising the outcomes from implementing the strategies – *consequences*. The complete list of the categories that should be closely considered is known as the *6C coding family* and/or the *blocks of theory*. These categories are presented as follows: i) causal conditions, ii) phenomenon, iii) context, iv) intervening conditions, v) strategies, and vi) consequences. In the next step, the gathered data are analysed through three rounds of coding: i) open coding, ii) axial coding and iii) selective coding.

During the research, when a new dimension of the phenomenon was revealed, the corporate entrepreneurs were sometimes interviewed more than twice. In this study, each entrepreneur was interviewed at least twice. These interviews were conducted over a five-month period using face-to-face interviews, phone calls and if necessary, emails. During the study period two research assistants facilitated the questioning procedure, which was also an efficient strategy for tackling possible *biases*. At the primary interviews and for the warm-up phase of the discussions, general questions were asked, such as: interviewees' names, ages, positions, education, conducted strategies, detailed explanation of each tournament and so on. Semi-structured interviews were undertaken in accordance with Zorn (cited in Johnstone, 2007, p. 110). Each single interview lasted about 40-60 minutes. No specific software was used but all the interviews were recorded and then typed and dated in a booklet, labelled with each participant's name. Eventually, the gathered data were entered into an Excel file to be later categorised based on the steps of the GTM.

### **Statistical population**

For the aim of investigating and formulating the rivalry process between corporate entrepreneurs by using GTM, a corporation with some specific features should be investigated. Firstly, research on CE should be conducted within corporations, large firms or big business. Simply, a corporation can be defined as a legal entity that is officially registered by the government and includes groups of relationships and resources, with the main purpose of creating value for its stakeholders. However, in the context of CE, a corporation is defined as an organisation with more than 500 employees,

although the number may change from country to county. Secondly, corporate entrepreneurs should be chosen who have experienced the rivalry process. In addition, they must be available to be interviewed during the various rounds of the GTM. After a series of close consultations with two associate professors of CE at the Faculty of Entrepreneurship, University of Tehran, it was decided that the research should be conducted at the Iran Telecommunication Research Center (ITRC). The centre is nationally known as one of the oldest, as well as the most up-to-date Iranian research institutions, established in 1970 through a treaty between the governments of Iran and Japan (“About ITRC”, 2017). The centre is among the main advisors of the Ministry of ICT in terms of ICT governance in the country. The majority of the centre’s duties are performed as research-based projects, and the centre has also launched several ICT-based products. The centre has more than 600 employees. Based on the employees’ capabilities, promotion can occur at any time, and guidelines for rewarding employees’ and for compensation are clear. These features are considered to be crucial for this research. Accordingly, two departments of the ITRC with a background of entrepreneurship and strategy were chosen: the Department of Business and Entrepreneurship and the Department of Strategy. Before conducting interviews, a sample consisting of 16 corporate entrepreneurs was identified, using the characteristics of corporate entrepreneurs described by Zahra and Covin (1995).

**Table 1.** Statistical population (list of interviewees)

Interviewees	Educations	Ages
Senior Market Analyser	M.Sc. of Industrial Engineering	27
Chief Technology Researcher	Ph.D. of Industrial Engineering	32
Chief Information Technology Officer	Ph.D. of Information Technology	30
Business System Analyst	M.Sc. of Economics	32
Assistant HR Manager	Ph.D. of Information Technology	29
Attorney	M.Sc. of Law	28
Systems Analyst	M.Sc. of Electronic	28
Senior Security Specialist	Ph.D. of Applied Mathematics	32
Senior Network Engineer	Ph.D. of Electronic	28
Market Access Analyst	Master of Business Administration	43
Business Analyst	Ph.D. of Economics	27
Research and Development Associate	M.Sc. of Management	27
Research and Development Associate	Ph.D. of Management	28
Employee Relations Manager	Ms. of Information Technology	34
Senior Network Engineer	Ph.D. of Wireless Communication	32
Process Research Manager	M.Sc. of Technology Management	28

Of these, 19% were women and 81% men, and their educational levels could be categorised as PhD holders, MSc holders and others, at 50%, 44% and 6%, respectively.

## Analysis (the coding paradigm of GTM)

Based on the GTM the data gathered from interviews should be analysed via three different rounds of coding. Corbin and Strauss (1990) introduced these levels of coding as: open coding, axial coding, and selective coding, and Charmaz (1990) named the whole process “*theory generation*”.

### Open coding

As a rule, during open coding a bunch of text is encircled and then labelled. Following the procedures of GTM, the typed texts should be labelled sentence by sentence. In this research, open coding involved extracting 3416 labels, and 488 categories. In this level, the term “categories” refers to a combination of labels. This is demanding work but inspires the most original ideas. In addition, by using open coding, researchers are released from probable bias (Corbin & Strauss, 1990). Continuous comparative analysis should be performed in this level to ensure consistency in the data, and in the methods by which the data are categorised. For example, during open coding when new content is revealed which is not consistent with other categories, this may be an indication that it should be categorised under a new label.

When choosing the names of the labels and categorising them using an appropriate approach, the names of categories should make sense. Examples of categories used in this research are *entrepreneurial intellectuality of experience*, *alertness* and *heuristics*. For example, during the interviews a corporate entrepreneur argued that: “...by running my own business, co-operating with European researchers and working for several firms, I have learnt to take lessons from experiences and hence I do my best to make good use of those experiences, because I have nothing to lose...”.

In this regard, and in the context of entrepreneurship, Akanda (2015) refers to the above-mentioned quotation as “entrepreneurial intellectuality of experience”.

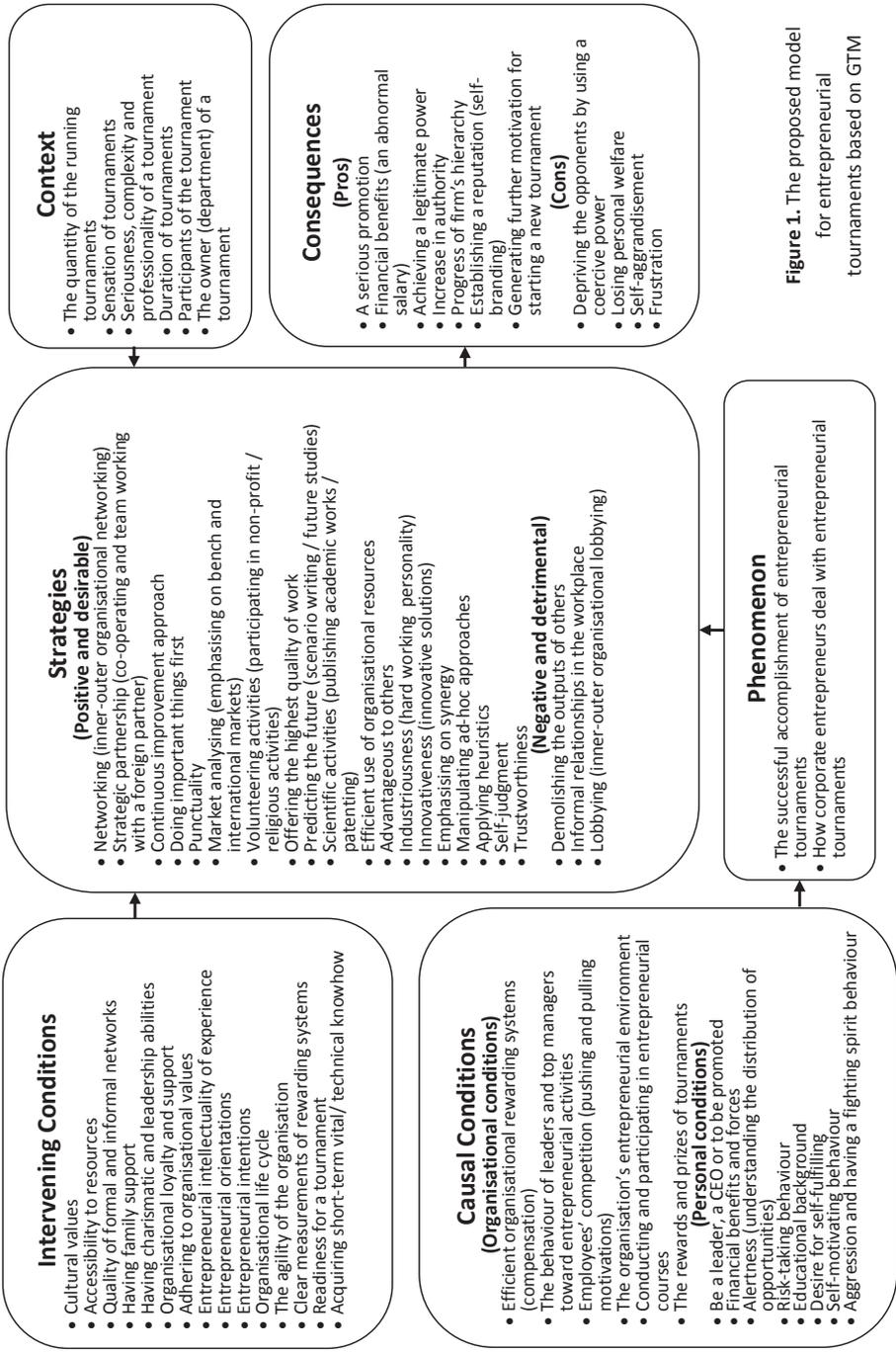
Alternatively, with regard to a Senior Market Analyser’s statement: “... you know, IoT and cloud [the terms referred to the Internet of Things and Cloud Computing] are being cited as breakthroughs in the world of ICT, I’ve never seen such a high potential tech [technology], it’s really fascinating, Gartner says [an international research company] around nine billion things [connected things such as smart phones with unique internet protocols] are going to be connected [to the web] by 2020, the agenda [The agenda for the connected world] is so close to happening, so this would be a big deal and I’m going to size them up even if it seems too far to achieve.....by the way, I have a keen eye for such things...”, it is clear that this content refers to “alertness”.

After labelling a large quantity of raw qualitative data and by extracting reflective notes – *memoing* – the core categories should become apparent. In addition, by observing the memos, the researchers must think about the possible ways that these memos can explain the process under investigation. Finally, after reading the manuscripts from the interviews several times, the open coding is considered complete if there are no new categories.

### **Axial coding**

The second round of the coding procedure is known as axial coding. In this level of coding the probable relationships among the categories which have emerged from the open coding are carefully considered. The main approach, for accomplishing axial coding, uses a paradigm known as the “*coding paradigm*”. The coding paradigm has various versions, but the current research follows Strauss and Corbin’s (1990) version. Based on this, the following terms are defined:

- *Causal conditions*: this refers to the factors that have influenced the central phenomenon, for instance, the triggers which have led to the emergence of an entrepreneurial tournament within an organization. The causal conditions are factors such as an efficient organisational reward system or the rewards given to the winners of tournaments.
- *Phenomenon*: this refers to the leading idea and the main process that the research aims to describe. This is the phenomenon which strategies have later been developed to deal with. In this case it will be the process by which a corporate entrepreneur has been successful in an entrepreneurial tournament.
- *Context*: this block alludes to the location of the event and its features such as the duration of the tournament or its participants.
- *Action/interaction strategies*: the perfect process requires implementation of a set of efficient strategies, which are utilised by corporate entrepreneurs, for instance, establishing an informal network or manipulating heuristic knowledge to win the tournament.
- *Intervening conditions*: Strauss and Corbin (1990) state that intervening conditions are commonly known as factors that have simplified or constrained the adopted strategies within the context, for instance cultural values or organisational life cycle.
- *Consequences*: consequences are outcomes of the applied strategies, for instance, achieving a legitimate power or an exceptional salary.
- Furthermore, the way the above-mentioned factors influence each other should be investigated. In this level, diagramming can be utilised as the best solution. Lines in the shape of arrows aid the researcher in deducing relationships. In fact, this method is suitable for explaining how the process works. The extracted model is presented in Figure 1.



**Figure 1.** The proposed model for entrepreneurial tournaments based on GTM

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### Selective coding

At the final level of the GTM, all the categories should be unified around a central phenomenon that is known as the “*core category*”. The core category represents the central phenomenon of the study (Strauss & Corbin, 1990). Around the core category a storyline is developed, which is supported by strategies for accomplishing success in the tournament, and other blocks of theory. At this stage, there is no visualisation or diagramming, only a *storyline*. At the selective coding stage, the whole story together with the main storyline of the phenomenon should be developed, as an overall explanation of the generated theory. The storyline is a paragraph of interpretation about the generated theory that explains how the core process really functions. In this research, the core category is defined as “the successful accomplishment of entrepreneurial tournaments” and provides sufficient interpretation of how corporate entrepreneurs in an organisation have accomplished the process. The storyline is presented in the results section.

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## RESULTS

Based on the grounded data and on the rounds of coding, the generated theory of so-called “corporate entrepreneurial tournaments”, following the protocol of the storyline, is explained as follows:

A corporate entrepreneurial tournament is a dynamic rivalry process amongst corporate entrepreneurs in an organisation. Such tournaments are triggered by a combination of organisational and personal factors. The organisational factors are related to the motivational mechanisms of the organisation such as compensation and reward systems and the personal factors are based on the corporate entrepreneurs’ entrepreneurial behaviours. To achieve success in an entrepreneurial tournament, and to benefit from its rewards, is the leading motivation for entrepreneurs to participate in such tournaments. This achievement of success requires effective strategies. It does not matter if the adopted strategies are ipso facto detrimental or desirable; the strategies have only to be efficient. Furthermore, the adopted strategies are affected by the intervening conditions and by the context of each tournament. In this regard, the intervening conditions do not necessarily remain constant between each tournament, though they do not usually change during a given tournament. Examples of these conditions are cultural values, the agility of the organisation, the organisational life cycle and so on. In addition, the features of the context in which a tournament emerges affect the strategies, for instance the duration, participants and sensation of the tournament. Eventually, at the end of a corporate entrepreneurial tournament, there will be only one winner, who will be significantly rewarded. However,

the consequences of winning a tournament are not always favourable. In fact, winning a corporate entrepreneurial tournament has its own advantages and disadvantages, for example: obtaining a significant promotion, a significant increase in salary or abusing the illegitimate power obtained.

The model extracted from the GTM depicting the details of the blocks of the theory is presented in Figure 1.

The reliability of the theory was considered in different ways. Firstly, the synthesised data was restricted to corporate entrepreneurs who have achieved success at least once in an entrepreneurial tournament. Secondly, to prevent bias, two research assistants were involved in the research, and both were completely aware of the theme of the research and the concepts of CE. Finally, those corporate entrepreneurs who participated in the research reviewed the generated model to see if it was consistent with the given statements.

## DISCUSSION AND CONCLUSION

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The grounded model developed in the research is to a great extent consistent with the literature of CE, for instance with McFadzean, O'Loughlin and Shaw's (2005) model. However, these authors considered neither how the decision to act entrepreneurially is made, nor what strategies are used by corporate entrepreneurs to improve the performance of the corporation. The GTM model depicts that participating and accomplishing an entrepreneurial tournaments, entrepreneurial decisions, and applied strategies within entrepreneurial tournaments are highly affected by intervening and causal condition. This subject was not clearly investigated in previous CE models. In this regard, the model shows that to accelerate and facilitate entrepreneurial decisions, the managers can emphasise on providing better organisational conditions (e.g. establishing an efficient organisational rewarding system, holding entrepreneurial courses and so on), and personal conditions (e.g. alertness, risk-taking behaviour etc), despite the fact that some of the personal conditions like alertness cannot change, at least at the moment.

Alternatively, in Kuratko's (2007) CE model the main categories of the model, from triggers to managerial outputs are considered, despite the fact that the author does not explain how corporate entrepreneurs have achieved these outcomes. In other words, a series of initiatives to win an entrepreneurial tournament is comprehensively illustrated by the model developed in this research, within the strategies block of the theory. The GTM model discloses not only these strategies, but also reveals that some of the applied strategies can be detrimental. For example, lobbying or establishing informal networks

in the workplace to be informed of top managerial decisions sooner than other entrepreneurs, if the others do at all.

As tournament theory predicts, compensation mechanisms have always performed an important role in initiating any tournament. This notion is endorsed by the *causal conditions* of the grounded model. In this regard, Hayton and Kelley (2006) suggested a competency-based approach toward motivating CE instead of the traditional forms of job analyses. The GTM model goes further than the current boundaries and shows that not only organisational compensation mechanisms are crucial for a dynamic entrepreneurial tournament, but also allow entrepreneurs to follow tournaments more closely, especially when a notable reward or prize is set for each tournament.

*Alertness* or awareness of opportunities that other entrepreneurs are not fully aware of (Kirzner, 2017) has always appeared as an important factor in any entrepreneurial process. Its influence has been confirmed by this research, also. In fact, based on the conducted interviews, alertness as a way of understanding the distribution of opportunities and putting them into practice has been mentioned as a factor that can trigger corporate entrepreneurs to initiate a tournament. Risk-taking behaviours have constantly been cited as a determining factor for corporate entrepreneurial activities. With that in mind, Hayton (2005), in pursuit of a theoretical explanation for the effect of HRM in providing a better atmosphere for emerging CE, developed two interdependent themes: encouragement of discretionary entrepreneurial contributions and acceptance of risk. The model in this research shows that the *risk-taking behaviour* dimension is not only important, but also has an important role in initiating an entrepreneurial tournament.

Resources have frequently been mentioned as leading aspects of prosperous entrepreneurial activities (Burgelman, 1983; Khorrami, Zarei & Zarei, 2017; Wiklund & Shepherd, 2003). The outcomes of the research endorse this aspect also; for instance, the research shows that *accessibility of resources* is an *intervening condition* that determines the extent to which a corporate entrepreneur decides to initiate an entrepreneurial venture. Furthermore, *efficient use of organisational resources* is categorised as an efficient *strategy*, which is essential for a productive entrepreneurial tournament.

Networking is discussed as one of the main categories of intangible resources and the importance of such resources has been discussed using the resource-based view (RBV). However, few studies determine how exactly entrepreneurial networks function, especially within entrepreneurial tournaments. Apart from the research endorsing the importance of networking to entrepreneurs, which was recognised as an intervening condition, the GTM

model finds out that the quality of networks, formal and informal, can be vital to entrepreneurs. In addition, the model depicts that networking can be applied by entrepreneurs as an efficient strategy to accomplish a successful tournament. Based on the interviews, networking has been used for sharing knowledge, reducing operating cost, accessing advanced technologies, recognising opportunities, evaluating entrepreneurial ideas, funding NSD and NPD projects and so on. As a result, the quality of entrepreneurial networks can define the intensity of entrepreneurial activities within a tournament.

Adhering to organisational values is crucial for corporate entrepreneurs (Burgelman, 1983), and in this regard, one of the main *intervening conditions* of the model was recognised as *adhering to organisational values*.

Nowadays, it is understood that CE is a process that engages more than one division of the organisation. As Burgelman (1983) argued: CE needs more than one participant because it is a multilayered activity. In this regard, the results of the research recognise *networking*, (both internal and external organisational networking), as a strategy that has apparently been adopted by corporate entrepreneurs.

Fostering entrepreneurial behaviours within an organisation is a crucial task when promoting entrepreneurship (Antoncic & Hisrich, 2001; Hornsby, Kuratko & Zahra, 2002), for instance by means of encouraging constructive contests, and it should therefore be addressed by managers. Consistently with this idea, *employees' competition* as an organisational condition was recognised as an engine that encourages corporate entrepreneurs to initiate a tournament.

The research has also provided some managerial implications. One of the main concerns of HR managers should always be to motivate entrepreneurs to participate in tournaments, and not to quit their jobs. In fact, organisational desertion is a common phenomenon, especially for corporate entrepreneurs who are to some extent already mentally predisposed to quit the organisation and launch their own business start-up. In this research, entrepreneurial tournaments were discussed as an opportunity to tackle this problem.

As with any study, this research has some limitations. One basic limitation is related to the chosen methodology; it is common at the end of qualitative research for the theory to be examined with new data, to determine to what extent the theory remains consistent. In the current study, due to some limitations in the number of participants, "discriminant sampling" was ignored.

During the research, there was no emphasis on, or sensitivity to, ethnicity, gender or background ideologies such as religion, for which the reason behind this can be questionable.

Iran has some particular macroeconomic and social capital characteristics, such as the level of entrepreneurial activities and the current state of the economy, which have probably influenced the generality of the results.

### Acknowledgments

Hereby I would like to acknowledge the help of the participants of the ITRC and the reviewers of the *Journal of Entrepreneurship, Management and Innovation* without whose insightful comments the research could not have been completed. In addition, I want to express my gratitude to those practitioners of Corporate Entrepreneurship (CE) who have opened ways to us to realise the value of CE.

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### **Abstract (in Polish)**

*Pojęcia i motywacje międzyorganizacyjnych rywalizacji wśród pracowników zostały w pewnym stopniu podkreślone przez klasyczne teorie zarządzania, takie jak teoria turnieju. Jednak konkurencje dla pracowników i przedsiębiorców mają zasadniczo inny kształt. Konkurencje przedsiębiorców oparte są na doktrynie przedsiębiorczości i mają zasadnicze znaczenie dla gospodarki produktywnej. Mimo to, niewiele zostało podjętych dogłębnych i holistycznych prób zrozumienia procesu rywalizacji między przedsiębiorcami korporacyjnymi. W ciągu ostatnich trzech dziesięcioleci przeprowadzono różne rozdrobnione badania z różnych punktów widzenia w celu wyjaśnienia procesu przedsiębiorczości korporacyjnej (CE). Niemniej jednak pozostaje sporo miejsca do opracowania modelu procesu rywalizacji w odniesieniu do działalności przedsiębiorczej w dużych i złożonych organizacjach. Stąd za główny wkład badań można uznać zbadanie i sformułowanie procesu rywalizacji. W tym celu zastosowano systematyczną jakościową metodykę teorii ugruntowanej (GTM). W okresie pięciu miesięcy, przeprowadzono systematyczne wywiady z przedsiębiorcami w jednym z głównych irańskich instytutów badawczych. Opierając się na wynikach badań, oprócz potwierdzenia istnienia takiego procesu rywalizacji pomiędzy przedsiębiorcami korporacyjnymi, model GTM rozszerza literaturę CE poprzez zbadanie części procesu, tj. ujawnienie wdrożonych strategii przedsiębiorców korporacyjnych, pośród innych aspektów teorii.*

**Słowa kluczowe:** przedsiębiorczość korporacyjna; konkurencja przedsiębiorców; turnieje przedsiębiorczości; teoria turnieju; metodologia teorii ugruntowanej.

### **Biographical note**

**Mohammad Zarei**, has a M.Sc. in Corporate Entrepreneurship, has published several academic papers and book chapters with international publishers such as Springer, Inderscience and IGI Global and journals like *International Journal of Management and Enterprise Development*, *International Journal of Innovation and Sustainable Development* and *International Journal of Business Excellence*. He has six years' experience in the third, governmental and private sectors, in organisational development and business process improvement. He has also participated in a number of national projects and achieved several letters of appreciation from the Iran Telecommunication Research Center (ITRC) and Ministry of ICT, Information Technology Organization of Iran. His research interests include strategies of corporate entrepreneurship (CE) and microeconomic studies.



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# Partner Capabilities and Alliance Time Frame: An Analysis of International Strategic Alliances from the CEE

*S. Hossein Jalali*<sup>1</sup>

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## **Abstract**

*Partner selection is one of the most discussed issues in strategic alliances literature. However, the majority of research has typically focused on generic partner characteristics and presented conceptual models for alliance partner selection, addressing clan image but only limited pieces of the partner selection puzzle. Rooted in the resource-based view, this paper suggests that partner selection is contingent upon the intended time frame of strategic alliances and presents a new and intensive conceptual framework that examines the appropriate partner capability for strategic alliances, in the case of short/medium-term alliances and long-term ones. Based on empirical evidences from 736 alliances in the CEE region, the findings stress the differences between varied partner capabilities in short/medium-term and long-term alliances. Accordingly, the significance of technological capability increases with the number of year's alliances endured. Moreover, the importance of market capability decreases significantly when alliances last for a longer time frame.*

**Keywords:** *strategic alliance; alliance time frame; partner capabilities; partner selection.*

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## **INTRODUCTION**

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During the recent decade, the number of international strategic alliances has gradually increased due to the interconnectedness of global market, making them a reliable and popular market entry strategy for being involved in international business. Strategic alliances are well-established collaborative models by which firms gain access to external resources (Hess & Rothaermel, 2011); rather than either operating on their own or merging their operations (Dussauge, Garrette & Mitchell, 2000). Indeed, strategic alliances provide firms with opportunities to gain more market power and achieve a faster and more effective entry into the international market (Xia, 2011); and are particularly

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effective in helping a firm gain and maintain a superior competitive position in a dynamic, volatile and uncertain international environment.

As firms seek actively to leverage the numerous potential benefits of strategic alliances, they often neglect the potentially detrimental effects of poor alliance partner selection (Shah & Swaminathan, 2008). Choosing the right partner is a determinant decision in the pre-agreement phase. Many scholars underscored the importance of appropriate partner selection as a critical parameter in alliance success, since superior value creation depends on whether partners represent synergies in the relevant characteristics (Shah & Swaminathan, 2008; Mitsuhashi & Greve, 2009; Ahuja, Polidoro, & Mitchell, 2009; Mindruta, Moeen & Agarwal, 2016).

As Gomes, Barnes and Mahmood (2016) stated, the choice & evaluation of partners appears to play a significant role in contemporary research on strategic alliances, particularly due to the growing importance associated with partner selection in alliance activities. Scholars have produced an impressive body of work from different viewpoints on partner selection (Hitt et al., 2000; Hitt et al., 2004; Chen, Lee & Wu, 2008; Dong & Glaister, 2006; Li et al., 2008; Shah & Swaminathan, 2008; Li & Ferreira, 2008; Doherty, 2009; Wu, Shih & Chan, 2009; Al-Laham, Amburgey & Baden-Fuller, 2010; Solesvik & Westhead, 2010; Meuleman et al., 2010; Roy, 2012; Ahlstrom et al., 2014; Mindruta, Moeen & Agarwal, 2016), but yet, there are some important limitations.

First of all, we have access to a rich literature about general partner characteristics, yet frameworks that breakdown different characteristics, and addresses when and why managers choose partners with certain, specific characteristics, are understudied. According to Cummings and Holmberg (2012) the vast majority of the prior alliance partner research has been framed in static analysis terms. Given the complexity of partner selection decisions, a generic model for distinctive partner characteristics may be unsuitable for understanding complex phenomena. Distinguishing between partner characteristics due to their nature (i.e., skills, assets, capabilities etc.) and specifying the circumstances under which alliances are studied, could help to understand how firms select their collaborative partners and under what conditions. Against this backdrop, the current research focused primarily on partner capabilities, not all of the characteristics; and then tries to provide insights about partner capabilities due to the time frame of alliances. In addition, the majority of strategic alliances literature has been based on developed economies and hence, their insights are best fitted with alliances from this context. In the recent decade, the strategic alliance concept is growing in appeal to firms in developing economies and is becoming a preferred choice for firms to gain a competitive advantage

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in international markets. However, the highly complex, volatile and largely unknown business environment of developing economies raises the risk of any business collaboration (Li & Ferreira, 2008). Regarding this issue, the current work applied the theory to the case of wholly export-oriented alliances from developing economies, and provides empirical evidence that is compatible with the contextual conditions of developing economies. The research question thus follows: Which partner capabilities play an important role in short/medium-term or long-term alliances among developing economies-based firms?

This research makes a number of empirical and practical contributions. The most important is that it adds significant new empirical knowledge to the literature on international strategic alliances in a developing economy context and provides a more complete understanding of partner selection decisions. Second, this study focuses on the time frame of alliances. Previous literature rarely provides insights about specific partner selection criteria in each of the short/medium-term or long-term strategic alliances. From the theoretical perspective, we know that long-term strategic alliances are not the same as short/medium-term ones and each of them has particular attributes. It is believed that short/medium-term alliances give freedom of action to independent behaviors, have limited resources exchange, and are excessively prone to conflict and instability. While resources exchange in long-term alliances happens frequently and normally, the separation phase is not arranged and alliances are terminated due to problems associated with the alliance (Bignoux, 2006). Also, this paper has an important managerial implication. Executives that better understand which partner capabilities are best fitted with their strategic alliances; will make a better decision at the stage of partner seeking and evaluation.

The remainder of this paper is organized as follows: The next section contains a brief literature review about international strategic alliances and decision making over partner selection. Then the research methodology, including data collection and measures presents in the subsequent section. The paper continues with a presentation of empirical findings and sensitivity analysis, along with the discussion of the findings, limitations, and directions for future research.

## LITERATURE REVIEW

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In the recent decade, the interconnectedness of global market has raised the importance of the ability to seize opportunities from international markets. The task is a challenge requiring both the recognition of new opportunities,

and also, an understanding of how to obtain market share abroad (Yu, Gilbert & Oviatt, 2011). In such a situation, a strategic alliance plays an important role as a collaborative solution for firms to expand their activities into international markets (Nakos, Brouthers & Dimitratos, 2014).

Strategic alliances are voluntary interfirm cooperative arrangements for value creation through access to reciprocal resources, skills and capabilities (Ahuja, 2000; Zhang, Duysters & Filippov, 2012), and are aimed at achieving the objectives of the partners (Das & Teng, 2002). Scholars have defined international strategic alliances as a firm's propensity to engage in strategic alliances with foreign partners (Lee & Park, 2006). Indeed, in international markets, strategic alliances provide firms with the resources and capabilities needed to overcome the liability of foreignness (Nakos, Brouthers, & Dimitratos, 2014). Firms seeking alliances recognize opportunities for resource complementarity that are best exploited for rents through collaborative operational models rather than through market means or acquisition (Phene & Tallman, 2014).

Strategic alliances are a very complex phenomenon. Despite the advantages offered by international strategic alliances however, empirical evidence shows few successful alliances (Bierly & Gallagher, 2007; Arranz, Arroyabe & de Arroyabe, 2016), especially from a developing economies context (Li & Ferreira, 2008). Challenges in governance and internal conflicts always threaten the longevity of alliances; however, it can be inferred from the literature that inappropriate partner selection is antecedent of any forthcoming difficulties such as internal tension (Krishnan, Martin & Noorderhaven, 2006) and is a key determinant of failure in strategic alliances (Bierly & Gallagher, 2007). Thus, the benefits of alliances for firms depend on the attributes of the alliance's partners (Bae & Insead, 2004).

Partner selection consists of choosing to ally with someone among the various available options who has the resources you need and whom you can induce, via your own stock of resources, to collaborate with you. This choice relates to what capabilities are being combined in an alliance (Ahuja, Polidoro & Mitchell, 2009), and is a key decision alongside decisions about governance, structure, and alliance scope (Meuleman et al., 2010). The importance of partner selection can be discussed from different theoretical contexts. From the resource based-view, partner selection is a critical decision in the pre-agreement phase of strategic alliances formation, because it influences the mix of resources and capabilities which will be available to the alliance (Dong & Glaister, 2006); and thus, arises complementarity (Shah & Swaminathan, 2008; Mindruta, Moeen & Agarwal, 2016).

The partner selection is not a generic, static decision. According to Shah and Swaminathan (2008), alliance type is a critical consideration in evaluating the importance of specific partner characteristics. There is a need to do studies which examine whether, and how, partner selection criteria might vary with

different types of strategic alliances (Hitt et al., 2000). In theory, mutual gain can be achieved by partners in any type of alliances, however the reality is different. Comparing short/medium-term alliances with long-term alliances revealed the inherent differences between alliances due to their time frame. Firms involved in short/medium-term alliances exchange resources for a pre-arranged time period in order to achieve a specific objective and separate at the end of that time period. While, in long-term alliances there is no clear time horizon and the alliance is dependent on relational parameters such as trust and reputation of the partners (Bignoux, 2006). Notwithstanding these fundamental differences, there is barely any empirical evidence which provides a classification about the appropriate partner characteristics for short/medium-term and long-term alliances.

Also, the variety of partner characteristics makes it difficult to decide about partner selection and do a comprehensive review on partner characteristics, so it is necessary to limit the theoretical and contextual backgrounds (Hitt et al., 2000); and focus only on some limited dimensions of characteristics. Also, in accordance with Cummings and Holmberg (2012), the criteria for choosing someone to ally will change over time, and so it is important to consider time-based limitation in the alliance partner selection. Thus, the framework of current study is focused narrowly, but deeply, on partner capability among various partner characteristics and provides insights around three fully distinctive and independent capabilities, including market capability, managerial capability and technological capability.

**Market capability.** Market capability is the first and most explored partner capability in previous studies. As Lu and Beamish (2006) explored, market knowledge is associated with the profitability of collaborative relationships. Parameters such as international market knowledge, local market knowledge, distribution channels, links with major buyers and suppliers, and market relative power are all cited numerously in literature (Dong & Glaister, 2006). Also, Hitt et al. (2000; 2004) and, Wu, Shih and Chan (2009) directly emphasized on market capability as a determinant characteristic for partner selection.

**Managerial capability.** As Hitt et al. (2004) indicated, managerial capabilities are not well developed in the firms from a developing economies context. In addition, successful managerial capabilities in developed economies are not compatible with necessitates of developing economies. High levels of volatility, irregularity, and uncertainty of the business environment in developing economies and a lack of managerial capabilities has posed critical competitive problems for firms from developing economies. The managerial capability has conceptualized in a relatively similar way. Hitt et al

(2000; 2004) and Ahlstrom et al. (2014) referred to managerial capability as a decision-making style and a bundle of knowledge, experiences and skills. However, Bakker (2016) used the diversity along skill and competence-based dimensions among the board of directors in his research. The competence breadth would help scholars to have a more qualified predictor of managerial capability in strategic alliances.

**Technological capability.** The technological capability is the third distinctive partner capability in the alliance literature. Most authors defined technological capability as; the ability to develop new process or product technologies such as significant R&D operations; develop and commercialize new products; know-how and so on (Ahlstorm et al., 2014). The main advantage of technological capability is accessibility to non-overlapping technological resources and know-how, which allow firms to more easily respond to the challenges of a discontinuous and turbulent technological breakthrough (Vasudeva, Spencer & Teegen, 2013). Firms in developing economies often lack the knowledge and capabilities for sophisticated manufacturing and need modern, updated technology to produce qualified products and services to compete in global markets (Hitt et al., 2004). Hence, seeking technological capability gains more importance for the firms from developing economies.

Table 1 presents a list of three distinctive partner capabilities for international strategic alliances, and also recent contributors for each item. This list is not limited to indicate ones, but the theoretical, contextual and time-based concerns would ensure that potentially all important and fully distinctive partner capabilities for international strategic alliances from developing economies, are extracted from the literature.

**Table 1.** Partner capabilities and recent contributors

Capability	Sub-criteria	Contributors
Market Capability	Increase market share, better export opportunities, and knowledge of local business practices	Hitt et al. (2000); Mitsuhashi (2002); Hitt et al. (2004); Chen and Tseng (2005); Wu, Shih and Chan (2009)
Managerial Capability	Managerial experiences, decision-making processes, and competence breadth	Hitt et al. (2000); Luo (2002); Hitt et al. (2004); Ahlstrom et al. (2014); Bakker (2016)
Technological Capability	Technological knowledge, significant R&D expertise, and know-how	Hitt et al. (2000); Luo (2002); Chen, Lee and Wu (2008); Gulati, Lavie and Singh (2009); Chand and Katou (2012); Ahlstrom et al. (2014); Badir and O'Connor (2015)

Accordingly, a key question arises as to: Which partner capabilities are best fitted with strategic alliances due to their time frame? Most research

stated that a strategic alliances' outcome depends on partner characteristics, but limited studies explore the role of specific partner characteristics (Nielsen, 2003; Wyatt, Pathak & Zibarras, 2010; Arranz, Arroyabe & de Arroyabe, 2016).

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## RESEARCH METHODS

### Data collection and sample

This study focused on partner capabilities and their impact on strategic alliances due to the time frame of alliances. To do this, current research has aimed at three distinctive capabilities including market capability, managerial capability and technological capability and has assessed their impacts on international strategic alliances divided in two groups, short/medium-term alliances versus long-term ones. In order to test the intention of the study, the databases of the Iran Chamber of Commerce, Industries, Mines and Agriculture (ICCIMA) and the Iran Customs Administration (IRICA) were used as an initial sampling frame to find strategic alliances between firms from Central and Eastern European (CEE) countries (Comprising Albania, Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, Estonia, Latvia and Lithuania, according to the OECD) and Iranian firms. So, the initial sample consisted of international strategic alliances between partners from developing economies-based countries.

For sampling, alliances were categorized in two groups, those that have been formed during the last three years (short/medium-term alliances) and those that have endured more than three years (long-term alliances). Then, simple random sampling was used and a sample of 1080 alliances, of which most of them were comprised of two partners, was identified. 59.8% of the sample is short/medium-term ones and 40.2% is long-term alliances. All participants received an identical online questionnaire. Prior to the full-scale study, the questionnaire was presented to several experts of different disciplines in strategy and international business to test the difficulties, ambiguities, clarity and validity of measures. Then, a revised version of the questionnaire was used in the full-scale study. Data were collected over a period of five months during 2016. The data collection yielded 736 valid surveys from the managers responsible for developing and managing those alliances (54% of short/medium-term alliances and 46% of long-term alliances), making an available return rate of 68.1%. While 13.72% of the sample comprised of alliances between partners from Iran and three or more CEE countries, the remaining sample including alliances between Iranian firms and partners from Albania (3.67%), Bulgaria (7.74%), Croatia (15.35%), the Czech Republic (9.1%), Hungary (10.33%), Poland (13.32%), Romania (9.78%),

the Slovak Republic (5.84%), Slovenia (5.03%), Estonia (2.85%), Latvia (1.36%) and Lithuania (1.9%). Nearly half the alliances partners (49.7%) are large firms with more than 250 employees, while 18.3% of firms have fewer than 50 employees, and 32% are firms with employees between 50 and 250. Overall, the sample represented 8 different manufacturing industries. Petroleum products, mineral products and food manufacturing were represented the most with 39.6%, 33.4% and 22.2%, respectively. These alliances are involved in different markets, but the majority of them (68.2%) export their products to a target market which is not the origin of any partners, and 20.9% of them are doing business internationally, without focusing on a specific target market.

## Measurements

The respondents were presented with a questionnaire containing the three partner capabilities, as mentioned in the Table 1. The measurements for each item were derived from the literature and most recent contributors. Respondents were asked to identify their perception of the importance of partner capabilities on each item, which was rated on a five-point scale, ranging from “not at all important” (1) to “very important” (5).

The dependent variable in the current study is the performance of alliances. Due to the scope of this study, the performance of chosen alliances is directly contingent to their performance on international markets. Thus, the scale of Jalali (2012) was used to measure the dependent variable. Although, due to the scope of this study, the performance of short/medium-term alliances (alliances with less than three years age) and the performance of long-term alliances (alliances endured more than three years) are separated from each other. Also, some variables were used as controls in the analyses because of their potential effect on capabilities. These variables can be categorized in four groups: industry, age, size and experience. Industry type (natural resources and manufacturing) was controlled in the analyses. Each industry type was transformed into a dummy variable; while petroleum products, textile product mills and food manufacturing represented 95.2% of the sample. Firm age and firm size are other control variables which were calculated as the natural logarithm of the total number of years since the establishment of the firm, and total number of employees. International experiences is the fourth control variable. As firms gain more experiences in international markets, they will better respond to the international markets necessities. Thus, the international experience of the focal firm, calculated as the total number of years in which the firm had engaged in international markets, was controlled.

## ANALYSIS

### Descriptive statistics

Table 2 shows descriptive statistics and intercorrelations for all variables, including both main variables and control variables.

**Table 2.** Descriptive statistics and correlation matrix

I. Main Variables								
		Mean	S.D.	1	2	3	4	5
1.	Short/Medium-term Alliances	3.18	0.96	1				
2.	Long-term Alliances	4.08	1.11	0.53**	1			
3.	Market Capability	1.86	1.33	0.29**	0.32**	1		
4.	Managerial Capability	4.44	0.95	0.31**	0.38**	0.08	1	
5.	Technological Capability	2.54	1.22	0.24**	0.23**	-0.19*	-0.06	1

N=736; \*\*p<0.01 level; \*p<0.05 level

II. Control Variables								
		Mean	S.D.	1	2	3	4	5
1.	Natural Resources	0.98	0.24	1				
2.	Manufacturing	0.21	0.13	-0.13	1			
3.	Firm Age <sup>a</sup>	4.14	3.21	0.20**	0.19*	1		
4.	Firm Size <sup>a</sup>	3.99	3.03	0.36**	0.21**	0.21*	1	
5.	International Experiences	5.12	9.11	0.19*	0.10	0.16*	-0.03	1

\*\*p<0.01 level; \*p<0.05 level; <sup>a</sup>Logarithmic

Based upon Table 2, the averages and the standard deviations moderately indicate that there is not substantial variation across different capabilities. In addition, the average links with managerial capability measure is 4.44, and the standard deviation of 0.95 shows that managerial capability is the least varied variable as one of the core capability of partners in strategic alliances. Table 2; also provide some valuable insights about the sample, as it shows that the size of partner plays a more significant role than firm age in the formation of strategic alliances in natural resources and manufacturing.

### Which capability for which strategic alliances?

To answer the question about the most effective capability in each alliance due to its time frame, the results are presented in models A to D of Table 3. Each of the reported estimates is from panel-level regressions allowing for random effects, heteroskedasticity and clustering of the standard errors. Model A and B are related to short/medium-term alliances, while the results of analyses for long-term alliances are presented in model C and D. Also,

models A and C include only fixed effects (control variables), while model B and D include both fixed effects and random effects.

**Table 3.** Effective partner capabilities due to time frame of the strategic alliances

	Short/Medium-term Alliances				Long-term Alliances			
	Model A		Model B		Model C		Model D	
	$\beta$	z-stat	$\beta$	z-stat	$\beta$	z-stat	$\beta$	z-stat
<b>Fixed Effects (controls)</b>								
Intercept	0.662	0.347	3.021*	2.227	1.426	0.965	4.209**	2.818
Industry 1 (Natural Resources)	0.186*	1.523	0.143+	1.611	0.166*	1.403	0.184*	1.772
Industry 2 (Manufacturing)	0.141+	1.208	0.106	1.019	0.150*	1.189	1.149+	1.276
Firm Age	1.149+	1.040	1.116	0.801	0.166*	1.210	1.152*	1.602
Firm Size	0.171*	1.224	1.130*	1.082	0.189**	1.544	1.157*	1.214
International Experiences	-0.133+	0.992	-0.079	0.560	0.129+	1.077	-0.109	0.558
<b>Random Effects</b>								
Market Capability			0.373**	2.990			0.229*	1.372
Managerial Capability			0.361**	2.628			0.422**	3.612
Technological Capability			0.221*	1.139			0.390**	2.840
Chi-squared Statistic	320.5*		466.4*		348.2*		600.2*	
R-squared	0.214		0.239		0.219		0.291	
Adjusted R-squared	0.199		0.220		0.203		0.268	

Notes: N=736; Results are based on random-effects regressions with controls for heteroskedasticity, autocorrelation, and industry-level clustering. \*\*p<0.01 level; \*p<0.05 level; +p<0.1 level. All significance tests are two-tailed.

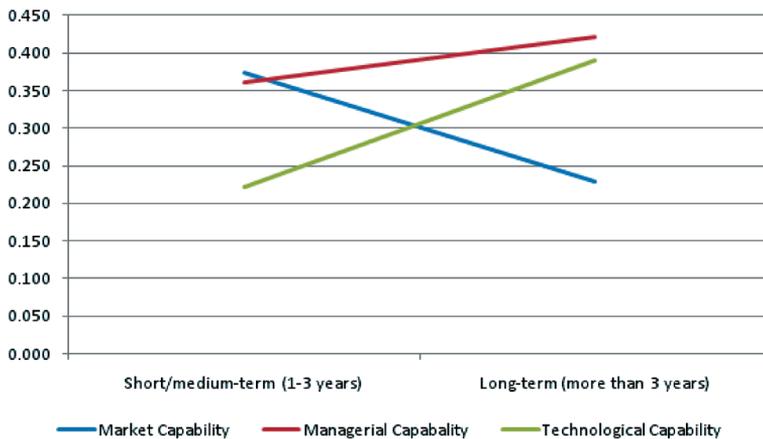
The results presented in Table 3 show that the coefficients for managerial capability are positive and statistically significant in both the short/medium-term alliances ( $\beta=0.361$ ;  $z=2.628$ ;  $p < 0.01$ ) and long-term alliances ( $\beta=0.422$ ;  $z=3.612$ ;  $p < 0.01$ ), suggesting that both forms of short/medium-term and long-term alliances place emphasis on this criterion as a determinant partner capability. Furthermore, the comparison between  $\beta$  coefficients and z statistics shown in Table 3 is indicating that long-term alliances emphasize more heavily this criterion than do short/medium-term ones.

The coefficients presented in Table 3 for market capability is also positive and significant with different levels for both short/medium-term alliances and long-term alliances. However, the difference between significant level suggests that short/medium-term alliances are more determined by market

capability ( $\beta=0.373$ ;  $z=2.990$ ;  $p < 0.01$ ) and increases in the time frame of strategic alliances resulted in lower level of influence ( $\beta=0.229$ ;  $z=1.372$ ;  $p < 0.05$ ) for market capability.

Along with these capabilities, analysis showed that technological capability is also a determinant capability in strategic alliances. Table 3 shows that the coefficient and z statistic for technological capability is positive and weakly significant in the short/medium-term alliances ( $\beta=0.221$ ;  $z=1.139$ ;  $p < 0.1$ ), but the coefficient for this capability is strongly significant ( $\beta=0.390$ ;  $z=2.840$ ;  $p < 0.01$ ) in the long-term alliances. Hence, the results show that technological capability has a contradictory behavior to market capability. It is also notable that a previous alliance experience is not statistically significant in both forms of alliances.

Due to the findings, the following chart could be presented to provide an image of effectiveness of the various partner capabilities in strategic alliances due to their time frame. As depicted in Figure 1, whenever the time frame of strategic alliances is higher, the impact of managerial capability and technological capability is stronger. Capabilities are depicted by the  $\beta$  coefficient.



**Figure 1.** Relationship between effectiveness of partner capabilities and time frame of alliances

### Sensitivity analysis

In order to reach reliable results, a sensitivity test was carried out to ascertain whether findings are robust to a closer matching of the time periods for

defining alliances (i.e. short/medium-term in less than three years and long-term for more than three years). The alliance time frame measured using data from shorter time spans (i.e. in one year, and for the second time, in two years), which are a closer match to the alliances outcome. This sensitivity analysis found support for findings at the 1 percent significance level and showed that findings are strongly robust to this alternative estimation methodology.

## DISCUSSION AND CONCLUSION

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Drawing on the resource-based view, this research contributes to a greater understanding of the different partner capabilities. Previous studies stated that partner selection is a critical consideration in the pre-agreement phase (Mindruta, Moeen & Agarwal, 2016), and is vital to alliances' success (Hitt et al., 2000). Researchers generally refer to a broad concept of partner characteristics including assets, skills and capabilities. Also, it is important to consider the differences between short/medium-term and long-term alliances, since the short/medium-term cooperative agreements prevent partners from establishing trust or reputation capital needed in the long-term ones (Bignoux, 2006). Thus, it is necessary to distinguish between partner assets, skills and capabilities due to the time frame of alliances. With the focus on partner capabilities, the current research findings provide insight about which partner capability has a greater effect on strategic alliances due to the intended time frame of alliances, and then, which partner capability should have priority as a criterion for alliance formation.

The current study provides several empirical, theoretical, and practical contributions. The most important, is the contingency between partner capabilities and the time frame of alliances. Previous studies didn't provide evidence about the relationship between specific partner capabilities and the time frame of alliances. In doing so, this research extends the literature by suggesting that alliance time frame has an important role in determining the relative importance of partner capabilities. Findings show managerial capability plays a vital role as a partner capability in both of short/medium-term alliances and long-term ones. It is also inferred that different strategic alliances due to their time frame, put a different emphasis on partner capability in attaining the desired level of performance. Based upon evidence, technological capability gains a more determining role in long-term alliances, while market capability is more important in short/medium-term alliances. This difference may be influenced by the nature of alliances. On-time market entry is a critical criterion in short/medium-term alliances, while firms seek

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reliable advantage in more durable alliances which are rooted in technological innovation.

In terms of empirical contributions, this is one of the few empirical studies focusing on international strategic alliances from a developing economy context. The results provide empirical evidence about the most important partner capabilities that are key determinants of performance for developing economies-based alliances in both short/medium-term alliances and long-term alliances. In addition, most of the previous research focused on the broad concept of partner characteristics and presented general models that assume the factors that drive partner attractiveness in every alliance types. However, this research focused only on a narrower domain of partner capabilities and the findings show the importance of studying the alliance time frame, and strongly support the idea that alliance partner capabilities are contingent on the differential inherent in short/medium-term strategic alliances and long-term strategic alliances. The research also contributes to practice by providing an insight into strategic alliances' partner selection; and particularly the distinctive type of capabilities of partners. Partner selection is a critical decision in the pre-agreement phase (Mindruta, Moeen & Agarwal, 2016), and plays a vital role in alliances' success (Hitt et al., 2000). The current research findings help executives understand the basis on which partner capabilities should have priority on their decisions about alliances' partners. Executives, who understand the differences and similarities of alliances partner capabilities, can form more successful alliances regarding their purposes.

Building on the findings of the current research and its implications, future research could examine partner capabilities under different alliance attributes. Identifying the way partner capabilities affect alliances can help researchers and practitioners to develop more efficient alliances, especially in international markets. Also, the relationships examined in this study should be investigated in other geographical regions to determine whether the highly significant results of this study are stable.

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### **Abstract (in Polish)**

*Wybór partnera jest jednym z najczęściej poruszanych kwestii w literaturze dotyczącej sojuszy strategicznych. Większość badań koncentruje się głównie na ogólnych cechach partnera i prezentuje modele koncepcyjne jego wyboru, odnoszące się do obrazu klanu i ograniczonych fragmentów puzzli w wyborze partnera. Bazując na podejściu zasobowym, artykuł sugeruje, że wybór partnera zależy od*

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*przewidywanych ramami czasowymi strategicznych sojuszy i przedstawia nowe ramy pojęciowe, które sprawdzają odpowiednią zdolność partnera do strategicznych sojuszy w przypadku zarówno krótko- lub średnioterminowych sojuszy, jak również długoterminowych. Na podstawie empirycznych dowodów z 736 sojuszy w regionie CEE, ustalenia wskazują na różnice między różnymi kompetencjami partnera w krótko-, średnio- i długoterminowych sojuszach. W związku z tym znaczenie kompetencji technologicznych wzrasta wraz z liczbą sojuszy w danym roku. Co więcej, znaczenie kompetencji rynkowych znacznie spada, gdy alianse trwają dłużej.*

**Słowa kluczowe:** *strategiczny sojusz; ramy czasowe sojuszu, kompetencje partnera, wybór partnera.*

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### Biographical note

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# ***Friends Doing Business. An Explorative Longitudinal Case Study of Creativity and Innovation in an Italian Technology-Based Start-Up***

***Alessandra Tognazzo<sup>1</sup> and Paola Angela Maria Mazzurana<sup>2</sup>***

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## ***Abstract***

*With a process perspective based on a framework derived from several disciplines, we theoretically discuss how friendship dynamics in founding teams may affect a business. We develop a conceptual model that considers the different nature of exchanges in business and friendship, which may serve as a useful starting base for future investigation (in the Appendix we report some measures of friendship). We then examine an exemplary case. We focus on group cohesiveness (a proxy for friendship), decision-making, and organization of an Italian technology-based firm's founding team over time and explore the process of generating creative ideas and implementing innovation. Our speculative findings show that chaos does not necessarily favor creativity and innovation: while low group cohesiveness leads to disorganization because business norms prevail over friendship ones, high group cohesiveness creates structure in the organization that sustains the generation of creative outcomes by enhancing the role of friendship norms in decision-making. We explain this finding in the light of the principle of reciprocity of exchanges.*

**Keywords:** *spin-offs; reciprocity; friendship; group-cohesiveness; creativity; innovation.*

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## **INTRODUCTION**

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To be successful new entrepreneurs must be innovators—creative, idealist, and visionary. In most new technology-based firms the founding team has a major role in this process, especially given the limited size of the organization (Amason & Sapienza, 1997; Cesaroni, Minin & Piccaluga, 2005;

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Klotz, Hmieleski, Bradley & Busenitz, 2014). Interestingly, a lot of literature has emerged about families and innovation within businesses, and scholars in this literature showed that family dynamics do impact on innovative processes and outcomes (e.g., De Massis, Frattini & Lichtenthaler, 2013; Kammerlander et al., 2015). Whereas relatives are designated by blood or legal ties, friends are selected, so friendship is a unique form of voluntary intimate relationship. Furthermore, friendship is a relatively uninstitutionalized relationship without standard rituals, norms or nomenclature to guide the partners. Yet, friendship choices are not wholly fortuitous, nor is amicable behaviour unscripted (Allan, 1989). Also, friendship evolves over time and it is the process of living from day-to-day that shapes friendship patterns (Blieszner & Adams, 1992; Hays, 1988). Some friendships are based on routine, repeated, and predictable interactions, while others are formed after chance meetings. The individual's social and psychological characteristics set the stage for the types of relationships that can emerge (Adams & Blieszner, 1994). Sociological research about groups of artists shows how friendship fosters creativity in these collaborative circles. Farrell (2001) notes that the figure of the *lone genius* is not always accurate in this context and that extraordinary creativity is often the result of successful collaboration among peers who develop an intense friendship and work together for an extended period. Farrell argues that such work is spurred by a set of enabling social dynamics that work to support, encourage, and stimulate creativity among members of the group (Farrell, 2001; Corte, 2013).

Despite the widespread occurrence in new ventures of friends *doing business together*, research in management devotes virtually no attention to friendship and to how it might be related to business creative outcomes. Research in laboratory and organizational settings has focused on how creativity and innovation can be fostered in work-groups (or work-teams) focusing on methods like idea generation, brainstorming (e.g., Paulus & Yang, 2000; West, 2002) or creative synthesis (Harvey, 2014). All these studies underline the importance of individuals' cognitive resources like creative thinking skills, social resources inherent in group composition and dynamics, and environmental resources that support autonomy and motivation. However, this stream has focused on creative processes and outcomes generated by teams and groups of workers, not company owners. Moreover, leadership researchers have proposed that leaders' styles and behaviours might be transformational and promote change among followers and employees, and also in start-ups founding teams (e.g., Chen, 2007). However, these studies do not devote attention to the quality of the relationships

among the founding team members. Also, psychologists and sociologists have focused on the relation between the group of friends and the individual in various contexts, like artists and classrooms (e.g., Farrell, 2001; Starko, 2013), but the issue of business still remains underexplored in this literature.

In this article, we chose to focus on analyzing how *friendship* impacted on the inception and development of one Italian start-up. This start-up is not an “exceptional” case, it is “one of the many”, but we have followed its story since the founders were a group of friends, so well before venture founding. After observing them for eight years, we realized that *friendship* has a meaningful impact on creativity and innovation processes. Not only friends generated the idea of a venture and implemented it by founding one, but also friendship is strictly related to internal organizational dynamics and has a major influence on decision-making processes that impact on how creative ideas may become implemented innovations (e.g., products, etc). This research is largely explorative - and to some extent “intuitive” - in nature, and includes both informally collected information (which derives from observing the start-up over its development) and purposefully collected evidence (though interviews and direct observation).

Our aim here is twofold. First, we want to shed light on the underexplored issue of *friends* doing business together. We review some theoretical perspectives that might be applied to the issue of *friendship* as an element that affects individuals’ and groups’ creative activity in the business context. Given that virtually no literature has specifically considered this aspect in the business context, we aim to bring together theoretical perspectives belonging to several research streams and provide the basis for future investigation about *friends* doing business together. Second, we explore how friendship can sustain organizational creativity and innovation, focusing in particular on decision-making processes. In line with a recent call for additional research on the relationship between entrepreneurs’ group dynamics and innovative processes (Baron & Tang, 2011; Brockman, Rawlston, Jones & Halstead, 2010), our paper aims to shed light on an interesting phenomenon which we hope will stimulate the attention of scholars.

In the following sections, we consider the definition of creativity and innovation and review several streams of literature about friendship. Then, we describe the main findings and propositions. Finally, we present conclusions and directions for further research.

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## THEORETICAL BACKGROUND

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### When creativity spurs innovation: Is *friendship* a missing link?

In this paragraph, we first articulate the definitions of creativity and innovation based on the managerial literature. Then, we review what psychological studies report about friendship and we integrate the sociological viewpoint. Also, we propose a model that may serve as a basis for future investigation of friends in business.

### Creativity and innovation: The managerial process approach

Theoretical work in the management field has focused on how to define the phases of innovation processes. Models that address creativity (Crossan & Apaydin, 2010; Woodman et al., 1993) define innovation as an outcome of creativity which characterizes the even broader construct of organizational change and thus consider creativity and innovation as consecutive phases.

Creativity at the individual level is usually defined as an approach to work that leads to the generation of novel and appropriate ideas, processes, or solutions (Amabile, Conti, Coon, Lazenby & Herron, 1996; Ford, 1996; Shalley, 1991). The appropriateness and novelty of an idea, process, or solution depend on the context: in order to be considered creative and innovative, these outputs must be unique in some way. Innovation can be defined as the production or adoption, assimilation, and exploitation of a value-added novelty, renewal or enlargement of a products or service, development of a new method of production, and/or establishment of new management systems or markets (Crossan & Apaydin, 2010). Innovation, then, is both a process and an outcome.

The characteristics of creativity and innovation differ in the required degree of novelty and social interaction, as creativity results in something novel, while innovation can be based on ideas that are adopted from previous experience or other organisations. Moreover, innovation is primarily a social process, whereas creativity is at least to some extent an individual cognitive process (Anderson & King, 1993).

In this paper, we take a process perspective. We define *creativity as the first step before innovation*—the generation of good, valuable ideas that could (or could not) be actualized as innovations (e.g., new products, services, or processes), while *innovation as the implementation and development of ideas*—the introduction and application of new ideas to a relevant group. These definitions are logical. However, these phases in organizations are not always consequential, as recent meta-analysis shows (Sarooghi, Libaers & Burkemper, 2015). The generation of creative ideas requires favourable

conditions to become actual innovation. Indeed, Sarooghi et al. (2015) show that the relationship between creativity and innovation is stronger for large firms, process innovations, and low-tech industries relative to small firms, product innovations, and high-tech industries. In other words, it appears that high-tech start-ups are disadvantaged in terms of transforming creative ideas into innovation. The “*why*” question still remains open to possible explanation. Given that little work has been done on how group dynamics affect these two consequential phases (Rank, Pace & Frese, 2004), we speculate that friendship dynamics have a role in this link.

Indeed, it is also interesting to note that, even if the management literature suggests that there are cognitive, social and environmental resources that may enhance group creativity, the empirical evidence is equivocal on how a group may affect creativity. For instance, interaction is necessary to provide access to other members’ cognitive resources, but it is challenging for group members and depletes their own cognitive resources for idea generation (Diehl & Stroebe, 1987); diversity is expected to provide more varied input, but diverse groups sometimes underperform homogeneous groups on creative tasks (Harvey, 2013); and a supportive environment is expected to enhance creativity, but constrained task environments sometimes also promote creativity (Hoegl, Gibbert & Mazursky, 2008). Thus, we speculate that friendship is an underexplored element that might impact on business processes and outcomes, such as innovation and creativity.

### **Friendship: The evolutionary psychological approach**

Interest in friendship relations significantly predates the earliest psychological investigation of the topic as philosophers have elucidated conceptual and theoretical considerations of friendship for well over twenty centuries. Hebrew proverbs remind us that being friendless is akin to living life with only one hand, whereas Chinese proverbs urge tolerance of our friends’ frailties *in lieu* of removing these flaws with a hatchet. Greek and Roman philosophers in antiquity considered friendship to be a requisite aspect of moral and political philosophy and developed theories of friendship to support their positions (Aristotele cited by Ross, 1925). The empirical investigation of friendship is quite recent and range from definitions of friendship and its components (Sullivan, 1953) to investigations of the importance of peer and friendship relations for child development (e.g., Parker & Asher, 1987).

Sullivan’s (1953) contends that friendships emerge in the preadolescent period, when the need for acceptance, fulfilled by participation in general peer group interactions in the juvenile era, shifts to the need for interpersonal intimacy. He deemed friendship a collaborative relationship, and that friends

are sensitive to the needs of one another and seek mutual satisfaction. So, friendship fulfils a fundamental human need for social interaction (Baumeister & Leary, 1995; Demir & Davidson, 2013).

Friendship is a voluntary interdependence between two individuals that includes the experience and satisfaction of various provisions (intimacy, support and self-validation) to varying degrees (Hays, 1988; Demir et al., 2014). However, friendship is a mixed blessing such that it also involves conflict (Berndt & McCandless, 2009; Solano, 1986). Indeed, scholars who explore group dynamics distinguish group cohesiveness from friendship, highlighting that group cohesiveness is related to social attraction and solidarity, while friendship may fragment and disrupt the group (Hogg & Hains, 1998).

Friendship literature also highlights the fact that friendship dynamics evolve over time. Friendships have beginnings, when partners become acquainted; middles, when solidarity and other features increase/decrease/fluctuate or remain stable; and sometimes, endings due to a variety of reasons (Blieszner & Adams, 1992; Hays, 1988). Any movement from one friendship phase to another might be deliberate or might occur by chance. In young adulthood friendship and romance relationships may also be intertwined (Collins & van Dulmen, 2006).

This literature is largely focused on the individual and the evolution of the human being and virtually no attention has been devoted to how friendship might impact on business dynamics. We propose here one model of investigation based on the notion of exchanges that can be a useful base for future research aiming to explore *friendship and business together*.

### **Exchanges in friendship and business: Integrating different logics**

Both friendship and business relationships are two different forms of social relationships. Social relationships are characterized by exchanges and these exchanges can be governed by different logics.

Social psychologists refer to *exchange of resources* as the social events which are most relevant to relationship formation and maintenance. Resources can be anything from attention and approval to food, clothing, and money (Foa, 1973).

Today, organizations survive because their exchanges are governed by the *principle of reciprocity*. The fact that the balance sheet may include debts (or credits), materially shows the existence of this principle because they owe something to someone (or vice versa). If organizations do not respect the norms of reciprocity they simply fail (i.e. cease to exist). For instance, even a non-for-profit organization that does not pay its debts or which is not able to give back to the community a “social value” that justifies

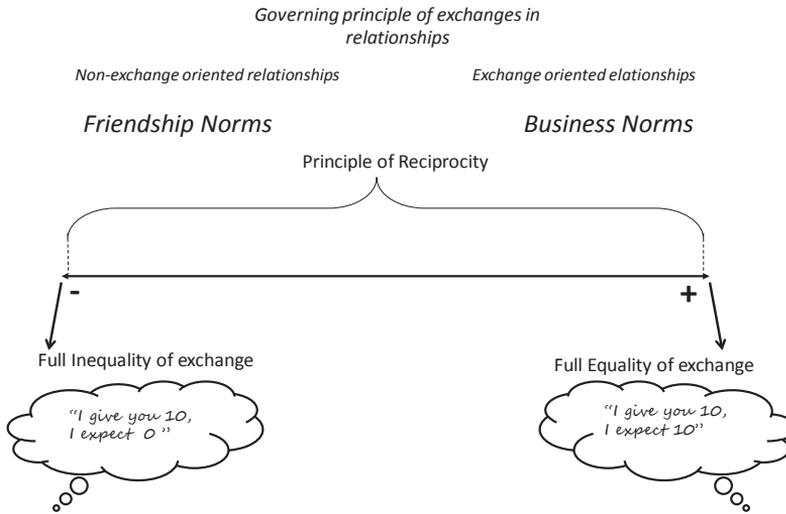
its existence ceases to exist. This idea is highly in line with those traditional theories that see organizations as a nexus of contracts (e.g., Coase, 1937; Jensen & Meckling, 1976). Therefore, all business relationships (both for-profit and non-for-profit) are by definition *exchange oriented* ones, where exchange may be in various form (material goods such as money; behaviours such as work; or intangible values, such as social recognition, legitimacy, support etc.). In other words, business relationships are exchange-oriented relationships and as such, are characterized by *norms of reciprocity*.

Ideally, friendship relationships are *non-exchange oriented* ones (i.e. friends do something independently of receiving something back). This concept mirrors the idea of “ideal altruism” (where parties involved in a transaction don’t expect anything back). This means that friendship relationship should not be governed by the principle of reciprocity. However, we commonly assume that friendship is reciprocal in nature to the point that even the very nature of the relationship is influenced by this: if we say “Giulia is *“my friend,”* the implication is that Giulia also thinks of me as a friend. In general, reciprocity is one of the expectations about affective relations (e.g., Laursen, 1993). What is different is that generally these affective elements are highly subjective and therefore they are hard (if not impossible) to measure, therefore these relationships are to some extent characterized by inequality of what is exchanged (e.g., I give you a hug, you give me a kiss... but what is the value of that hug or that kiss?).

In James Coleman’s seminal essay about social capital (see next paragraph), one important feature of social capital is the *reciprocity of expectations and norms* (Coleman, 1988); similarly, friendships that are more reciprocal are likely to be more emotionally supportive as well as a superior resource compared to friendships that are less reciprocal.

Figure 1 is a representation of the above-mentioned concept. When relationships involve exchanges, the principle of reciprocity may operate according to different intensities, which is why we represented it here on a continuum. Generally, in an exchange oriented relationship – which typically characterizes how companies operate – business norms presume full equality of exchange. While in non-exchange oriented relationships – that are present in amicable relationships – friendship norms imply a different evaluation of what is an “equal” exchange to the point that this exchange might also become irrelevant.

This simplified model may explain the friction generated by integrating friendship with business norms. Given that exploring these kinds of dynamics and interactions requires more than an exploratory research work, we hope this may provide a basis for further inquiry in this context.



**Figure 1.** Reciprocity in business and friendship

### Friendship and group cohesiveness: A prosocial approach

In this article, we focus on a group of friends governed by norms of *prosocial* reciprocity, where by prosocial we mean that people ought to return favours (“*Do unto others*”) rather than aggressive reciprocity that permits retaliation (“*An eye for an eye*”). Even if we acknowledge that this is a partial view of friendship dynamics, this “bounded” definition helped us guide our exploratory study. *Group cohesiveness* may parallel the concept of “friendship governed by prosocial reciprocity” because as mutual trust, and closeness among individuals increase, both friendship and group cohesiveness also increase. A cohesive group is one that sticks together, whose members are bonded to one another, and to the group. Cohesiveness is often accompanied by feelings of solidarity, harmony, and commitment (Mudrack 1989a). Mullen and Copper (1994) suggest that group cohesion is a ‘lubricant’ that minimizes the friction from the human ‘grit’ in the system. The most widely accepted definition of group cohesion describes it as “forces which are acting on the members to stay in a group” (Festinger, 1970: 274).

Psychology studies that focus specifically on the relationship between group cohesiveness and creativity, sustain the ideas that cohesion is associated with high levels of conformity and commitment to prior courses of action, a lack of openness to new information, and interference with a group’s ability to use information fully, which prevents the generation of

new ideas. However, experimental evidence (Craig & Kelly, 1999) shows that groups in situations with high levels of task and interpersonal cohesion exhibit high levels of creativity. Studies on collaborative circles and scientific collaborations also support this idea (Farrell, 2001; Levine & Moreland, 2004).

In sum, even though there is some empirical evidence in favour of the positive effect of group cohesiveness on group creative performance, there are also theoretical arguments in favour of a negative or neutral effect, thus there is no clear answer regarding this dynamic.

### **Ties and creativity: The sociological approach**

Following the same line of thinking, the concept of group cohesiveness is also similar to the definition of strong ties in sociological literature. Strong ties among network contacts occur among those with close personal relationships who interact frequently (Granovetter, 1983), like friends, whereas weak ties occur among those who are emotionally more distant from one another.

Most empirical studies about the effect of social processes on creativity have been conducted in the sociology field, in which creativity is not clearly distinguished from innovation. These works usually analyse both creativity at a particular stage or measure both creativity and innovation as the dependent variable in terms of patent counts or citations (Fleming, Mingo & Chen, 2007; Nerkar & Paruchuri, 2005). Only a few scholars seek to improve the measurement of creativity using involvement in a creative project (Obstfeld, 2005) or managers' evaluation of submitted ideas (Burt, 2004), but they still consider these measures as measures of success without taking into account that, involvement in creative projects or "good ideas" (according to managers), doesn't necessarily mean "new products". We propose that a process perspective that considers the distinction between creativity (i.e. idea generation) and innovation (i.e. idea implementation) can be useful in explaining the conflicting results in the sociological stream of research.

In this literature, we can find two opposing perspectives about the influence of social structures on creativity. On one side, proponents of cohesion sustain that closed social structures support the development of trust, group norms, and efficient flow of information, all of which enhance creativity (Milliken, Bartel & Kurtzberg, 2003). These close ties also facilitate the exchange of information that is fine-grained—that is, tacit, complex, or proprietary at both the individual (Obstfeld, 2005; Reagans & McEvily, 2003) and network levels of analysis (Uzzi & Spiro, 2005). Research at a dyadic level also shows that strong ties are effective catalysts for creative ideas when such

ties link actors who are intrinsically motivated to work closely together (Sosa, 2011).

On the other side, proponents of brokerage often build on Granovetter's (1983) concept of the strength of weak ties. Since creativity requires a variety of information sources, a large number of sporadic and distant relationships (i.e., weak ties) can foster creativity (Burt 2004; Nerkar & Paruchuri, 2005; Perry-Smith & Shalley, 2003). According to this perspective, people whose networks span structural holes (Burt, 1992) such that they are connected to sources of information that are not connected to each other have early access to diverse, often contradictory information and interpretations, which gives them a competitive advantage in seeing good ideas. In this sense, bridging ties provide access to alternative points of view and to a broader scope than do collocated, or strongly tied, connections. In other words, weak ties help increase creativity and diffuse good ideas once they have been developed. For instance, collaborative brokerage (i.e., low group cohesiveness) can aid in the generation of an idea (i.e., creativity) but then it can hamper its further diffusion and use by others (Fleming et al., 2007).

In sum, there are reasons to believe that group cohesiveness favours creativity, but it might not directly affect innovation, when innovation is consecutive to creativity.

### **Our framework of analysis: Group cohesiveness, creativity and innovation**

Thus, adopting a process perspective which sees innovation as an outcome of creativity, we suggest that group cohesiveness (i.e. friendship), group decision-making, and organizational structure affect creativity, while only group decision-making and organizational structure directly affect how creativity lead to implemented innovations. Hence, our premise is that group cohesiveness has only an indirect effect on innovation because innovation is successive to creativity. In other words, friendship has a direct impact on creativity and an indirect impact on innovation, due to the fact that while creativity requires "thinking", implemented innovation requires "action" (Figure 2 summarizes our framework).

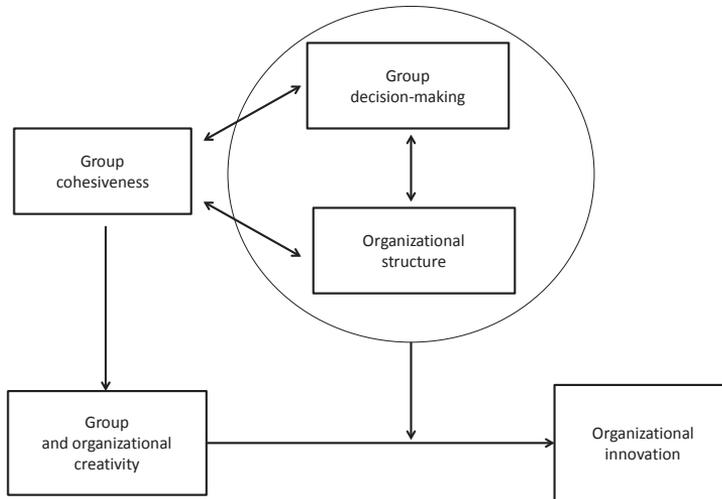


Figure 2. Theoretical framework

## CASE STUDY PROCEDURES AND ANALYSIS

### Research strategies: Methodological notes

A qualitative case study method is adopted in this research. We follow Eisenhardt's (1989) suggestions on case study analysis; they are particularly useful in our research area (Eisenhardt, 1989; Corley & Gioia, 2004) since using an inductive approach helps us explain the relationships that emerge from the literature review.

As we explained in the introduction, this case is not "unique" nor "exceptional" (Yin, 2013), however given that we have informally followed the story of the venture for several years (since 2003, so even before the firm was established) and we have observed some interesting dynamics that attracted our attention, we choose to formally interview and observe the venture members.

We chose this case because (1) during the period studied (2003-2011), the founding team became more cohesive, allowing us to differentiate the effects of different levels of cohesion (i.e. friendship) over time; (2) the sector in which the firm operates is highly innovative, so creativity is an issue of concern in the firm; and (3) our privileged access to firm members and data.

We collected data about the company from multiple sources: we interviewed the CEO of the firm and integrated that information with data from previous informal interviews with the founding team members; from the company's website and Facebook page; and from other internet sources.

A visit to the enterprise also allowed us to see their innovations so we could understand the creative process involved. We also held two semi-structured interviews of more than one hour each with key leaders of the firm. All formal interviews, which were carried out between June 2010 and February 2011, were tape-recorded and transcribed, and a summary was sent to the interviewees for review to make sure that we elaborated all the information correctly and to collect further feedbacks and comments.

Our within-case analysis after the data collection (Eisenhardt, 1989) resulted in some speculative research propositions.

In the analysis, we first describe the research site and the main characteristics of the firm. Then, we deepen the investigation on the organizational processes of interest by means of some illustrative events.

### **Research site: DemoMark**

DemoMark (a pseudonym) is an ICT venture that provides services related to software development. Its activities deal with a wide range of consulting services, such as image processing and assistance with technological transfer from basic research to industry and *vice versa*.

The entrepreneurial team is composed of four members: Matteo Fris, Roberto Giapani, Ornella Matti, and Sergio Racci (pseudonyms). The firm was established in 2006, but the idea for the firm emerged in 2004/05 when the founders met at the University of Udine, Department of Physics (Table 1 summarises some descriptive information about the founding team members).

Initially, DemoMark provided software solutions for supporting research activities, but its offer has been extended in the face of market changes. Especially during the 2008 world financial crisis, universities and research institutes had financial challenges, so DemoMark started to offer its product to private businesses (software for image enhancement and also websites) as well. Today, DemoMark's software solutions are also applied to medical systems, which are included in some academic research projects. These projects have become increasingly important to the firm over time, especially because thanks to them the firm could develop several new products and algorithms.

At the time of the interviews, members were also considering whether to apply to some public calls. For example, the European Spatial Agency publishes several announcements yearly that could be appropriate for DemoMark's services, but the firm could not afford to apply, as its members would spend too much money and time in writing the project without any assurance that their application would be accepted.

**Table 1.** Descriptive information about founding team members

Name	Matteo Fris	Roberto Giapani	Ornella Matti	Sergio Racci
Year of birth	1973	1970	1973	1979
Education	PhD in Computer Science	PhD in Physics	PhD in Mathematics and Physics	Master Degree in Physics Competencies on Accounting, Administration, Management and Business Planning
Previous professional experience	Post doc researcher at the department of Physics in Udine	Post doc researcher at the Department of Physics in Udine	PhD student at the Department of Physics in Udine; attended some optional management and accounting university classes	Master student in Physics in Udine

The external environment and clients' demands have an impact on overall venture creativity and innovation, as information between the client and the firm is exchanged until agreement is reached, at which point most of the creative ideas actually become implemented innovations. Hence, the external context is a stimulus for change and searching for new solutions, which consequently force the founders to work on these inputs. Even if we could not rule out the influence of external dynamics (e.g., the type of demands of clients, etc.) on creative processes, we tried to focus on the number of ideas generated by comparable demands and observed how the process evolved under the situation of low and high group cohesiveness.

DemoMark defines itself as a creative firm. As Sergio Racci explained, *"We have several algorithms developed, thanks to all the research projects that could be transformed into products tomorrow. We used only about 30 percent of our algorithms, while the other 70 percent are just good ideas. We don't have enough resources to develop all the potentialities our firm has, or it is difficult to figure out the application of our innovations. For example, we developed software that captures letters and figures: the potential of this innovation is really high. However, the only product we developed was a videocamera that can recognize cars' license plate numbers and automatically send an input to open a gate"*.

### Members' relationships in DemoMark

The relationships among the members of this firm evolved over time. In 2002, before the firm was set up, Matteo, Roberto, Sergio, and Ornella met at university. Roberto had a post doc position and was working on some academic projects with Matteo, who was a PhD student. Roberto had been the professor of Sergio, a master's student. Since Sergio was interested in collaborating in a research project, he started to meet Roberto and Matteo more frequently. Ornella, also a master's student, knew Matteo and later took a PhD course in Mathematics and Informatics. When Matteo, Sergio, and Roberto started to talk about setting up an enterprise, they knew little about business planning and administration, so they asked Ornella to help them. She had learned accounting and management in coursework.

### Synthesizes the main elements that have changed over time.

Once the firm was set up, the four founders' relationships strengthened from working together every day, and the group became increasingly cohesive. Thus, their relationship changed over time: from an acquaintance relationship it became friendship, and today two of the founders are married (Ornella and Sergio).

**Table 2.** Organizational changes at DemoMark

Shifts	Low Level of Group Cohesiveness	High Level of Group Cohesiveness
Governance	Peer governance: all decisions made jointly	Operative decisions: made by whoever has the required competencies. Strategic decisions: made jointly
Coordination mechanism	Coordination through standardization: weekly meetings defined ex ante (three times a week)	Coordination through mutual adjustment: only when necessary
Trust	Low level of trust: acquaintances	High level of trust: friendship (each member knows that the others will make the right decisions)
Clients	Universities and research institutes	Universities, research institutes, and private businesses
Products	Software for public research purposes	Software tailored for private businesses

All four of the firm's founders are willing to do what is necessary to make the firm profitable; they have invested time and personal resources in the business and have learned to do what is best for the group, rather than

only what is best for themselves as individuals. Besides having an impact on creative outcome, this shift was accompanied by changes in the decision-making process and the organizational structure.

### **Group cohesiveness, creativity and innovation: Illustrative concepts**

Three illustrative concepts are described in this section to explore the relationships among cohesiveness, creativity, and innovation: the decision-making process, logo and website design, and pride and ethics.

**Concept 1: The decision-making process.** At the venture's inception, all decisions were made jointly and with unanimity, as the need to control one another's work was considerable. Soon, however, the entrepreneurs faced problems. As Sergio describes it, *"In the beginning, when we'd known each other only a short time, we wanted to share everything and discuss every idea. This doesn't mean that we didn't trust each other at the beginning, but we preferred to know and to share all information. Then, day by day, trust among us grew, so now, when someone has to make a decision, we all know that he or she will make the right one."* The main inconvenience in the beginning, Sergio explains, was the huge number of interactions required among the four founders: *"Think about the purchase of a printer. Even if I knew the prices of two printers, I could not decide which one to buy. I had to email my colleagues and then wait for their answer before making a decision. This took much too long. We noticed that we exchanged a lot of information that wasn't strictly necessary."*

The four founders decided to change the internal norms because the increase of the amount of *trust* needed less control. The increased trust is shown in the number of weekly meetings: in 2006, they met three times a week for about thirty minutes. A year later, they met twice a week, and now they meet only when necessary. The formal mechanisms of control were complemented with trust so they could face the increasing complexity and number of everyday activities.

Today, each member is in charge of activities that are in line with his or her individual knowledge and competencies. Everyone can make decisions that incur an expense of less than 1000 Euros without contacting the others. For strategic decisions, individuals think about solutions without consulting the others, but discuss them together before making the final choice.

While strategic decisions are made jointly, minor decisions are made by the member who is most competent to do so. For example, in the product development process, after the first contact with the client, they decide together who will be in charge of the project, and that person becomes

responsible for it, talking to the clients and proposing initial ideas and possible solutions to all four members to discuss and decide. Decisions about hiring new employees also follow this rule, where one person does a pre-selection and all four members make the final decision. While the initial decision-making system led to too much information-sharing and chaos, the combination of collegiality and definition of roles helped to generate new ideas.

As the literature on organisation growth suggests (see for example Churchill & Lewis, 1983), the efficiency of the decision-making process could be also the result of the growing complexity of the business. This process of growth leads to a structuration of the business, and the definition of roles and responsibilities. In DemoMark this process is also characterised by the strengthening of friends' ties, that consequently, with high probability, affects members' trust.

**Concept 2: Logo and website design.** At the beginning of the venture, when firm members were thinking about a logo, each member proposed images and ideas. Since this activity has to do with aesthetics and taste, their continuing discussions eventually became an annoyance, and they ended up using an external designer. As Sergio explains, *"We discussed a lot about the logo, and in the end, a graphic studio made it. All the discussions were a waste of time, because it was a matter of taste. We would never have found agreement! The same was the case for the website's graphic design—a terrible, exasperating discussion took place until we outsourced the project."*

According to Sergio's thinking, it is important to discuss and decide jointly technical decisions that affect the firm's products and activities and when certain competencies and kinds of knowledge are necessary. Only then can the discussion lead to the generation of new ideas of which the members can take advantage. However, under some conditions debate is a waste of time. The problems associated with agreeing on logo and website design show how a low level of group cohesiveness can limit creativity (and, consequently, innovation) in a small firm where there are not many slack resources.

**Concept 3: Pride and ethics.** Organizational culture, particularly ethics, has affected the firm's strategy. When the members decided to begin the enterprise, they decided not to be a university spin-off because they did not want to have academic staff on their board. They wanted to be completely independent, without owing anything to anyone.

Both pride and ethics are important to them. For example, they agreed when they started the firm that they would "never do websites" because it is as a low-level activity and that they would "never develop software for military purposes," which would be against their moral principles. They also

decided they would have help research in some branches of biology, such as those that control the intensity of X-rays, in order to avoid having to take responsibility for a possible mistake in the software. They also added in the certificate of incorporation some notes about ethical behaviour and choices.

However, after the world financial crisis in 2008, they had to disregard some of their initial agreements even though doing so was contrary to their principles. For instance, they developed some websites, but their norms and values prevented them from developing some ideas into innovations, although they were aware of the potential applications of their products. Since the firm members know each other well, they discuss possible new applications and products informally.

The moral and ethic norms they stated at the beginning are examples of factors that prevent creativity from becoming innovation. In a broader interpretation, we could say that in some cases, contextual factors sometimes prevent creativity from becoming innovation. However, this perception need to be further analysed to be consistent.

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## CASE ANALYSIS AND PROPOSITIONS

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It appears that group processes and context can be either the main drivers of creative outcomes or the main obstacles. By analysing the shifts and events in this particular case study, we explored how the creative and innovative outcome of a small firm, DemoMark, is affected by group cohesiveness and how the organizational structure and the decision-making norms influence the process that generates the new ideas (i.e., creativity) that lead to innovation.

Single elements like group cohesiveness, decision-making processes, information flow, and organizational context can have positive, neutral, or negative effects on creativity over time. These factors also appear to have differing impacts on innovation.

When the relationships among the members of the firm seem to shift from a low level to a high level of group cohesiveness, creativity also reaches higher levels. This observation is in accordance with social capital theories that suggest that closed social structures increase trust, ease the development of group norms, and improve information flow, all of which enhance creativity (Milliken et al., 2003; Coleman, 1988; Sosa, 2011). This effect is especially evident in the process of new product development (*Concept 1*), even when one person is responsible for the project, if all the members debate the various solutions, examine the various points of view, and deliberate the final solution with the richness of information matured in this process.

This sharing of ideas fosters the creative outcome, but our case shows that cohesive groups can generate new ideas without necessarily implementing them, since implementation may require resources that a small firm cannot afford because of resource constraints or ethical issues (*Concept 3*). In fact, DemoMark's CEO declares that only about 30 percent of the firm's creative ideas become products.

A low level of group cohesiveness and the related emphasis on consensus and unanimity endangered creativity in DemoMark's early days, as discussing everything became tiresome in time (*Concept 2*). However, according to the brokerage in social capital theory (Burt 2004), a low level of group cohesiveness and a large amount of information-sharing should have been the key for creativity. Coming from different information groups, the members should have brought together their differing perspectives, which should have engendered creativity. In this case, we found not only that a low level of group cohesiveness is not sufficient for the generation of new ideas, but that it can also be an obstacle to innovation. The need for control over one another's work and the common objective to make the firm profitable caused an information overload related to ongoing activities, which consumed the time and resources that were needed for the development of new ideas.

It appears also that the exchange of thoughts in a highly cohesive group that can divide labour efficiently is a valuable resource for social capital and, therefore, for creative and innovative performance. Since members discuss new ideas from the beginning and consider how to organize the potential project, there is a sense of group ownership that makes the group more likely to implement the project and reach the innovation stage.

Another element to consider in this process is the small firm's limited resources, especially money and time, which limits its ability to develop innovative projects. Instead of using its own resources, the firm uses its relationships with clients as a source of ideas and money necessary for innovation. In this case, the number of good ideas is higher than the number of products that are developed, so size is a critical element of the dynamic.

The organizational culture—particularly the ethical norms that characterize DemoMark's culture—and the members' sense of pride are also important factors in the firm's creative process (*Concept 3*). Previous research finds that the ego can be a factor in generating new ideas during brainstorming sessions (Cohen, Whitmyre & Funk, 1960). Strong shared norms based on personal values and mutual respect could limit the development of innovation (e.g., software for military uses), even if such shared norms do not obstruct the generation of ideas. In fact, the four founders agreed to bypass some of the proscriptions they set when they founded the business, such as the proscription against building websites. Clearly, ideas are present even

when the group's morals, values, and principles preclude them from pursuing these ideas. The choice not to build websites was due to pride, so it was easier to overcome than an ethical proscription would have been.

Concepts 1, 2, and 3 illustrate how group cohesiveness interacts with group processes and contextual factors to generate creativity and the succeeding innovative outputs. A low level of group cohesiveness, combined with a highly formalized-decision making processes, results in a low level of creativity and, thus, a low level of innovation. Organizational context does not appear to play a critical role in this relationship. However, a high level of cohesion leads to creativity and the generation of ideas, as strong ties facilitate information flows and informal decision-making processes based on trust. In this case, organizational context plays a critical role in transforming ideas into products, while resource constraints and ethical norms prevent creativity from leading to innovation. In short:

**Proposition 1a.** A low level of group cohesiveness in the founding team causes; disorganization in the management of activities, greater need for control over other members' work, information overload, and a low sense of group ownership of the initial idea, resulting in a low level of creativity and, consequently, a low level of innovation.

**Proposition 1b.** A high level of group cohesiveness in the founding team helps the team define the internal division of labour and lowers the need for control over other members' work, fostering creativity, increasing the sense of group ownership of the initial idea, and increasing innovation.

**Proposition 2a.** Limited resources interfere with the mechanisms of generating innovation, but not of group creativity.

**Proposition 2b.** Group members' pride and ethical norms interfere with the mechanism of generating innovation, but not that of creativity. As an obstacle to innovation, pride is weaker than ethics.

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## CONCLUSION

In this article, by reviewing several research traditions about the role of amical relationships, we focused on how friendship and business norms may be seen as opposite forces that push firm decision-makers to think and act in different ways.

This exploratory research aims to shed light on friendship as an important group process that deserves more attention in an effort to go beyond the recurrent theme that founding groups become more structured over time (Kohtamäki, Kekäle & Viitala, 2004). As propositions 1a and 1b aim to stress, we focus on a specific group characteristic related to friendship, that is group

cohesiveness, and determine its impact on two consecutive outcomes, creativity and innovation. By analysing the DemoMark case, we begin to shed light on the possible interrelationships among disciplines in explaining the impact of group processes on creativity and innovation. Since the case focuses on a small entrepreneurial venture, it provides useful insights that differ from the existing research conducted in larger settings (Bergendahl & Magnusson, 2014).

In particular, our findings from this exploratory case study show that the principle of reciprocity by regulating both *business* and *friendship* may differently impact on the way the founding team members take decisions and thus on firm level structure and outcomes. Indeed, members perceived their *thoughts* (i.e. opinions) as a resource for the business. The high reciprocity that characterizes business dynamics implied that all resources, even thoughts, had to be equally exchanged. In other words, the prevalence of the exchange-oriented norms in place enhanced the need for exchanging all thoughts. That's why a situation of low group cohesiveness (i.e. friendship) may lead to disorganization: it appears that, in this case, chaos did not lead to creativity or innovation. While high group cohesiveness, which provides the benefit of lowering the perceived need of full reciprocity in exchanges within the firm, favors the creation of structure in the organization which sustains the generation of both creative ideas and implemented innovation.

The literature on founding teams (Cesaroni et al., 2005) may benefit from this research, which provides new insights on group dynamics, as requested in a recent call for research on the relationships between entrepreneurial teams' group dynamics and innovative processes (Baron & Tang, 2011; Brockman et al., 2010).

As for practical implications, we hope that this exploratory research stimulates further investigations in this area, in particular scholars might consider the issue of exchanges and reciprocity introduced in the theoretical part of the article, and develop a finer grained research model to purposefully collect data to explore how business and friendship exchanges interact. We report in the Appendix a list of references of commonly used measures of friendship that researchers might want to consider in their future analysis. For instance, it would be interesting to explore how the different reciprocity principles that regulate business and friendship dynamics impact on firm level outcome (such as business performance, growth, etc.) and on individuals (e.g., happiness, life and work satisfaction, etc.). Also, the theoretical ideas about reciprocity might be used to analyse other group decision-making processes. Moreover, not only scholars, but also entrepreneurs, may certainly benefit from the explanation of what can affect creativity and innovation and the possible consequences of internal processes, and its effect on other firm

outcomes. For their part, educators could learn to increase their focus on those actions and behaviours that foster not only creativity but also tangible outcomes such as innovation.

The main limitations of this study lie in the implementation of the case study research method. A multiple case study with purposefully collected data could be more useful in defining the role of friendship in innovative outcomes. For instance, a case in which the founding team was initially made up of a group of friends but in which relationships evolved such that each member became more isolated in making decisions could help this work to advance. Also, a more refined assessment of friendship in business settings is certainly a challenging task that deserves further investigation. Moreover, a configurational approach could suggest new insights on the intervening factors that lead to creativity and innovation, especially in terms of differentiating how organizational and group characteristics work together to lead to creative and innovative outcomes. Finally, as the present research involves an inductive case study, future quantitative studies could come up with other propositions in order to advance knowledge about the relationships between friendship and business also focusing on creativity and innovation.

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## Appendix

A summary of different measures of friendship from the literature

Measures that consider positive and negative components of friendship	a. Network of Relationships Inventory (NRI)	Furman & Buhrmester, 1985*
	b. McGill Friendship Questionnaire- Friend's Functions (MFQ-FF)	Mendelson & Aboud, 1999*
Quantity of friendship	a. Single item, which asks participants to report their number of close friends	Demir & Weitekamp, 2007*
	b. Combined with quality	Demir et al., 2013*
Satisfaction with friends	a. Single item	Lyubomirsky et al., 2006*
	b. Scale adapted from Hendricks's (1988*) relationship satisfaction scale	Morry, 2003*

\* Note: articles indicated in the reference list.

### **Abstract (in Polish)**

Z perspektywy procesu wywodzącego się z kilku dyscyplin, dyskutujemy teoretycznie o tym, jak dynamika przyjaźni w zespołach założycielskich może wpłynąć na firmę. Opracowujemy konceptualny model, który uwzględni odmienną naturę wymiany w biznesie i przyjaźni, co może posłużyć za użyteczną podstawę dla przyszłych badań (w załączniku przedstawiamy kilka miar przyjaźni). Następnie badamy przykładowy przypadek. Skupiamy się na spójności grup (pełnomocnictwa do

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*przyjaźni), podejmowaniu decyzji i organizacji zespołu założycielskiego włoskiej firmy technologicznej oraz poznajemy proces generowania twórczych pomysłów i wdrażania innowacji. Nasze wstępne ustalenia wskazują, że chaos niekoniecznie sprzyja kreatywności i innowacji: przy niskiej spójności grupowej prowadzi do dezorganizacji, ponieważ normy biznesowe przeważają nad przyjaźnią, wysoka spójność grup tworzy strukturę organizacyjną, która podtrzymuje generowanie kreatywnych efektów, wzmacniając rolę przyjaźni w procesie decyzyjnym. Tłumaczymy to stwierdzenie w świetle zasady wzajemności wymiany.*

**Słowa kluczowe:** *spin-offs; wzajemność; przyjaźń; spójność grup; kreatywność; innowacja.*

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# Generic Modular Ontology for Innovation Domain. A Key Pillar Towards “Innovation Interoperability<sup>1</sup>”

*Lamyaa EL BASSITI*<sup>2</sup>

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## **Abstract**

*In a century of complexity, organizations are moving towards open innovation. So, contemporary Innovation Management Systems have to deal with the distributed, heterogeneous and fast growing characteristics of knowledge that are available in different forms and are rather weakly structured. In addition, the increasing degree of specialization and interdependence between and among organizations calls for group capabilities at the organizational level to interoperate with others to produce not only novel, but also critically acclaimed innovations. This is the focus of this paper that introduces the new concept of “Innovation Interoperability”. Then, it formalizes and represents semantically the key concepts underlying a systematic innovation approach and the relations between them, through a Generic Modular Ontology, we have called “GenID Ontology”. The latter consists of three interconnected sub-ontologies, referring to the key dimensions of successful innovation within an open context, which are: Core-ideas, Actors and Context. This paper has adopted a mixed research strategy and uses a qualitative online survey to examine the delivered constructs.*

**Keywords:** *innovation interoperability; idea and innovation management; ontology; semantics; online survey.*

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## **INTRODUCTION**

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The need to develop innovations quickly and systematically has become the key driver of growth today. To be able to do that organizations have to make

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<sup>1</sup> Innovation Interoperability: A new concept that aims to smartly investigate experiences as well as inter- and intra-organizational interactions and critically exploit the deduced knowledge to meet current needs and develop new opportunities for unforeseen circumstances.

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best use of their knowledge resources and memory. So, there is an imperative to actively use previous, similar, as well as equal, purposive experiences to advance new ideas' and opportunities' emergence. Thus, keeping a record of previous innovation initiatives appears to be of utmost importance as part of the innovation process. As such, every formalized innovation event has to be collected and stored as experienced knowledge, and any technology able to do this will allow the innovation process performance to be improved by reducing innovation time, as well as avoiding repetition and duplication in the process. Besides, organizations have become more aware of external knowledge and technology and they feel a growing need to open up their innovation processes.

Nevertheless, the widely distributed, heterogeneous and fast growing characteristics of innovation knowledge available in different forms and rather weakly structured, make it more difficult to find, organize, access and maintain relevant sources of knowledge. So, it becomes imperative to integrate the innovation process with mechanisms and technologies that allow the establishment of a common vocabulary to facilitate access and reuse of knowledge, and to coordinate efficiently the actors' roles in the innovation process. This is an explicit call to the concept of "*interoperability*". Zittrain (2008) has argued that ideas which emerge within an interoperable context are likely to be good because it could lead to "generative" innovations. Nevertheless, at this level the main challenge is to identify "innovation interoperability" and what it means, the key dimensions underlying this concept, their potential benefits and how it can be achieved and sustained within a complex system.

Pagano et al. (2013) distinguished three levels of interoperability: (1) "*Organizational level*" entailing the definition of processes and policies to enhance inter and intra-collaboration; (2) "*Technical level*" involving the link up of heterogeneous systems via agreed standards; (3) "*Knowledge level*" focusing on the exchange and sharing of data and its meaning between linked systems. One of the most complicated issues related to knowledge interoperability is "*knowledge representation*". Hence, it is necessary to create a structure able to take knowledge from day-to-day formal innovation events, to store proper characteristics of the experience acquired through these activities, to keep this experience as explicit knowledge, and to make it available for tools and technologies in order to be used, analyzed, and categorized. In doing so, it could be possible to extract the most significant characteristics from the current circumstances and relate them to similar situations and initiatives in the past. This paper focuses on this issue and aims to provide a relevant answer to the following research question: "*How*

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*to represent the innovation domain semantically to support innovation interoperability?”*

The remainder of this paper unfolds as follows: In the next section, to facilitate a better understanding of the topic, we introduce the concept of “innovation interoperability” and highlight the need for it within an open context. Then we review and discuss the existing innovation ontologies. The following section presents the adopted research design and evaluation approach. Next, we detail “GenID Ontology” aiming to deliver a single point of reference for innovation KM and provide a formalization that can be applied to achieve interoperability within and across different organizations and knowledge systems. Data collection and analysis of the empirical investigation are presented in the following section, before we conclude by summarizing topics for further research.

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## LITERATURE REVIEW

### **The need for “innovation interoperability”**

Over the last two decades, innovation management has increasingly evolved towards a more distributed, more participatory and more decentralized approach to innovation. Thence, organizations have become more aware of external knowledge, technology and competencies to maintain their competitiveness in the global market. Named “*Open Innovation*”, this paradigm refers to the use of both inflows and outflows of knowledge to improve internal innovation and expand the markets for external exploitation of innovation (Chesbrough, 2003).

Recently, the interest in open innovation has been on the rise in both the academic and business world. A report authored by Chesbrough and Brunswicker (2013) found that an impressive 78% of large companies are practicing some form of open innovation and that they are satisfied with the achieved results. A 2015 study conducted by Accenture with G20YEA highlighted that 26% of large companies currently practiced open innovation, while a further 38% expect to within the next three years.

Being based on the fact that useful knowledge today is widely distributed, weakly structured, heterogeneous and grows very quickly, open innovation challenges traditional notions of KM. So, within an open context there is a clear need for some sense of what of the available knowledge resources should be mapped. Further, more and more innovation systems appear, so it becomes imperative to establish a common vocabulary that facilitates access and reuse of knowledge and to coordinate efficiently the actors involved in the innovation process. In other words, there is a need for innovation

interoperability (El Bassiti & Ajhoun, 2014). The EU Software Directive (2009) defines interoperability as the ability to exchange and mutually use information. Pagano et al. (2013) regards interoperability as "a problem affecting the interaction of entities at various levels". Accordingly, we define "*innovation interoperability*" as the ability of people, systems and organizations to smartly investigate experiences as well as inter- and intra-organizational interactions and critically exploit the deduced knowledge to meet current needs and develop new opportunities for unforeseen circumstances. Thus, storing experiences is necessary for finding an optimal path to the source of inspiration required for the emergence of great ideas and outstanding innovations. To deal with such a challenge, semantic technologies have been proposed to provide an efficient solution to support the integration of the innovation process with heterogeneous knowledge sources.

According to Gruber (2007) "many major scientific discoveries and breakthroughs have involved recognizing the connections across domains or integrating insights from several sources. These are not associations of words; they are deep insights that involve the actual subject matter of these domains. The Semantic Web has the machinery to help address *interoperability* of data from multiple sources". In May 2001, the concept of a semantic web was introduced by Berners-Lee et al. as a collection of standards and approaches for bringing order and meaning to unstructured data on the web. Semantic web technologies enable the explicit representation of knowledge and its further processing to deduce new knowledge from an implicitly hidden one. In addition, using semantic techniques in innovation management has the potential to improve end-user efficiency by means of automated processing and to cope with the advanced analytical processing of innovation metadata through reasoning. Thus, innovation managers can profit from better structured information, integration and data exchange across tools and platforms, as well as additional semantic reasoning capabilities that would allow them to analyze ideas based on related concepts. To achieve these goals, ontologies, which provide "formal and explicit specification of a shared conceptualization" (Studer et al., 1998), were used.

Ontologies, as the foundational component of semantic technologies, provide a framework for the "standardization of concepts and relationships used to describe and represent an area of knowledge", in order to support interoperability and facilitate access and reuse of knowledge (W3C). They encapsulate rules for automated inference and reasoning, making it possible for applications and software agents to discover relationships and meaning which are not explicitly expressed (Berners-Lee et al., 2001). In addition, using ontologies can benefit innovation management by allowing advanced searches, information filtering and semantic annotation, which can support

continual learning, enhance the understanding of contributions from different actors and increase the quality of decision-making.

### Innovation ontologies

According to Lee (2001) “research in the IS field examines more than just the technological system, or just the social system, or even the two side by side; in addition, it investigates the phenomena that emerge when the two interact”. Thus, to understand the innovation field, an ontology that links the natural, the social and the artificial worlds of human constructions is required. Although several research-works currently deal with innovation management, to our knowledge few of them explicitly aim at creating a common ontology for the purpose of achieving interoperability. An overview of the existing semantic models has been summarized in Table 1 below:

**Table 1.** Overview of innovation ontologies

Ontology	Feature
<i>Iteams Ontology</i> (Ning et al., 2006)	<ul style="list-style-type: none"> <li>• Classified as Domain Ontology</li> <li>• Designed for Extended Enterprise</li> <li>• Facilitates distributed collection and development of ideas</li> <li>• Relies on Semantic Technologies to allow integration of idea development tools</li> <li>• Main Classes: Goals, Actions, Teams, Results and Community</li> </ul>
<i>OntoGate Ontology</i> (Bullinger, 2008)	<ul style="list-style-type: none"> <li>• Classified as Domain Ontology</li> <li>• Focuses on the early stage of innovation.</li> <li>• Aimed at modeling the idea assessment and selection rather than providing technical integration</li> <li>• Deduced from empirical research</li> <li>• Covers three perspectives along which an idea or concept can be evaluated: market, strategy and technology</li> <li>• Presents a large number of modules</li> <li>• Core Elements: Participant, Gate (integrates Assessment), Input, Output</li> </ul>
<i>Idea Ontology</i> (Riedl et al., 2009)	<ul style="list-style-type: none"> <li>• Classified as Application Ontology</li> <li>• Designed for Service Sector</li> <li>• Focus on the front end of innovation (Idea Management)</li> <li>• Offers common language for idea storage and exchange to achieve interoperability across innovation tools</li> <li>• Does not provide a data model for representing individual ideas</li> <li>• Provides a technical means to represent complex idea evaluations along various concepts</li> <li>• Main Concepts: Core Idea, Idea Realization, Community, Status</li> <li>• Generic Concepts of Core Idea: Origin, Person (Creator), Rating, Tagging, Grouping</li> </ul>

Ontology	Feature
<i>GIZMO</i> <i>Ontology</i> (Westerski et al., 2010)	<ul style="list-style-type: none"> <li>• Classified as Domain Ontology</li> <li>• Focus on the front end of innovation (Idea Management)</li> <li>• Aimed at serializing the IT systems data and enabling idea comparison regardless of the underlying IT system layer</li> <li>• Aimed at using semantic web technologies to interconnect data</li> <li>• Developed based on a defined Idea Management Life Cycle</li> <li>• Provides a formalization of metadata that can be used to describe ideas and associated information</li> <li>• Main Concepts: Trigger, Innovation, Object, Proposed</li> </ul>

Source: El Bassiti & Ajhoun (2014).

As a stored experience, we consider every innovation deliverable as a “*unique knowledge unit*” involving a “*similar set of activities*”. This uniqueness, on one hand, is driven by multiple factors including the transient nature of *innovation actors* and the distinctive characteristics and *contextual criteria* of each innovation journey. The similarity, on the other hand, is driven by long-held views of how innovation initiatives should be conducted through reasonably stable organizational structures, slow-changing key concepts and a risk-averse approach to investment policies. This challenging duality of uniqueness and similarity can be addressed through the development of a granular ontology that has to be based on the concept of *flexibility* to cater for uniqueness and the notion of *uniformity* to cater for similarity.

Accordingly, a generic representation of innovation must cover the following criteria: (1) *Management Flexibility*, which allows checking if semantic tools can be applied irrespective of organizational characteristics or contextual variables, (2) *Validation Uniformity*, which allows checking if the innovation deliverables are evaluated based on a set of predefined criteria. As well, if the assessment results pertaining to an innovation phase, stage or iteration can be uniformly and respectively compared to another deliverable at the same phase, stage or iteration. In addition, according to Fox et al. (1998) and Gruber (1995), a representation of innovation must also cover (3) *Functional Completeness*, which allows checking if the semantic representation provides the necessary information to support the management of the represented domain, i.e. if the semantic representation is in respect to the domain’s purpose and its intended use. (4) *Perspicuity*, which allows checking if the representation is easily understood by the users so that it can be consistently applied and interpreted, and if it “documents itself?” (5) *Precision/Granularity*, which allows checking if the core set of the representation primitives are partitionable or do they overlap in meaning? In other words, does the representation support reasoning at various levels of abstraction and detail? Based on these factors we evaluated the innovation

ontologies presented in Table 1 above. Table 2 below provides a summary of this evaluation:

**Table 2.** Innovation ontologies evaluation

Criterion Ontology	management flexibility	validation uniformity	functional completeness	perspicuity	precision/ granularity
Iteams Ontology	x	x	x	√	√
OntoGate Ontology	√	√	x	x	x
Idea Ontology	x	x	x	√	√
GI2MO Ontology	√	√	x	x	√

The investigation of the concept innovation has been a hard challenge for scholars because the definition of this concept is still fluid and slippery. The literature from innovation semantic representation provides few ontologies which, although relevant, have limited the scope of the key concepts underlying the innovation knowledge area. Each of these ontologies has presented “innovation” differently to suit the purpose of the study at hand, which has led to narrow and restricted conceptualizations of this domain of knowledge on the majority of ontologies. In addition, the presented models - although valuable in their own right - do not provide a foundational basis suitable for the systematic investigation of the innovation domain. Because of this inconsistent representation of innovation, no common understanding exists about what the meaning is of many related concepts, which has led to problems for both academics and practitioners in the field of innovation management as there is little opportunity to build up a shared knowledge model about innovation.

Although relevant, the knowledge representation provided by Iteams Ontology investigates the organizational context (Extended Enterprise) and provides the key features of organization that interact with and affect the innovation process, but doesn’t provide the key concepts underlying innovation as an activity and a knowledge domain. OntoGate, although it is considered as domain ontology, doesn’t highlight any specific concept related to the innovation knowledge domain. Further, it provides a very generic overview of the key elements of the innovation process and lacks the explicit capturing of specific concept related to the idea which is the central object that defines an innovation, the context where this idea has emerged

and evolved, and the actors involved in the innovation process. Whereas Idea Ontology is designed for the service sector, it emphasizes a set of concepts related to idea generation and focuses on the concepts underlying idea evaluation. Finally, GI2MO Ontology, despite providing coverage for most of the key concepts underlying idea management, focuses on idea assessment and lacks explicit capturing of contextual conditions and knowledge about actors involved in the innovation process.

As a result, we conclude that the presented ontologies, although they have a similar objective to represent innovation semantically, they differ in conceptual depth, practical focus, terminology, and target audience. Each model is either specific to a domain or focuses mainly on a specific aspect of the innovation process. Although there are a few -extensive- efforts trying to provide a specific view, there is no comprehensive model that can be applied to the innovation knowledge modeling, its lifecycle phases or its deliverables in a holistic manner. As such, we decided to design and develop a generic ontology to represent semantically the innovation domain in a systematic and consistent manner, in order to avoid the shortcomings and weaknesses found in existing models. Leveraging from existing ontologies (e.g., FOAF, DOAP, SIOC, SKOS, SCOT), we aim to define a more targeted approach to innovation design and adoption with a systematic and open view (El Bassiti et al., 2017).

## RESEARCH DESIGN

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According to Louis Pasteur "chance favors the prepared mind". Since this research work does not seek to prove, disprove or compare phenomena but rather to discover the underlying structures of a nascent domain of knowledge, this study adopted a *mixed research perspective* combining behavioral and design research patterns, an *interpretive and critical paradigm*, a mixture of research strategies focusing on *retroduction*, and an *exploratory mixed data collection* methodology.

The components underlying the GenID framework were first submitted for scrutiny through *peer-reviewed publications*. Then, they were presented to subject matter experts through an *online survey* (questionnaires and interviews). Next, the collected data were analyzed and the results have been further examined through critical discussions within the research group as well as with other innovation professionals. In addition, we collected relevant documentation from key databases (e.g., EBSCO, Elsevier and Thomson Reuters) to complement the data collected through the survey.

To represent a subset of potential stakeholders, a set of 16 innovation professionals and experts from both academia and industry across four countries (UK, Malaysia, Australia and US) were invited to participate in the online survey. Although they shared their materials and thoughts with us, they did not give us permission to disclose their identity.

### **Generic Innovation Designing -GenID- Ontology**

The unpredictability of an emergent process means that it is nearly impossible to know in advance the different *actors* who may be involved in the process and the *context* of their participation (i.e. when and where they will be called in, and whether internal or external conditions will be implicated). This is because an emergent process often requires high-level professional and technical personnel; and the actors involved in such a process have a high degree of autonomy, to the extent that it is very difficult to know how and why their work is performed. In addition, in emergent processes, the needed knowledge evolves dynamically and must often be searched from distributed sources that are sometimes poorly structured and thus difficult to capture and share. Furthermore, a great deal of intuition and sense-making is required in emergent activities.

Innovation, being an *emergent process*, is then characterized by highly unpredictable potential actors, dynamic and not always known context conditions, and ill-structured and distributed knowledge objects. So, innovation, that is perceived as an *emergent knowledge activity*, refers to an organizational activity pattern characterized by (1) Emergent “**context**” with no predefined identity, properties or behavior; (2) Emergent “**actors**” with unpredictable roles or prior knowledge; (3) Emergent “**knowledge objects**” with no best structure or sequence. Based on these cornerstones we elicit the three key dimensions required to build a *domain vocabulary* to represent the innovation concept, we called “**Generic Innovation Designing -GenID- Ontology**” (see Figure 1), which are: (1) **Innovation Actor** which refers to the involved individuals, organizations or communities in the innovation effort; (2) **Innovation Core-Idea** which refers to the aggregation of knowledge objects delivered and used by an innovation actor to generate an idea; (3) **Innovation Context** which refers to the contextual variables -either internal or external- impacting the innovation process (e.g. resource endowments, customer needs).

Based on this conceptualization, we identify the main challenge facing today’s organizations as being able to bring “the right *core-idea* to the right *actors* in the right *context*”. Schumpeter, the father of innovation, has argued that innovation rarely involves a single idea, but rather a bundle



activities that occupy their attention and that filter their perceptions. These differing perceptions and frames of reference are amplified by the proliferation of transactions and relationships among people and organizational units that occur, as the innovation unfolds. In addition, motivated teams, composed of individuals with diverse expertise and experiences, usually accomplish much more than individual employees. Hence, effective management of intra- and inter-organizational interactions is critical to ensure sustained innovation capacity.

In the realm of a GenID perspective, we broadened the notion of “human capital” and we adopted the term “**GenID Actor**” to denote an individual, organization or a community involved in the innovation effort: “**Individual**”, as the primary unit in understanding the organizational innovativeness capability, refers to a person who participates in the *emergence, design* and *adoption* of an idea in order to contribute to private as well as global wealth creation, which is necessary for organizations to thrive in the long run (e.g. educator, design professional, manager or a tradesman). “**Organization**” refers to a complex assemblage of individuals and their interactions (e.g. responsibilities, dependencies, social structures, organizational entities, objectives, tasks and resources). “**Community**” refers to a purposeful cluster of individuals or organizations, temporarily bound together through a unifying long-term mission, a common goal or a shared activity (e.g. CoP).

From a semantic standpoint, the **GenID Actor** sub-ontology aims then to represent the different kinds of innovation actors (individual, organization or community) and their interactions within the innovation process, in order to support effective management of their involvement. This sub-ontology seeks to allow the analysis of the innovation actor competencies; selecting and hiring qualified actors; assigning suitable roles to the proper actors who assist in obtaining appropriately focused communities as required in each phase, stage or iteration throughout the innovation process; exchanging frequent feedback related to goal attainment; and linking between the actors’ abilities, recognition, rewards and the organization’s profitability. Figure 2 below depicts a knowledge view that summarizes the main concepts, attributes and relations comprised in the innovation actor sub-ontology.

As particular concepts included in this sub-ontology we can note: (1) “*Role Concept*” which allows defining prototypical *activities* that an actor may play, alone or within a *community*, in order to achieve a set of predefined *goals*, according to the *responsibilities* and *competencies* he has. (2) “*Competencies Concept*” which refers to the flows of *tasks* for acquiring and using new *innovation objects* (knowledge objects) to bring new ways of thinking through progress tracking, *feedback* interpreting and the analysis and provision of *resources* needed to perform an *activity*. (3) “*Activities*

Concept" which describes the required *tasks* to be performed by a given *actor* to achieve a defined *goal* using one or a set of *core-ideas* at a particular iteration in the innovation *process*.

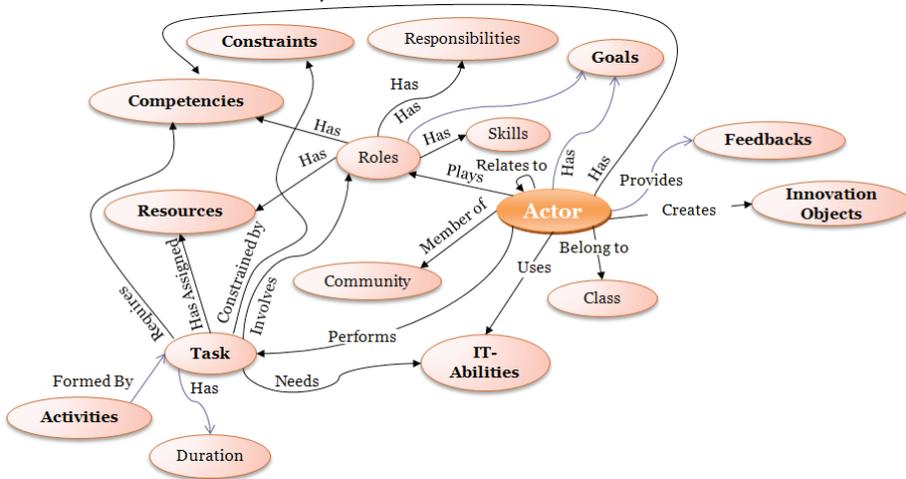


Figure 2. GenID Actor Sub-Ontology Knowledge View

### GenID Core-Idea Sub-Ontology

As reported by Amabile et al. (1996) “all innovation begins with creative ideas”, and they define innovation as “the successful implementation of creative ideas within an organization”. As well, in the innovation process, the stage of “idea generation” also called “ideation”, whose objective is individual or collective identification of new ideas or opportunities, is often recognized as one of the highest leverage point for an organization. So, *ideas* are a cornerstone of innovation management and are essential because without ideas, or rather without good ideas, there are few chances to have an innovation that can drive the growth of the organization. To routinely generate valuable innovative ideas requires *intentionality*. According to Cañibano et al. (2006) intentionality is the will to conceive or imagine realities which differ from the perceived realities with the purpose of making them effective. However, even though getting “better” is important when organizations have reached their limit of efficiency, being “different” is a matter of life and death (May, 2007). According to Davila et al. (2006), only challenges and surprises, in other words the ability to innovate sustainably and radically, can move an organization forward in our increasingly nonlinear and complex world.

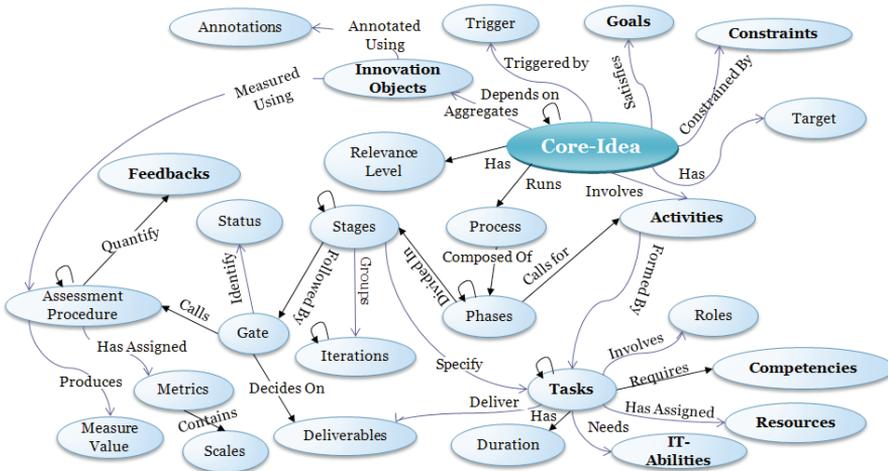
*Deep change* has been always connected with reflection of deep assumptions and stepping out of a *core of reference*, which involves going beyond the boundaries of the pre-structured space of knowledge and

reframing it in the sense of constructing and establishing new dimensions and new semantic categories. In the realm of a GenID perspective, we expanded the concept of “idea” and we used the term “**GenID Core-Idea**” to denote the very essence, the heart, the very meaning, the substance and the complete set of knowledge objects underlying the idea of an innovation. Revealing the core-idea of an innovation involves excavating the most profound meaning and essence of the related phenomenon by observing it closely in a highly mindful manner, asking deep questions and trying to get as close as possible to the object of investigation both intellectually and physically. Thus, an essential challenge for the innovation community has been how to represent the core-idea of an innovation in a systematic manner to realize effortless interoperability and knowledge reuse.

Researchers have proposed that the content of KMSs should be oriented around small knowledge units coupled with associated metadata and semantics (Kolovski & Galletly, 2003). As such, *GenID core-idea* can be represented as one or an aggregation of the four following “**Innovation Objects**”: (1) “**Entity**”: a set of knowledge objects that can be used, re-used or referenced during the innovation lifecycle. (2) “**Behavior**”: a set of actions performed by an actor on a particular entity. (3) “**Process**”: a set of activities occurring within a given context as a result of transforming inputs into outputs in a defined order. (4) “**Class**”: a set of qualitative or quantitative descriptions of an entity, behavior, or process. These innovation objects can be grouped into larger *collections of innovation objects*, which make it possible to personalize the innovation content individually to each actor’s needs and perception without big investments. The short period of time that an actor needs to get acquainted with an innovation object will make the *open innovation* paradigm more accessible, and allow the realization of anytime-anywhere innovations. The reusability of these objects allows, thus, each actor to better understand the innovation materials and the interlinking between the different entities, behaviors, processes and classes.

From a semantic perspective, **GenID Core-Idea** sub-ontology aims then to represent the conceptual and practical knowledge usable by an innovation actor to perform a set of tasks in order to deliver a noteworthy outcome. This sub-ontology seeks to allow the easy handling and quick locating of relevant innovation items; breaking individual as well as organizational innovation content down into small chunks, so each innovation object can be used independently and (re)used efficiently in various innovation contexts; and providing *self-contained* components *aggregating all the required information*, so they can be easily understood, computationally searched and then quickly modified according to the innovation actor’s requirements. This *micro-based approach* is legitimate as we suggest that any innovation can be

built from reusable components of cognition, which are created just once, but can be used several times separately in different contexts. Such an approach can foster motivation for innovating in a sustainable manner. Figure 3 below depicts a knowledge view that summarizes the main concepts, attributes and relations comprised in the innovation core-idea sub-ontology.



**Figure 3.** GenID Core-Idea Sub-Ontology Knowledge View

As particular concepts included in this sub-ontology we can note: (1) *“Trigger Concept”* which describes events leading to the core-idea generation. (2) *“Process Concept”* which allows defining task and activity networks organized in phase, stages and iterations in order to delineate the transformation of an idea into a successful innovation. (3) *“Deliverables Concept”* which denotes the outcome of a stage along the innovation lifecycle.

### GenID Context Sub-Ontology

According to Griffin (1997), the most successful innovative companies do not succeed merely by using one innovation approach more extensively or better, but by carefully selecting the right approach within a given *context*. The context of innovation is not just about individual factors or organizational factors; instead, it shall integrate the various internal as well as external contextual factors into a managerial framework (Ortt & van der Duin, 2008). A contextual approach to innovation management and a better understanding and management of such an approach can provide an overview of alternative choices in different contexts, and assist innovation actors in their decision-

making process, which in turn will make the innovation management more efficient. Managers therefore face the challenge of creating contextual conditions where innovation actors can develop and exploit their innovative potentials (De Spiegelaere et al., 2012). Nevertheless, innovation actors must have the required abilities (e.g. freedom) to perform such adaptations, and not be constrained by corporate rules regarding innovation that contradict what their specific context demands.

In the realm of a GenID perspective, we used the term “**GenID Context**” to denote a network of relationships between the *innovation actors’ roles*, inside and outside the organizational context, and the *innovation objects* underlying the core-ideas of an innovation. Lawson and Samson (2001) argue that a successful innovation is based on a set of core elements and processes that are similar across industries and organizations. Accordingly, as a basis for a wider conceptualization of an *innovation context*, we identified three fundamental elements that emphasize systematic change and sustain re-creation of worthy wealth, and determine what kind of innovation strategy and deliverables an organization can adopt or produce: (1) “**Resources**” that refer to a set of tangible and intangible assets, in particular intellectual assets, supporting the accomplishment of innovation activities. (2) “**Policies**” that refer to the principles, rules and moralities guiding the decision making along the innovation lifecycle. (3) “**Capabilities**” that refer to the systematic knowledge practices and tools, in particular technologies, turning organizational vision into action and enhancing the organizational innovation performance.

From a semantic viewpoint, **GenID Context** sub-ontology aims then to represent the organizational abilities allowed to innovation actors to perform innovation activities and deliver noteworthy outcomes. This sub-ontology seeks to allow the representation of *contextual ability* within a wider perspective that is not only restricted to the use of technologies but that can also pertain to the development of novel policies and organizational resources. This is supported by the fact that in a turbulently and unexpectedly changing environment, the ability of an organization to change and improve organizational resources, policies and capabilities in a flexible and agile manner is a key driver of organizational performance and would impact organizational sustained competitiveness. Thus, the development of a contextual ability to be endowed with the adequate resources, appropriate policies and advanced capabilities, in order to attain breakthrough innovations seems to be more critical for systematic innovation management. Figure 4 below

depicts a knowledge view that summarizes the main concepts, attributes and relations comprised in the innovation context sub-ontology.

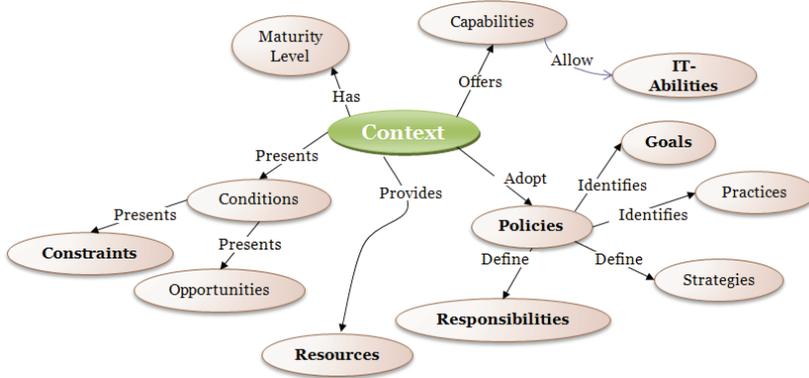


Figure 4. GenID Context Sub-Ontology Knowledge View

As particular concepts included in this sub-ontology we can note: (1) “*Resources Concept*” which describes the organizational assets to be allocated to an innovation actor’s *role* for disposition under its *responsibility* to carry out certain *activities*. It may also be the result of other activities through the innovation *process*. It seeks to support decision making by assigning the right resource to the right actor. (2) “*Capabilities Concept*” which represents the organizational *abilities* granted to an innovation *actor* to continuously transform knowledge and *core-ideas* into new and valuable deliverables for the benefit of the entire community of stakeholders. (3) “*Policies Concept*” which represents alliance-based or risk-sharing contractual agreements between involved innovation actors along the innovation lifecycle. It seeks to allow the analysis of contracts, regulations and *practices* in order to understand how different *strategies* and levels of governance are working and in what way they give rise to conflicting *goals* and contradictory (or complementary) initiatives. It is intended to assist policy makers, researchers and community practitioners in planning strategies, preparing practices, delivering documents, distributing benefits, allocating risks and minimizing conflicts between innovation actors.

## EMPIRICAL INVESTIGATION

The evaluation of ontologies is an emerging field; however, researchers have identified a number of evaluation methods that have been discussed in numerous publications. Peffers et al. (2007) distinguished two activities in the evaluation process, the first aims to show that the artifact feasibly works to

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achieve its objective in at least one context, while the second considers how well the artifact provides a solution to a problem (Venable et al., 2012). The methods for evaluation identified in this case include, for instance, surveys, simulations and logical proofs. Venable (2006), in turn, identified two methods which are the artificial evaluation that explores an artifact in a contrived and non-realistic way, and the naturalistic evaluation that is empirical and investigates the performance of an artifact in a real environment (Helfert et al., 2012). The former includes methods such as laboratory experiments, field experiments, simulations, criteria-based analysis, theoretical arguments and mathematical proofs; while the latter includes methods like surveys, field studies, case studies and action research (Helfert et al., 2012). Nevertheless, a deep core of preliminary ideas and guidelines for choosing between these methods is still missing, which lead to emphasize an “evaluation gap” (Venable et al., 2012) that should be filled.

This study used a mixed research design. The argument for the utility, quality, and efficacy of the built ontology has been based on two evaluation methods: survey and a prototypical implementation used in a case study. In this paper, we present the empirical investigation of GenID Ontology based on an online questionnaire developed under *SurveyMonkey* followed by some interviews. In the questionnaires, the participants were asked to comment on and rate based on a set of 10 criteria (adapted from Hevner et al.'s (2004) guidelines). In the interviews, the participants were asked to provide more detailed feedback on the strengths and weaknesses of the presented constructs and how they can be improved and extended to meet the imperatives of innovation within modern organizations. Figure 5 below provides a summary of the collected data from the conducted online survey:

Based on the results from the questionnaires and interviews, we found that almost 94% of participants have shown a very broad consensus on the clarity, representativeness and usability of GenID Ontology, while all of them (100%) completely agree on its relevance. There was also general agreement (more than 81%) on the accuracy, purposefulness, novelty and inspiring of the presented semantic representations; as well as its easiness of understanding and utility. Whereas one participant objected to the clarity, easiness of understanding and utility of this representation and argued that it should be more detailed and simplified in a manner that it can be commonly used and understood by non-experts.

As a result, the performed experiment has delivered proof for usefulness and relevance of GenID Ontology and its components. These constructs should be extended with more detailed taxonomies, conceptual models and practical tools to enable a better understanding for non-experts. This task

could be done in an easy and flexible way thanks to the modular design of GenID Ontology.

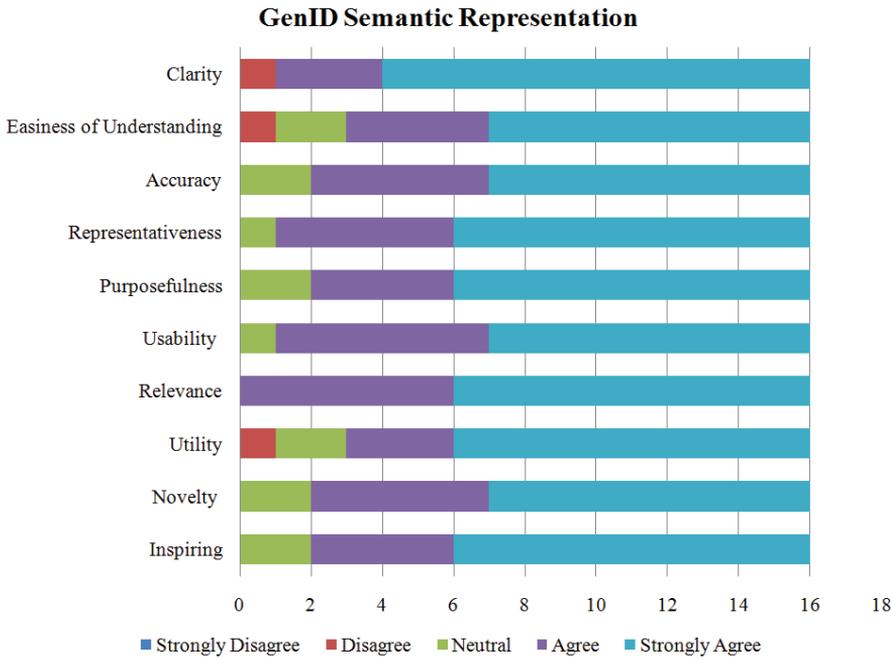


Figure 5. Results of Online Survey about GenID Ontology

Otherwise, although 16 subject matter experts participated in our online survey, this number -while statistically representative from a qualitative perspective- is thinly spread across the delivered constructs. Therefore, the collection of additional data is required before data saturation can be reached and purposeful data analysis can be conducted. To address this limitation, a new set of surveys (questionnaires and interviews) will be conducted to test and validate the deliverable of our research work in different contexts. Besides, and in order to expose the benefits of GenID Ontology and show to what extent it can practically facilitate innovation structuration and management, an *in-depth case study* has been conducted and will be the subject of an upcoming publication.

## CONCLUSION

In this paper, we introduced the new concept of "innovation interoperability" and presented GenID Ontology, a new and generic representation of the

innovation knowledge domain, through a modular semantic model covering the interlinked dimensions that we identified as cornerstone for any successful innovation initiative within an open context, which are: 1) Core-Ideas, 2) Actors and 3) Context. These constructs constitute a first step towards developing a theory of innovation interoperability, and form the basis of a *generic framework* for innovation designing that can be integrated into a multitude of contexts. So, in a future work, they can be *contextualized* to represent collaborative relations between different innovation actors, and be *extended* to identify changing roles and emerging tasks within organizations and communities. Further work will be made to use GenID Ontology for *similarity* detection, *clustering*, *networking* and *recommendation* of relevant innovation entities (i.e. core-ideas, actors and contextual conditions). Another extension of this work would be to develop a custom *annotation* model to capture and visually represent complex innovation processes. These annotations could also be used for innovation assessment, performance measurement and metrics development. Yet, the introduction of new elements to GenID Ontology will make the annotation process difficult. So, potential future lines of research in this case could be to *extend* the ontology and add new concepts in a fully *automatic* way. A related line of extension is to *verify* related *terms' ambiguity and validation*. In another line, an *online innovation dictionary* could be defined and expanded to include a large number of terms and descriptions, in order to reduce terms' ambiguity and enable the development of interconnected competency assessments, learning modules and performance workflows. On the other hand, the performed experiment has delivered proof for usefulness and further experiments with specific and large use cases in both industry and academia are planned.

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### Abstract (in Polish)

*W okresie wzmożonej złożoności organizacje zmierzają ku otwartej innowacji. Współczesne systemy zarządzania innowacjami muszą zajmować się rozproszonymi, heterogenicznymi i szybko rozwijającymi się cechami wiedzy, które są dostępne w różnych formach i są raczej słabo zorganizowane. Ponadto coraz większy stopień specjalizacji i współzależności pomiędzy i wewnątrz organizacji wymaga współpracy grupowej na poziomie organizacyjnym w celu współdziałania z innymi, aby produkować nie tylko nowatorskie, ale także krytyczne innowacje. Jest to sedno tego artykułu, który wprowadza nową koncepcję „Interoperacyjność innowacyjności”. Następnie formalizuje i reprezentuje semantycznie kluczowe pojęcia, które leżą u podstaw systematycznego podejścia do innowacji i relacje między nimi, poprzez Generalną Modułową Ontologię, którą nazwaliśmy „GenID Ontology”. Ten ostatni składa się z trzech wzajemnie połączonych sub-ontologii, odnoszących się do kluczowych wymiarów udanej innowacji w otwartym otoczeniu, którymi są: Core-ideas, Actors and Context. W tym do-*

*kumencie przyjęto mieszaną strategię badawczą i wykorzystano jakościową ankietę online w celu zbadania dostarczonych konstruktów.*

**Słowa kluczowe:** *interoperacyjność innowacji; zarządzanie pomysłami i innowacyjnościami; ontologia; semantyka; ankietę online.*

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## **Biographical note**

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# User Innovation: State of the Art and Perspectives for Future Research

*Maria Roszkowska-Menkes<sup>1</sup>*

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## **Abstract**

*Given the rising role of users in innovation processes and the increasing amount of research in this field the aim of this paper is to explore the limits of our understanding of the user innovation (UI) concept. In doing so, the study addresses four basic questions: (1) Why do users create and share innovation? (2) Who is the user-innovator? (3) What type of innovation do users create? (4) How do users innovate? The results of a systematic literature review identified the main research streams on user innovation, together with weaknesses of past research and perspectives for future studies.*

**Keywords:** *co-creation; collaborative innovation; mass customization; user innovation; user-driven innovation.*

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## **INTRODUCTION**

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For decades innovation research has focused primarily on manufacturers as the major source of innovation in the economy. This dominance of a manufacturer-centric innovation model was challenged by von Hippel in the 1970s, who first paid attention to the role of users as innovators of scientific instruments (von Hippel, 1976). Since this seminal work user innovation (UI) has become one of the key topics in innovation management research. Von Hippel (2011) defines user innovation as the “one that a firm or individual makes to use themselves”. In this model, users are no longer “pure” consumers of products created and supplied by producers, but they design and often manufacture products and services for themselves. User innovation is based on three key premises: (1) users have unique information about their needs; (2) when enabled they will create solutions to those needs; (3) they often freely reveal those solutions to others (Piller & West, 2014). Users, both

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intermediate and consumers, play a central role in innovation processes in various sectors – from oil refining (Enos, 1962), chemical (Hollander, 1965) and the semiconductors industry (von Hippel, 1988) to software (von Krogh & von Hippel, 2006) and sports equipment development (Franke & Shah, 2003). The phenomenon of UI has recently been strongly reinforced by the continuing advances in computer and communications capabilities (von Hippel, 2005) that increase access to information within society (Lakhani & Panetta, 2007) and drive heterogeneity of user demand (Franke & von Hippel, 2003). The latter can be observed especially within the new generation of consumers, born and raised in the digital era, who demand customized products and services or at least the freedom to modify them accordingly to their needs (Tapscott & Williams, 2006). Empirical studies show that many users—from 10 per cent to nearly 40 per cent— engage in developing or modifying products. Consumers are transforming into prosumers whose solutions, which are usually the fruit of cooperation within globally dispersed communities, can successfully compete with fully commercial products.

Von Hippel's seminal study has opened up an extremely fertile field of research that has extended to many diverse areas including innovation communities and open source (von Krogh & von Hippel, 2006), entrepreneurship (Shah & Tripsas, 2007), mass customization (Pine, 1993), open innovation (Piller & West, 2014), and policy and law making (Fisher III, 2010). On the one hand this diversity shows that users are gaining vast recognition as important sources of value for companies and society at large, while on the other hand it leads to conceptual ambiguity and confusion. Further development in this area requires a comprehensive literature review that would provide clarification and explore the limits of our understanding of user innovation.

The aim of this paper is twofold. First, is to review the growing literature on UI and investigate major research streams in the field. Second, is to identify weaknesses and gaps in the previous studies and suggest directions for future research. In doing so, the study addresses four very general questions that enable the organization of the vast literature on UI and embrace this extremely rich concept:

1. *Why* do users create and share innovation?
2. *Who* is the user-innovator?
3. *What* type of innovation do users create?
4. *How* do users innovate?

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To the author's best knowledge there has been only one comprehensive literature review on user innovation published so far. Bogers, Afuah, and Bastian (2010) explore the role that users play during innovation and review the main journals in management in general and management of technology in particular, as well as other publications that explore the sources of innovation. In their analysis the authors focus on four key dimensions—research questions, methods and findings, theoretical perspectives, and assumptions. They identify different research streams within the literature, and some of the key unexplored questions in the area. The previous include the distinction between studies exploring users' innovation activity and those focused on producers taking advantage of users as innovators. In both categories two research streams have been differentiated, respectively: *intermediate users as innovator vs consumer user as innovator*, and *user as post-implementation adapter vs user as source of innovation-related knowledge*. It is argued that the identified streams are too broad and fail to highlight some of the important forms of UI, such as innovation by ordinary users, mass customization, firm-hosted communities and community innovation that, as being determined by different factors and producing different outcomes, should be tackled separately. With regard to further research opportunities Bogers et al. (2010) argue that future studies on UI should focus on user motivation, on types of users and their roles in innovation processes, on types of innovation created by users and their impact on industry dynamics, on clarification of the users and innovations definitions, and finally on empirical validation of the phenomenon.

The study presented in this paper builds on and contributes to the previous review in two ways. First by analysing the literature from the perspective of the four very general research questions it is hoped to identify more specific themes within the field. Second, the selected questions for the study of more recent research papers have enabled an investigation into whether major weaknesses and gaps in the UI literature, identified so far, have been tackled and to provide directions for further exploration in the area.

The remainder of this paper is organized into three sections. The first section introduces the research method. The second section presents the results of the relevant literature review conducted with respect to four research questions, which are followed by the identification of challenges for further development of the UI concept and opportunities for future research. Final remarks are presented in the conclusion section.

## RESEARCH METHODS

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To identify relevant research for the analysis the author used systematic review methodology. While selecting the method, the research questions, as well the form of the findings presentation, the author consulted the methodology presented in Tranfield, Denyer, and Smart (2003) and similar literature reviews on the related field of open innovation (Chesbrough & Bogers, 2014; Dahlander & Gann, 2010; Huizingh, 2011; West & Bogers, 2014). The search was conducted within Thomas Reuters Web of Science for publications that had “user innovation” in the topic field. The topic field includes the title, key words and abstract in the database. The chosen database is generally considered the most comprehensive for scholarly work, includes the most prominent journals in a field (Dahlander & Gann, 2010) and enables the identification of most influential and recognized studies. The search was conducted on April 3, 2015. It included articles, abstracts, editorials, book chapters, interviews and reviews. In order to capture research conducted within management sciences the results were limited to the Social Sciences Citation Index (SSCI).

The search yielded 138 articles. After abstract analysis 7 papers that actually did not concern user innovation were excluded from the original list. Bibliometric analysis was conducted on the final list of 131 articles in order to investigate the growth, scope and breadth of UI research. Although the origins of research on user innovation date back at least to the 1960s, it was not until recently that the field started to be intensively explored by scholars. Out of 131 identified articles 118 were published after 2005. The topic has been discussed in some of the best peer-reviewed journals, just to name few: *Research Policy*, *Management Science*, *Organization Science* and *International Journal of Technology Management*. In alphabetical order, the list of authors that contributed the most to the field include: Franke, von Hippel, von Krogh, Lakhani, and Piller.

The next step focused on the identification of the most influential studies in the area - 50 articles with the largest number of citations were selected from the final list to serve as the basis for a thorough review of UI literature in reference to the research questions. Such citation counts are biased towards earlier publications and cannot identify more recent work that will be influential in the future. The latter are, however, taken into consideration in the discussion section focused on new research streams. Finally, in order to learn more about the origins of the concept under study, backward reference

search within 50 selected papers was conducted. This yielded 25 additional studies that were also reviewed thoroughly using the four general questions.

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## LITERATURE REVIEW

### **Why do users create and share innovation?**

One of the key issues intensively explored in the past research on user innovation related to motives that drive users to create and share innovation. The following section provides overview of the results of these studies.

#### **Utilitarian motives – addressing heterogeneity of needs**

User needs for a particular type of product or service are often heterogeneous (Franke & von Hippel, 2003), and it is difficult and costly for firms to understand them (von Hippel & Katz, 2002). Users with unique needs, who can either buy a custom-made product from a specialist supplier or innovate themselves, often choose the latter. One reason for that relates to the agency costs that result from the divergence of interest between user (principal), who wants to get a unique product and the hired manufacturer (agent), who may have an incentive to use the solutions that she already has or to create new solutions that could be attractive for a wider range of potential users in the future (von Hippel, 1998).

Another explanation for user innovation is the stickiness of need-related information, i.e. the incremental expenditure required to transfer the particular unit of information to a specified locus in a form useable by an information seeker (von Hippel, 1994). The higher the cost of transfer is, the stickier the information is. If the information required in the innovation process is sticky, the process (or the particular part of it) will be carried out in the locus of that information. While there is the possibility to “unstick” the information, the manufacturer, who will use this particular information for only one user, has no incentive to engage in this costly process and would rather shift the locus of the innovation process to the user (von Hippel, 1998).

#### **Beyond utilitarian motives – incentives for creating and sharing innovation**

While the early user innovation literature focused mostly on users developing products by themselves and for themselves, the advent of collaborative innovation projects, such as open-source software (OSS), has prompted a new wave of research focused on factors driving users not only to create, but also to share innovation (von Hippel & von Krogh, 2003). However, the phenomenon of innovation sharing has been observed also in other industries and in

regard to various products (de Jong & von Hippel, 2009; Franke & Shah, 2003; Lüthje, 2004; Lüthje, Herstatt & von Hippel, 2005; Morrison, Roberts & von Hippel, 2000; Eric von Hippel, 2007). Furthermore, research also shows that firm-users often “freely reveal” what they have developed for in-house use. As long as there is no rivalry between user-innovator and potential adopters, users often decide to voluntarily give up exclusive intellectual property rights to innovation and give access to it to all interested parties.

Motives for innovation creation and sharing include business motives, e.g. enhancement of reputation in the industry, generation of positive network effects or obtaining a cheap source of supply for the innovation (Baldwin & von Hippel, 2011). Freely revealing their innovation, users also avoid the generally high cost of protecting design information that requires security walls and restricted access or the enforcement of intellectual property rights (transaction costs motives) (Kollock, 1999). Motives for innovation creation and sharing include *business motives*, e.g. enhancement of reputation in the industry, generation of positive network effects or obtaining a cheap source of supply for the innovation (Baldwin & von Hippel, 2011). Freely revealing their innovation, users also avoid the generally high cost of protecting design information that requires security walls and restricted access or the enforcement of intellectual property rights (*transaction costs motives*) (Kollock, 1999).

Lerner and Tirol (2002) try to explain knowledge sharing within open source communities by referring to reputational factors and *signalling incentives*. Authors argue that the main driver for a programmer to contribute to open source software (OSS) projects is the delayed payoff that such a contribution may generate in the form of future job offers or wage premium. Another group of user innovation drivers relates to the growth in *self-esteem and pride* that might be the result of innovation process. Kollock (1999) suggests that a person decides to share knowledge because the act creates a sense of efficacy, that is, a sense that they have an impact on the community and, thus, supports their own self-image as an efficacious person. Developing and sharing innovation can also lead to higher peer-recognition and the sense of ownership and control over the innovation process and its product (von Hippel & von Krogh, 2003).

Finally other researchers point out to *hedonic motives* for users to voluntarily create and share innovation. The very process of problem-solving can be perceived as an intrinsically rewarding task, it can bring enjoyment from engaging in creative and challenging work and create learning opportunities (Lakhani & Wolf, 2005; von Hippel & von Krogh, 2003). User innovators may be also motivated by a willingness to be a part of the so called “*gift culture*”

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based on trust and altruism, in both its reciprocal and pure version (Hau & Kim, 2011).

### **Who is the user-innovator?**

Users are those who directly benefit from created innovation (von Hippel, 2005). It has been long argued that user innovation tends to be concentrated among lead users (Lüthje, 2004; Morrison et al., 2000; Schreier, Oberhauser & Prügl, 2007), who combine two characteristics: (1) they expect attractive innovation-related benefits from a solution to their needs; (2) they experience needs ahead of the majority of a target market (von Hippel, 1986). Prior research on innovation by lead users indicates that high benefit expectations are often related with the experience of new, stringent needs that are not addressed by existing market offers. With their ability to forecast future demand and their motivation to innovate regardless of market size and uncertainty level, lead users' contributions are most valuable in the early stages of a product life cycle (Chatterji & Fabrizio, 2012). Other authors argue that lead users also play an important role in the stage that innovation is put to use. They are opinion leaders, who perceive new technologies as less complex and are more ready to adopt them than ordinary users (Schreier et al., 2007). Therefore, tapping lead users for concept and prototype testing, after-launch modifications and innovations in function (Harrison & Waluszewski, 2008) may increase the chances for adoption (see also Douthwaite, Keatinge & Park, 2001).

However, the innovative performance of individuals is influenced not only by their motivation, but also by their qualifications. Thus it is argued that lead user characteristics in combination with user expertise in a given product field, in terms of use experience and product-related knowledge, are positively associated with the likelihood of user's innovation propensity (Lüthje, 2004). Use experience is the knowledge gained from direct acquaintance (Russell, 1948). Product related knowledge consists of know-how about the product architecture, the used materials and the applied technologies in the particular product category (Lüthje, 2004). This type of knowledge often comes from a user's professional background or hobbies (Lüthje et al., 2005). User-innovators generally are experts in the field or activity, giving rise to their needs and often have high levels of solution expertise (von Hippel, 2005, p. 74-75).

Studies on UI focused traditionally on lead users. However over the last decade the interest of not only researchers, but also practitioners, who in search for new sources of innovation and competitive advantage, have started to shift towards *ordinary users* and their role in innovation processes. For

instance, Chu and Chan (2009) argue that normal users' feedback may prove to be valuable for the testing and launching stage of new product development. Hyysalo (2009) namely users' adaptations and micro-innovations and their impact on industry development in user-innovation-intensive industries. It complements previous analyses of rodeo and freestyle-kayaking that explore the role of user innovators in industry development, by focusing on different aspects of micro-innovation: (1) suggests that after the product launch, the move from early radical innovation to market expansion depends on a stream of micro-innovations and micro-adaptations that are the domain of normal users.

Ordinary users may prove to be a valuable source of innovation, especially if they are encouraged and supported by manufacturers to participate in the innovation process (Kristensson, Gustafsson & Archer, 2004). Schreier, Fuchs and Dahl (2012) studied the consumer perception of firms that sell products designed by ordinary users and show that the innovation effect of common user design leads to positive outcomes with respect to purchase intentions, willingness to pay, and willingness to recommend the firm to others. The authors identify four factors that build positive perceptions of common design: (1) the number of consumers; (2) the diversity of their background; (3) the lack of company constraints and (4) the involvement of actual users of the product in the design process. However, even for relatively simple design tasks, the innovation effect of user design depends on consumers' familiarity with user innovation and that common design by users loses its perceived power in case of more complex products and technologies.

### **What type of innovation do users create?**

Some of the most important and novel commercialized inventions are developed by firm-users for *in-house use* (Baldwin & von Hippel, 2011). User firms developed important innovations in oil refining (Enos, 1962), the construction industry (Slaughter, 1993) the users may be in a better position to both identify the exact nature of these problems and to solve them through their own innovations. In a detailed field-based study of the residential construction industry, I find that user-builders, rather than component manufacturers, are the developers of almost all of the innovations (n = 34, agriculture (Aoki, 2009) plant tissues and genetic sequences in plants and problems this poses for global food supply and agriculture. The article then goes on to analyze recent treaties such as the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR, in chemical production processes (Freeman, 1968), in machine tools (Rosenberg, 1976), scientific instruments (von Hippel & Finkelstein, 1979) and information

systems (Nambisan, Agarwal & Tanniru, 1999). A similar tendency is observed in the case of *consumer products*. For instance, users played a central role in the development of sports equipment (Franke & Shah, 2003; Hiennerth et al., 2006), cars, home-used tools and software (Flowers, von Hippel, de Jong & Sinozic, 2010). User innovation also plays an important role in *service industries*. For example Oliveira and von Hippel (2011) find that 55% and 44% of today's computerized commercial and retail banking services respectively, were first developed and implemented by users.

Another type of innovation developed by users is innovation in *function* (Baldwin, Hiennerth & von Hippel, 2006), that is the introduction of a new use for a given technological object. Some examples of user-driven innovation in this area are free-style skiers, surgeons developing new procedures, teachers using games for educational purposes or DJs using turntables as musical instruments. Faulkner and Runde (2009) argue that users dominate manufacturers as innovators in function and that this type of user-innovation inspires manufacturers to implement changes in form.

As far as newness of user innovation is concerned the literature provides evidence that users develop both *radical and incremental* changes. Lead users do a lot of commercially significant process development and product modification in many fields (Flowers et al., 2010). The performance level of these user developments can be explained by the fact that lead users are ahead of the trend in terms of demand and have significant incentives to solve a given problem (Jeppesen & Frederiksen, 2006). While lead users' ideas are more radical, the ideas from ordinary users tend to be more incremental (Hyysalo, 2009) namely users' adaptations and micro-innovations and their impact on industry development in user-innovation-intensive industries. It complements previous analyses of rodeo and freestyle-kayaking that explore the role of user innovators in industry development, by focusing on different aspects of micro-innovation: (1.

However, newness of user innovations depends also on the field in which these new solutions are implemented. For instance Lüthje et al. (2005) report that most of the innovations by lead users in mountain biking can be characterized as "moderate improvements", which is generally the predominant innovation pattern in the field in question.

### **How do users innovate?**

The results of the literature review enabled the author to identify two sets of themes related to the "how" question. The first divides UI into two contrasting models: user-centric and firm centric. The user-centric model, originating from the earliest research on UI, focuses mainly on firms and

individuals that directly benefit from innovation (von Hippel, 1988), using it to address their own needs. The firm-centric model has developed as a producers’ response to the growing awareness of users’ innovation activities. It is primarily concerned with accessing and leveraging users as a source of external knowledge that could improve a firm’s internal innovation processes and its economic performance (Bogers et al., 2010). Thus, it would be more appropriate to relate to this model as user-driven innovation rather than user innovation per se, which is to be discussed in the next section focused on major weaknesses of the UI literature. The second set of themes relates to the locus of innovation created by users. Innovation can be a product of either individual or collaborative effort. While in the first case only one user (firm or consumer) is engaged in the innovation process, in the second, innovation is created by a community of users.

The combination of these two identified sets of themes leads to a fourfold classification of UI models: 1. single user innovation; 2. user community innovation; 3. mass-customized innovation; 4. firm-hosted community innovation (see Figure 1 below).

Firm-centric	User community innovation	Firm-hosted community innovation
User-centric	Single user innovation	Mass-customized innovation
	Single user	Community

**Locus of the innovation**

**Figure 1.** User innovation models

**Single user innovation**

A single user innovator is a single firm or individual that creates an innovation in order to use it (Baldwin & von Hippel, 2011). Single users engage in the innovation process, when the benefits from using the innovation are higher than the costs of creating it, and these include transaction, design and production costs. The results of the literature review indicate that user innovators are generally not interested in commercializing their innovation or rarely seek to assert exclusive rights over it (Lüthje, 2004). Thus they often

incur no transaction costs and while deciding whether to create innovation or not, they take only design and production costs into account (Baldwin & von Hippel, 2011). As users rely primarily on the local need and solution information that they already have “in stock” to develop innovations (Lüthje et al., 2005), the level of design costs are at large determined by the level of the innovator’s use experience and technical capabilities. While production costs in the case of digitized products goods are zero, in other industries specialized manufacturers maintain their advantage over users in respect to the cost of production. Nevertheless technological development, especially in computerization and 3D printing, increases users’ production capabilities.

For some users, innovation ideas and efforts become the starting point for their businesses. User entrepreneurship occurs in vastly different industries (Chandra & Leenders, 2012; Haefliger, Jäger & Von Krogh, 2010; Shah, Smith & Reedy, 2012; Shah & Tripsas, 2007). Shah and Tripsas (2007) propose that user-entrepreneurship is more likely to dominate classic sources of entrepreneurship under four conditions: (1) when the use of a particular product provides enjoyment; (2) when users have relatively low opportunity cost; (3) when the industry is characterized by niche markets with a high variety in demand; (4) when the market for the product is highly uncertain. The process of commercialization of user innovation may be divided into four stages (Baldwin et al., 2006). First, one or more users recognize a new set of design possibilities and begin to innovate in order to satisfy their own unique and unserved needs. They then obtain feedback from other users, either unintentionally, simply by using the innovation or intentionally, or by freely revealing innovation-related information. Signals from the community allow them to improve the solution and to notice its commercial potential. In the next step user-manufacturers emerge, using high variable cost/ low-capital production methods. Their advantage over established manufacturers is threefold: (1) they have already made the investment to design the product; (2) they have already established relationships with potential buyers and can use low-cost, word-of-mouth marketing techniques; (3) by setting up prototyping facilities they have already invested in small amount of manufacturing capital. In the last phase user innovation slows, the market stabilizes enough for established manufacturers with high production capital investment and low variable costs to enter.

### **User community innovation**

Collaborative user innovation is created in the process of cooperation between many users, who first seek to develop a solution that would address their needs and then freely reveal it for anyone to use. A number of studies (Franke

& Shah, 2003; von Hippel & von Krogh, 2003) suggest that collaborating users, who join peer-to-peer special-interest communities (both online and offline), may yield new or modify existing products and services in different fields. There are two main driving forces for user community innovation: transition to increasingly digitized and modularized design and production practices, and the development of low-cost, Internet-based communication (Baldwin & von Hippel, 2011). In a modular system a given component is dependent on the characteristics of other components within its subsystem (module), but is independent from parts outside that subsystem (Baldwin & Clark, 2000). Modularity increases the flexibility of configuration and allows independent and dispersed contributors to design separate modules in parallel. However, user innovators, particularly those working on digital goods, cooperate not only across modules but also within modules. Colfer (2009) argues that they achieve coordination through the so-called “actionable transparency”. The emerging artefacts can be easily understood (are transparent) by other contributors and allow real-time iteration due to rapid generate-test cycles (are actionable). Actionable transparency would not be possible without broadband, peer-to-peer and real-time communication.

Since collaborating users must communicate with one another rapidly and repeatedly, communication costs are the most critical condition for this type of user innovation (Baldwin & von Hippel, 2011). For users engaging in an innovative community, costs of design are marginal as they are divided into a number of co-creators. Additionally users do not face any transaction costs, as all solutions are freely revealed (*ibidem*). However, due to production costs the applicability of the collaborative innovation model is still limited mostly to information goods (von Hippel, 2007).

### **Mass-customized innovation**

Not all users with unique needs have technical capabilities to design and produce innovation for themselves. They can either settle for a mass product or design it with the help of standard toolkits provided by the manufacturer of mass-customized products and services (von Hippel, 1998). Mass customization aims at the production of products and services with enough variety and customization that nearly everyone finds exactly what they want at prices comparable with standard offerings (Pine, 1993). Toolkits for user innovation used in this process are coordinated sets of “user-friendly” design tools that enable users (especially those ordinary ones) to solve need-related problems and develop innovations for themselves (von Hippel & Katz, 2002).

Instead of trying to guess what users want, companies may simply give them the opportunity to construct their own products (Desouza, Awazu &

Ramaprasad, 2007). The economic value of self-designed products has been attributed to the utilitarian (product of perfect fit) (Franke, Keinz & Steger, 2009) researchers have paid increasing attention to the marketing strategy of customization. A key assumption is that customized products create higher benefits for customers than standard products because they deliver a closer preference fit. The prerequisite for this effect is the ability to obtain precise information on what customers actually want. But are customers able to specify their preferences that precisely? Several theoretical arguments raise doubts about this, implicitly challenging the value of customization. The authors conduct two studies in which they find that products customized on the basis of expressed preferences bring about significantly higher benefits for customers in terms of willingness to pay, purchase intention, and attitude toward the product than standard products. The benefit gain is higher if customers have (1, hedonic (enjoyment from the creative activity) (Franke & Piller, 2004) and self-esteem (“I designed it myself” effect) consumer benefits ( (Franke, Schreier & Kaiser, 2009). Additionally it has been found that custom designs created by users are also attractive to non-designers (Franke & Piller, 2004; Schreier et al., 2012). Toolkits may also “serve as a crèche for interested but inexperienced users who could evolve into leading-edge users over time” (Prügl & Schreier, 2006).

Despite its benefits, mass customization generates two types of costs for the customer. Firstly, there is a direct cost in the form of a price premium that customer needs to pay for a custom product. Secondly, customers may perceive indirect, cognitive costs related with the risk of being involved in co-creation (Franke & Piller, 2003). Co-design activities can result in the perception of extended complexity, additional time and effort during the buying process, and may lead to “mass confusion” (Huffman & Kahn, 1998). There are three potential sources of this phenomenon: (1) burden of choice; (2) matching needs with product specifications; (3) uncertainty related to the behaviour of the supplier.

Concluding, a user will decide to innovate with toolkits provided by the producer when: the production costs are high, so that the consumer is not able to manufacture the self-designed product themselves; and the price of the customized product, and design and communications costs, are relatively low compared to the utilitarian, hedonic and self-esteem benefits. While communications costs, as has already been mentioned, in the era of ICT are low, the design costs are mostly determined by the skills of the user and the level of toolkits’ “user-friendliness”.

**Firm-hosted community innovation**

Firm-hosted communities generate interaction and co-operation between users and the company, and between users themselves. Forms of such engagement include conventional lead user method and online user communities. The lead user method accelerates the identification of new product or service concepts, and decreases the risks and costs related with these activities (von Hippel, 2005). Additionally, some authors believe (Piller & Walcher, 2006) that the conventional lead user approach can significantly benefit from the utilization of broader online user communities. Engaging user networks can be used to conduct broad, preliminary screening for innovation opportunities that can be developed later on in more specific challenges or during classical lead user workshops. This form of co-operation with users supports the lead users' selection process, allows a deepening of the relationship with other customers, and identifies opportunities for some incremental changes that would satisfy current needs.

Marchi, Giachetti and de Gennaro (2011) distinguish three main characteristics of lead users within firm-hosted communities: (1) a user's willingness to collaborate in the innovation process; (2) their product knowledge; and (3) a strategic alignment with the brand identity. Consumers engage in firm-hosted communities because they are intrinsically interested in the innovation activity and are responsive to firm recognition (Jeppesen & Frederiksen, 2006), but also for monetary compensation (Füller, 2006). Hienerth, Keinz and Lettl (2011) argue that the successful implementation of user-centric business models requires a comprehensive approach encompassing not only effective incentive systems, but also an appropriate social software design, a transparent intellectual property policy, and policies, strategies and structures for effective learning processes and employee empowerment.

Table 1 contains a summary of the literature review findings discussed above.

User innovation is a rich concept, encompassing different forms of activities, different actors and relations between them. The results of the systemic literature review in regard to the "how" question reveal that there are four major research streams on user innovation constructed around different models of UI. Each of the identified streams provides different answers to the remaining three research questions and is determined by different critical conditions.

**Table 1.** User Innovation – main research streams

HOW?				
	Single user innovation	User community innovation	Mass-customized innovation	Firm-hosted community innovation
Critical conditions for user innovation and sharing	<ul style="list-style-type: none"> <li>• Design and production costs lower than benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Communication and production costs lower than benefits</li> <li>• Low rivalry</li> <li>• Transaction costs higher than benefits from commercialization</li> </ul>	<ul style="list-style-type: none"> <li>• Price, design and communication costs lower than benefits</li> <li>• Production costs higher than benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Communication costs lower than benefits</li> <li>• Production costs higher than benefits</li> <li>• Low rivalry (user-to-user; firm-to-user)</li> <li>• Transaction costs higher than benefits from commercialization</li> </ul>
WHY?	<ul style="list-style-type: none"> <li>• Utilitarian motives</li> <li>• Hedonic motives</li> <li>• Self-esteem motives</li> <li>• (“I designed it myself” effect)</li> </ul>	<ul style="list-style-type: none"> <li>• Utilitarian motives</li> <li>• Business motives</li> <li>• Transaction costs motives</li> <li>• Signalling motives</li> <li>• Hedonic motives</li> <li>• Gift culture motives</li> <li>• Self-esteem motives</li> </ul>	<ul style="list-style-type: none"> <li>• Utilitarian motives</li> <li>• Hedonic motives</li> <li>• Self-esteem motives</li> <li>• (“I designed it myself” effect)</li> </ul>	<ul style="list-style-type: none"> <li>• Utilitarian motives</li> <li>• Hedonic motives</li> <li>• Gift culture motives</li> <li>• Self-esteem motives</li> <li>• (incl. firm recognition)</li> <li>• Financial motives</li> </ul>
WHO?	<ul style="list-style-type: none"> <li>• Firms</li> <li>• Individuals</li> <li>• Lead users</li> <li>• Ordinary users</li> </ul>	<ul style="list-style-type: none"> <li>• Firms</li> <li>• Individuals (prevalence)</li> <li>• Lead users</li> <li>• Ordinary users</li> </ul>	<ul style="list-style-type: none"> <li>• Individuals</li> <li>• Ordinary users</li> <li>• (crèche for lead users)</li> </ul>	<ul style="list-style-type: none"> <li>• Individuals</li> <li>• Lead users</li> <li>• Ordinary users</li> </ul>
WHAT?	<ul style="list-style-type: none"> <li>• Radical – lead users</li> <li>• Incremental – ordinary users (after-launch micro-innovation)</li> <li>• Product (mainly inf. goods)</li> <li>• Service</li> <li>• Process</li> <li>• Function</li> </ul>	<ul style="list-style-type: none"> <li>• Radical – lead users</li> <li>• Incremental – ordinary users (after-launch micro-innovation)</li> <li>• Product (mainly inf. goods)</li> <li>• Service</li> <li>• Process</li> <li>• Function</li> </ul>	<ul style="list-style-type: none"> <li>• Incremental</li> <li>• Product</li> <li>• Service</li> </ul>	<ul style="list-style-type: none"> <li>• Radical</li> <li>• Incremental</li> <li>• (screening; testing; after-launch micro-innovation)</li> <li>• Product</li> <li>• Service</li> <li>• Process</li> <li>• Function</li> </ul>

## CRITIQUE AND PERSPECTIVES FOR FUTURE RESEARCH

The following section presents major weaknesses of previous studies on UI and the identified areas for future queries. Table 2 presents the research results applicable both to the entire field as well as to specific research

streams derived from the literature review. The table is followed by a thorough discussion of the results.

**Table 2.** User Innovation – weaknesses and future research directions

Problems for future research				
<b>General</b>	<ul style="list-style-type: none"> <li>• Definitional clarity: need for clear distinction between user innovation and user-driven innovation</li> <li>• Large-scale research to measure the impact and validate propositions</li> <li>• Cultural context</li> <li>• User innovation and social welfare</li> <li>• Policy implications</li> <li>• Who, What, When?</li> </ul>			
	<b>Stream-specific</b>	<p>Single user innovation</p> <ul style="list-style-type: none"> <li>• User entrepreneurship (prevalence, determinants, success factors, community dynamics)</li> </ul>	<p>User community innovation</p> <ul style="list-style-type: none"> <li>• Collective intelligence or stupidity</li> </ul>	<p>Mass-customized innovation</p> <ul style="list-style-type: none"> <li>• Strategic capabilities required for success</li> <li>• External factors for success (national cultures)</li> <li>• Mass confusion – when does it occur and how to minimize its risks?</li> </ul>

**Definitional chaos**

Most of the analysed literature on UI does not build on the traditional distinction between innovation and invention (Schumpeter, 1934), focusing much more on the idea generation and design part of the innovation process. Innovation is understood as a “practical implementation of an idea into a new device or process” (Schilling, 2013, p. 18.). As it has been discussed in this paper, users provide more than merely ideas for new products - they help to identify needs, define product specifications, create design and even produce and distribute innovation independently from manufacturers. Bogers et al. (2010) argue, however, that it would be easier to compare studies if concepts related to user innovation are more explicitly defined with a distinction between idea generation, implementation and diffusion. Thus future studies need to make a clear distinction between user innovation, that is innovation

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invented and actually implemented (at least for in-house use) by users and users only, and user-driven innovation – the concept, in which users are engaged in one of the phases of the process, for instance as a source of ideas or new solution testers. The proposed typology of UI models, and more specifically the user-centric and firm-centric perspective used in it, may serve as a tool for such a distinction.

### **Measuring the prevalence and impact of UI**

With a few exceptions (Chatterji, 2012; de Jong & von Hippel, 2009; Flowers et al., 2010; Schreier, 2012) the analysed research field is largely based on small sample studies that merely demonstrate the phenomenon without measuring its effect. Lack of large-scale empirical research presents the major weakness of UI literature and probably the biggest challenge for scholars exploring this subject. Although literature provides clear evidence on the existence of user innovation in various industries, it does not show in what industries it is prevalent and how it affects industry dynamics. Due to the rise of low cost “user-manufacturing” technologies, especially 3D printing, the question of a user’s impact on industry dynamics becomes even more important. Another field for further investigation relates to the problem of how universal UI is across nations. Future studies could explore cultural (Hofstede, 1984) and institutional (DiMaggio & Powell, 1983) drivers for user innovativeness.

In contrast to the formal R&D activities of firms, innovative efforts of users, especially those of individuals and communities are not illustrated in any official statistics. Much of user innovation results in minor and subtle changes that are extremely difficult to trace and measure. Yet, some authors (Henkel & von Hippel, 2004) suspect that their cumulative economic impact might be tremendous. Future research could explore how important it is for social welfare, and to what extent and in what way it should be integrated into policy and law making (Fisher III, 2010).

Additionally, considering the impact that the level of entrepreneurship has on economic growth, further research on user-entrepreneurship is highly needed. The literature on this topic would greatly benefit from large-scale studies that could validate models presented in the literature review section of this article, measure their prevalence, identify determinants (e.g. types of product, users’ characteristics, cultural dimensions) and provide insights on key success and failure factors.

### **Who, What, When?**

As has been discussed in the previous section there is strong consensus among researchers that innovation is the domain not only of lead, but also ordinary users. The literature is also consistent in regard to the consequences of users' innovative behaviour – there is empirical evidence that users can create both radical (mostly lead users) and incremental (mostly ordinary users) innovation in product, process, service and function. However, again, since large-scale studies on UI are scarce, the literature does not provide the answer to the “when” question. What are the contingency factors influencing innovativeness of a particular group of users? For example Magnusson and Kristensson (2010) provide empirical evidence that in order to provide innovative ideas, ordinary users must have both a high level of contextual use experience and not have “too much” technical knowledge that, in fact, restricts the ideation process. This study was, however, limited to innovation in technology-based services and its results haven't been verified with regard to other products or services. What type of user-innovators and what type of innovation are dominant in particular industries and economies (assuming that national cultures and institutional environment have an impact on user innovativeness)?

Furthermore, dichotomous classification of innovation into radical and incremental is, according to some scholars (Henderson & Clark, 1990; Tushman, Anderson & O'Reilly, 1997), insufficient to capture the current trends, too general, and conceptually ineffective. Thus, user innovation literature would gain from some additional insights on types of changes that are created by users, whether they are incremental or radical in respect to market and technology, architectural, modular or generational. Their impact on firm performance and on industry dynamics is different, and various types of innovation might be the result of the activity of different users.

### **Exploring mass customization**

Another research area that requires further deliberation refers to mass customization. First, as it has been emphasized in the literature review section, mass customization generates many potential benefits for manufacturers seeking to address heterogeneous demands. However, it is still rather a niche strategy implemented mostly by start-ups entering mature markets. While there is growing interest of managers and academia in this approach to product development, there are also a growing number of companies who have tried to implement it and failed. Therefore, the literature would benefit

from further exploration on success and failure factors of mass customization as a single strategy or as a part of a holistic user-centric approach to innovation. Future studies should focus more on the strategic capabilities required for the introduction of mass customization strategy, as well as external determinants of success, especially those related to differences in national cultures.

Second, some authors have emphasized the downside of mass customization related to the complexity that a user faces while designing the product and argued that proper design of toolkits for UI, personalization features and fostering community co-design may decrease the risk of mass confusion (Piller, Koch, Möslin & Schubert, 2003; Piller, Schubert, Koch & Möslin, 2005) research on the role of the customer within the co-design process is rare. However, customers face new uncertainties and risks when purchasing a customized good. We discuss these risks and provide a new approach to address these problems based on personalization and collaboration. We will analyze how personalization of the co-design process and collaboration of users within communities can render (mass. However, most of the academic papers exploring this phenomenon are based either on literature reviews or case studies. Thus there is a need for a broad-scale quantitative study of consumer choice and buying behaviour during the mass customization process. Research on sources, but also moderating and mediating factors (in particular product type and user characteristics) of mass confusion is encouraged.

### **Firm-community relationships**

As the locus of innovation is intensively shifting from dyadic relationships towards ecosystems, networks and communities (Vanhaverbeke, West & Chesbrough, 2014) there is growing demand for further research on mechanisms governing the collaboration within firm-hosted innovation communities. For instance, it would be interesting to study the dynamics and life cycle of such communities. Important insights could be drawn from exploration on leadership processes, user roles and positions in the communities (Dahlander & Frederiksen, 2012).

Furthermore, as has been highlighted in the previous section, there is strong evidence in the literature that users are willing to freely reveal innovation-related information and share their solutions within their community. It has also been observed that some users are eager to share innovation with companies. While in the first case the revealed information becomes a public good, in the second it is acquired by the firm, utilized in its innovation process, integrated into commercial product and sold. Although some authors have already discussed factors driving users to contribute to

firm-hosted communities, many questions still seemed to be unanswered. As the gift culture of user communities is based on reciprocity and trust, what is it that company can offer users in return? What are the limits of users' "generosity"? Is "fun from design", identification with the brand and interaction with other members, really enough to attract and keep the most talented and active users within the community?

In relation to the questions concerning user motivation it would be interesting to explore further the impact of material rewards on the firm-user relationship. Füller (2006) found that monetary compensation has a negative impact on further participation in firm-hosted co-creation projects and a positive impact on participation frequency, and it becomes important for users willing to spend more time and effort on the task. But what is the impact of material rewards on the quality of submissions? What type of material rewards motivate best? Do they serve as motivational factors or merely hygiene ones (Herzberg, 1964)? What user characteristics determine the motivational power of particular rewards?

Another fertile ground for future studies relates to conflicts between companies and user communities. Users may feel dissatisfied with the co-creation process and feel exploited by the firm. Conflicts may occur also as a result of miscommunication or a firm's controversial actions in areas not related directly to the project, but still important for the community (e.g. ethical scandals). What are the effects of such conflicts? How do they evolve? What are the strategies to manage them? Valuable insights could be gained here from the still scarce research on failures in managing co-creation with users.

### **Collective intelligence or collective stupidity?**

Collaborative innovation projects, both those initiated by firms and by users only, are based on the collective intelligence assumption. It has been argued (Buecheler, Sieg, Fuchsli & Pfeifer, 2010; Mollick & Nanda, 2015; Surowiecki, 2004; Wagner & Vinaimont, 2010) that in contrast to groups, collectives are resistant to reasoning biases, such as groupthink (Janis, 1982) and herd behaviour (Banerjee, 1992), and thus outperform teams of experts in decision-making. There is however growing evidence that this is not always the case. Breitsohl, Wilcox-Jones and Harris (2015) investigate customers' tendency to conform when making decisions in a financial online community and support the applicability of groupthink theory in an online context. Muchnik, Aral and Taylor (2013) designed a large-scale randomized experiment on a social news aggregation Web site and found that prior ratings created significant bias in individual rating behaviour. Another experimental evidence (Lorenz, Rauhut, Schweitzer & Helbing, 2010) shows that even mild social influence

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can undermine the collective intelligence in simple estimation tasks. Knowledge about responses of other users narrows the diversity of opinions and undermines the wisdom of crowd through three mechanisms: (1) “social influence effect” diminishes the diversity of the crowd; (2) “range reduction effect” moves the position of the truth to peripheral regions; (3) “confidence effect” boosts individuals’ confidence about providing the right answer.

Results of these studies have direct implications for firm-hosted communities, especially those using peer-rating mechanism. As Noble (2012) argues, many crowdsourcing initiatives reward answers that agree with the masses, disregarding minority voices. Surowiecki (2004) identifies three requirements for collective wisdom to emerge: diversity, decentralization of opinion, and independence. As meeting these conditions becomes one of the main challenges in managing online communities, there is a growing need for research exploring decision biases in collaborative environments.

## CONCLUSION

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Due to the near-omnipresence of broadband Internet, decreasing costs of hardware and software, and increasing access to information, users are becoming more and more sophisticated. Innovation is no longer limited to companies with large R&D budgets and starts to be dispersed among many creative and entrepreneurial individuals. User innovation is a concept that has recently attracted a lot of attention, both in practice and in academia. Since the early works of von Hippel over four decades ago, we have learned a lot about the role that users play in innovation, about their motivation, characteristics and innovation capabilities. Nevertheless, much more research is needed.

This paper provides a comprehensive review of literature that investigates user innovation, identifies some of the weaknesses of past research and suggests possible future research directions in the area. The results of the analysis enabled the author to distinguish four models of UI – single user innovation, user community innovation, mass-customized innovation and firm-hosted community innovation – that define the main research streams and provide conceptual tool for further studies in this rich and chaotically defined area. Findings presented in the paper indicate that user-innovators are driven by various motives ranging from utilitarian to hedonic and even altruistic ones. What is more, while researchers have traditionally associated UI with lead users providing radical solutions, there is also some empirical evidence for innovative activity, although mostly of an incremental character, of ordinary users.

The results of the conducted analysis indicate that areas and topics for further exploration include user entrepreneurship, the phenomenon of mass confusion and innovation in user and firm-hosted communities, and more specifically the problems of governance, conflicts and collective intelligence in such communities. The major shortcoming of the previous studies, identified in this review, is the lack of large sample research that could provide validation of the discussed concept, especially the impact of UI and user entrepreneurship on industry dynamics and social welfare. We still know little about what types of users are typical innovators in particular industries, what types of innovation they create, and how their innovativeness can be stimulated. Thus future research should most of all focus on quantitative studies involving large samples in various industries and countries, not only in the US and Europe but also in Asia, to determine the frequency and importance of various practices and context factors.

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#### **Abstract (in Polish)**

*W obliczu rosnącej roli użytkowników w procesach innowacyjnych oraz szybko zwiększającej się liczby badań w tym obszarze, celem niniejszego opracowania jest wyznaczenie granic rozumienia tego tematu w literaturze. By zrealizować tak zdefiniowany cel badawczy oraz usystematyzować rozważania, autorka odniosła się do czterech podstawowych pytań badawczych: (1) Dlaczego użytkownicy angażują się w proces tworzenia i dyfuzji innowacji? (2) Kim jest użytkownik-innowator? (3) Jakie typy innowacji powstają w wyniku działań użytkowników? (4) Jak użytkownicy tworzą innowacje? Na podstawie systematycznego przeglądu literatury zidentyfikowane zostały cztery strumienie badań nad innowacjami użytkowników, a także możliwe kierunki dalszych prac badawczych w tym obszarze.*

**Słowa kluczowe:** ko-kreacja; innowacje oparte na współpracy; masowa kastomizacja; innowacje użytkowników; popytowe podejście do innowacji.

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#### **Biographical note**

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# Use of the Internet and its Impact on Productivity and Sales Growth in Female-Owned Firms: Evidence from India

*Aparna Gosavi*<sup>1</sup>

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## **Abstract**

*The Internet has completely transformed our lives on an individual basis in many ways, ranging from the way we communicate through the way we socialize to the way we shop and travel. Businesses are no exception to this premise. This paper studies the adoption of the Internet by female-owned firms in India. It uses the World Bank's Enterprise Surveys Program data set for the year 2014 to study the adoption of the Internet by more than 10,000 firms in the country. After controlling for a large number of firm-level characteristics, empirical results obtained indicate that female-owned firms are more likely to use the Internet than their male counterparts. However, further empirical analysis shows that more intensive adoption of the Internet by these female-owned firms does not necessarily translate into better performance. Specifically, the adoption of the Internet does not make female-owned firms more or less likely to have better productivity and sales growth in contrast to that of their male counterparts.*

**Keywords:** *internet; female-owned firms; productivity; sales growth; India.*

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## **INTRODUCTION**

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Telecom services in general and broadband Internet services in particular have changed our lives in many ways, ranging from the way we communicate, socialize, plan vacations, and do our shopping. These services are oftentimes considered to be *general-purpose technologies* because they benefit all the participants in the economy and exhibit persistent gains to individuals and businesses alike (Susanto Basu & Fernald, 2007). These services are treated

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as general-purpose technologies for a variety of additional reasons. Firstly, good quality telecom and broadband services facilitate firms to devote less time on communications and to acquire inputs more efficiently than otherwise (Röller & Waverman, 2001). Secondly, sound and modern telecom and Internet-services infrastructures allow firms to reach large geographical areas, thereby granting them access to large markets while at the same time drastically reducing the cost of collecting information on the various parties involved in business processes (Clarke, Qiang & Xu, 2015). Finally, the Internet plays a critical role in boosting the market share of firms, improving operations and enhancing competitive advantage (Porter, 2001; Teo & Pian, 2003).

In particular, the impact of the adoption of the Internet has revolutionized the way businesses carry out their operations on a day-to-day basis. Nowadays, businesses have websites that contain information about their products, promotions, employees, customers' reviews and even financial statements (for public companies). The Internet has truly revolutionized and expanded horizons of business operations in many respects. One classic example of such a business is the giant on-line retailer Amazon. It maintains a list of its customers and their preferences, and keeps its customers in the loop on various promotions and new features related to their preferred products. This particular process has not only led to enhanced customer satisfaction and repeat business, but has also resulted in better quality of products.

It is not a surprise thus that the Internet has been identified as the fastest growing market place around the globe. According to the Internet World Stats (2016), there are more than 3.67 billion Internet users around the world, while the population of the world is 7.3 billion. Although the Internet is used widely around the globe, its access is unequal across countries, thereby making some countries more competitive than others. For example, in 2016, the rate of penetration (as a percentage of population) is 92 percent in the U.S. whereas the same number is 32 percent in a developing country like India, which is the country under study for this paper (The World Bank, 2016). These wide differences in the rate of penetration of the Internet put countries like India at a significant disadvantage.

Thus, if the Internet is a general-purpose technology and offers so many advantages to businesses, it is worth studying its adoption by firms in a developing country such as India. In particular, as more and more women join the work force, analyzing the adoption of the Internet by female-owned firms is an interesting and important research question. This paper analyzes the adoption of Internet services by female-owned firms, vis-à-vis their male counterparts in India. For this analysis, the paper uses an extensive firm-level data set (10,000 plus observations) from the World Bank's Enterprise Surveys for the year 2014 (The World Bank, 2014). This paper finds empirical evidence

indicating that female-owned firms are more likely to use the Internet to communicate with their clients and they are more likely to have websites for their businesses than male-owned firms! Hence, the paper further analyses whether adoption of the Internet delivers, as a general-purpose technology, in terms of increased sales growth and productivity. The empirical analysis shows however that although female-owned firms have adopted the Internet more extensively than their male counterparts, its usage does not get translated into higher sales growth and/or productivity.

There are various reasons for the above-mentioned outcomes. In India, almost one third of the population has access to the Internet. Thus, for example, even though businesses have Internet connections, their customers may not necessarily have the same. This makes it very hard for businesses to extract opinions and preferences of their customers and also to keep track of their buying behavior – a process that can lead to customer loyalty and even better products. For example, in the US, where the Internet penetration rate is 92 percent, the digital-social-media giant Facebook maintains records of like-and-dislike posts of its users related to various products. Facebook shares this data with its business customers. In turn, Facebook users continuously get information about promotions and new features of their preferred products. This process can not only lead to repeat purchases, but can also enhance customer loyalty. Another potential reason for the empirical results in the paper could be the fact that a major part of the economy in India constitutes an informal economy. Thus, for the most part, financial transactions take a form of cash-based transactions. Customers rarely use checks or plastic money to pay or receive bills. This makes it very hard for goods and services providers to keep a record and a track of preferences of their customers and suppliers. Thus, even though businesses have the Internet presence, it does not necessarily get transmitted into better performance of these firms.

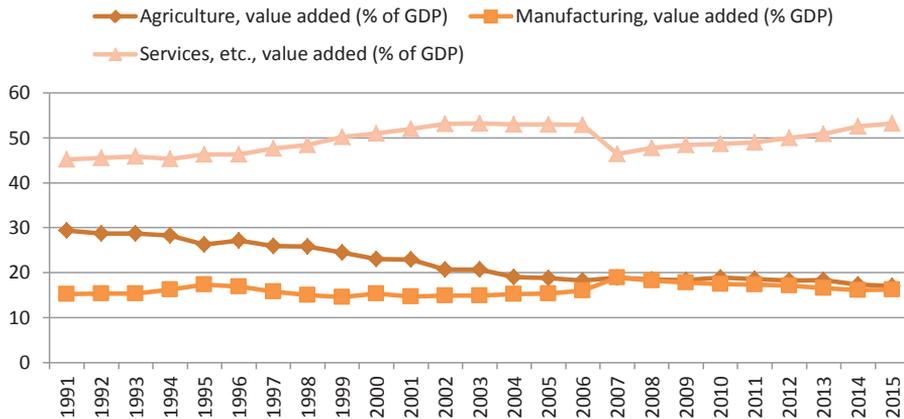
*Contributions of this paper are threefold:* 1. This is the first paper that studies the usage of the Internet by female-owned firms, vis-à-vis their male counterparts in India. 2. It investigates productivity and sales growth of female-owned firms that have Internet connections. And 3. It uses a firm-level data set of more than 10,000 firm-level observations from all sectors of the economy for the year 2014, making the study current and a near-perfect representation of the economy as a whole.

The rest of the paper is organized as follows. Section 2 discusses the existing literature, identifies the literature gap, and specifies contributions of the paper. The next section offers an empirical framework that includes a discussion on the data set and the associated empirical models. Section 4 presents the results, and the last section concludes the paper with a discussion on future avenues for research.

**LITERATURE REVIEW**

Before we discuss the extant literature on the adoption of the Internet by businesses, we would like to provide an overview of the current state of the Indian economy and how they got there. This discussion is important for a couple of reasons: 1. An overview of the Indian economy presents us with an outlook of its overall economic health that has some bearing on Internet adoption and 2. A study of the path adopted by the country, which traveled from an underdeveloped-socialist country to a developing-mixed-economy country, helps us understand various policy decisions made on the way and their impact on the adoption of this modern technology, namely, the Internet.

India, which is a lower-middle-income country, is the second most populous country in the world with a little over two trillion dollars’ worth of GDP (The World Bank, 2016). If we look at the quality of the work force in terms of education, more than 70 percent of the people in the country are literate. However, only 24 percent of the people in the country are enrolled in a tertiary education system. Further, the majority of the structure of employment shows that the services sector contributes 53 percent to its GDP, the manufacturing sector contributes 17 percent, and 20 percent is contributed by the farming sector (see Figure 1). There has been a steady growth in the services sector and a steady decline in the agricultural sector since 1991, which is a clear sign that the economy is becoming a consumer-based economy; the latter is a potential sign of economic development.



**Figure 1.** Agriculture, Manufacturing and services Sectors as % of GDP

Source: The World Bank’s World Development Indicators (2016).

At the same time, the employment structure of males and females in three sectors—agriculture, services and industry—echoes matching numbers as that of the contributions to the GDP by the same three sectors (see Table 1). Fewer workers were employed in the agricultural sector in 2012 than in 1994. This declining trend of employment in the agricultural sector is almost going hand in hand for males and females. Further, the economy experienced substantial growth of employment in the services and the industrial sector, which is a positive sign for the economy because it indicates that the economy is moving away from the agricultural based economy.

**Table 1.** Employment structure of males and females in the economy

Year	Employment in agriculture, female (% of female employment)	Employment in agriculture, male (% of male employment)	Employment in services, female (% of female employment)	Employment in services, male (% of male employment)	Employment in industry, female (% of female employment)	Employment in industry, male (% of male employment)
1994	72.4	55.7	12.5	25.9	12.4	17.1
2000	74.8	53.9	13.7	28.2	11.5	17.9
2005	70.9	49.2	14.7	29.8	14.4	21.0
2010	65.3	46.0	17.0	29.9	17.8	24.0
2012	59.7	42.9	19.4	31.0	20.9	26.1

Source: The World Bank's World Development Indicators (2016).

These transitions from a farmed-sector-based economy to a services-sector-based economy, in terms of contributions to the GDP as well as employment structures, have carved out a long journey. In 1991, the Indian Government liberalized its economy by boosting the growth of trade and by reducing regulations on businesses. These reforms have three dimensions: the industrial policy, the trade policy, and the financial sector policy. Under the industrial policy, the government has undertaken massive deregulation of the industrial sector by reducing and/or dismantling regulations and cancelling the so-called “license raj.” Until 1991, there were eighteen industrial sectors solely reserved for the public sector; under the reforms that number was brought down to three. Most importantly, restrictions on the import of foreign technology were removed. Under the reforms in the trade policy, tariffs on imports were reduced and other import restrictions were removed.

Under the reforms in the financial sector, the Indian currency became freely floated and interest rates were liberalized. Because of the confluence of all these above-described reforms, the economy has experienced more than 6 percent growth since 1991, which still continues to date. At the same time, the country has been experiencing a solid growth in the usage of Internet services (see Table 2 and Figure 2). In 2016, 15 percent of the households had a computer and were spending \$5 per month (which is a significant sum of money in terms of the Indian currency) for a fixed-broadband internet connection (The World Bank, 2016). Finally, the GDP growth rate and the volume of ICT goods imported and imported exhibit similar trends (see Figure 2).

**Table 2.** Secure internet servers and their density

Year	Secure Internet Servers	Secure Internet Servers (per 1 million people)	Internet users (per 100 people)
2001	122	0.1138	0.6601
2002	Not available	Not available	1.5378
2003	281	0.2535	1.6864
2004	462	0.4101	1.9761
2005	658	0.5750	2.3880
2006	825	0.7099	2.8054
2007	1121	0.9502	3.95
2008	1462	1.2213	4.38
2009	1796	1.4791	5.12
2010	2601	2.1129	7.5
2011	3545	2.8418	10.07
2012	4412	3.4916	12.58
2013	4889	3.8210	15.1
2014	7173	5.5377	21.0
2015	8944	6.8220	26.0

Source: The World Bank’s World Development Indicators (2016).

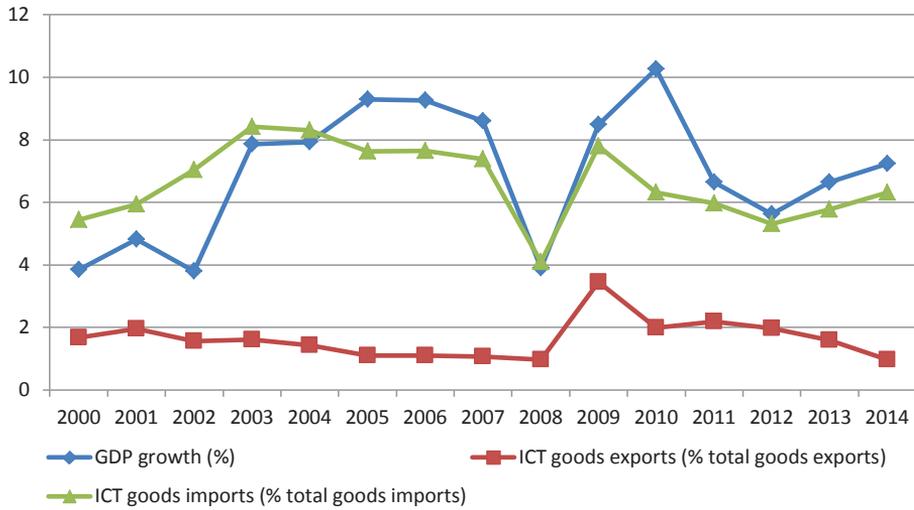
Some studies establish a theoretical link between the adoption of general-purpose technologies and its benefits to businesses as well as the economy at large. Bersnahan and Trajtenberg (1995) propose and test the idea of whether general-purpose technologies are engines of economic growth. Back in the mid-1990s, when their article was written, general-purpose technologies were steam engines, electric motors, and semiconductors. Although, nowadays, general-purpose technologies exist in the form of information and communication technologies, a theoretical framework proposed by

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Bersnahan and Trajtenberg (1995) is still applicable to the present. They show a theoretical link between general-purpose technologies and a boost to 'return-to-scale.' S. Basu and Fernald (2008) theoretically prove that the adoption of the new communication technologies lead to an increase in labor productivity. They also test their theoretical framework by using U.S. industry data and find that an increase in investments for information technologies lead to higher labor productivity, but with a long lag.

Now, we will turn our attention to the extant literature on the adoption of the Internet by businesses. Early studies, which were primarily focused on developed countries, on the adoption of the Internet by small and medium-sized businesses focus on various factors that were affecting the adoption of the Internet. For example, for businesses in Australia, Poon and Swatman (1997) find that firms use this service as a mode of communications and not so much for transferring documents or for advertising products and services. In another study of small and medium-sized firms in the UK, Levy and Powell (2003) find that the adoption of the Internet by these firms is a function of the owners' identification of the value of the Internet for their businesses in terms of growth of the businesses. Additionally, one more study of adoption of the Internet by small firms from the Netherlands suggests that the small firms do not adopt the service at the same pace as the large firms and claims that small businesses believe that the adoption of the Internet may not lead to more efficiency (Walczuch, Van Braven & Lundgren, 2000).

Another study on the adoption of the Internet by small firms in New Zealand indicates that perceived benefits, organizational readiness, and external pressure are the contributing factors for the usage of the service (Mehrtens, Cragg & Mills, 2001). In the same vein, Teo, Tan, and Buk (1997) find that for firms in Singapore, "organizational and technological factors, rather than environmental factors," play a major role in the adoption of the Internet. Adam, Mulye, Deans, and Palihawadana (2002) compare the use of the Internet and Web services among three developed countries—Australia, New Zealand, and the UK. In all of these three countries, firms use the Web for marketing communications, but, usage of the Internet for transactions in terms of marketing channels is much lower. Also, UK firms are more advanced in terms of the adoption of the Internet than those in Australia. In their study on the adoption of the Internet and websites by small and medium-sized firms in the U.S. Dholakia and Kshetri (2004) find that prior technology adoption and the influence of competitors' adoption of technology have a big impact on the propensity of adopting the Internet.



**Figure 2.** GDP growth rate, Information and Communication Technology (ICT) goods--imports and exports

Source: The World Bank's World Development Indicators, 2016.

Another aspect that can affect the adoption of the Internet is the societal culture in general and the organizational culture in particular that appears to have a great influence on the adoption rates of the Internet (Dasgupta, Agarwal, Ioannidis, & Gopalakrishnan, 1999). Their study, which focuses on India, finds that size, competition, government policies, exchange rates, and computer prices have a significant impact on the adoption of the technology. Moreover, poverty levels also play an important role. Although poverty lines are country specific, approximately 21 percent of the population earned no more than \$1.90 per day in 2011 (The World Bank, 2016). Only a small percentage of the population can be potential users (see Table 2). Interestingly, one third of the population is well-educated and eager to adopt new technologies. These users are predominantly young, male, and belong to the middle and higher classes (Raven, Huang, & Kim, 2009). Ironically, the best-run software companies—Infosys Ltd., Tata Communications Ltd., and Wipro—are listed on the U.S. stock market. Further, India is forecast to become the world's second-largest Internet user base after China by the end of 2016 (WSJ, 2015).

Early studies on the adoption of the Internet in developing countries also suggest that similar outcomes for businesses were found in developed countries. One study out of China claims that larger companies benefit more

in terms of sales and reduced costs (Riquelme, 2002). In their study of small and medium-sized firms in Malaysia, Sin Tan, Choy Chong, Lin, and Cyril Eze (2010) focus on demographic characteristics of these firms. They find that service-sector firms are more likely to adopt the service than manufacturing firms and that small and medium-sized firms benefit more for the adoption than micro-sized firms.

The adoption of the Internet is also affected by various factors that surround the firms. These factors are: a regulatory environment, the infrastructure with respect to information technology, and availability of skilled employees (Shore, 1998). Although in India regulatory reforms have been undertaken since 1991, these reforms are not good enough to increase the number of businesses or for businesses to flourish. The World Bank's Doing Business statistics offers some insights on running a business in the country. India ranks 130<sup>th</sup> (out of 190 countries) and scores 55.27 percent in terms of doing business (overall) (The World Bank, 2016a). Also, various business-related issues—such as dealing with construction permits, paying taxes, and enforcing contracts—are ranked below 170<sup>th</sup> out of 190 countries. Thus, even though the economy opened up in the early 1990s, things do not look as promising as they should when it comes to doing business in the country. Moreover, as far as India is concerned, infrastructure in terms of information technology has a lot of potential for improvement (see Table 2). The numbers for total number of secure servers and secure Internet server density are on the rise, but frustratingly lower than developed countries, making it a major hurdle for the people and businesses to get connected on line.

Some recent studies show that challenges for the adoption of the Internet and communication technology by businesses still persist worldwide. A survey on the adoption of the technology by about 400 small and medium enterprises in Malaysia show that the level of skills of owners needed, related to the adoption of technology, is poor and that their rate of adoption of the technology is slow and delayed (Hashim, 2015). Colombo, Croce, and Grilli (2013) study the adoption of broadband Internet connections of 800 small and medium enterprises in Italy. They find that the impact of the adoption of broadband on productivity of firms is negligible or even negative. Grimes, Ren, and Stevens (2012) study the impact of the speed of the Internet on the productivity of small and medium-sized enterprises in New Zealand. They find that broadband Internet connections enhance productivity of firms. In the same vein, Bertschek (2012) study the adoption of broadband Internet connections by firms in Germany and find a positive relationship between the adoption of broadband connections and innovation activities. The same study shows a smaller impact on labor productivity, however.

There are some studies that have studied Internet banking adoption in India (Kumar Sharma & Madhumohan Govindaluri, 2014; Malhotra & Singh, 2007; Roy, Kesharwani & Singh Bisht, 2012). On the other hand, some other studies focus on cultural aspects of India and its relationship with Internet shopping (Adapa, 2008; Rangaswamy & Cutrell, 2012). In their paper on E-Commerce, Tarafdar and Vaidya (2006) explain why firms differ in their adoption of E-Commerce. Their study finds that organizational culture, characteristics of information systems professionals, and organizational structure influence the adoption of the technology. Finally, these researchers claim that the utilization of technology has a significantly positive impact on the internationalization of small and medium firms in India. The existing literature shows that most attention is given to the adoption of the technology vis-à-vis culture and organizational structure.

Thus, a common theme emerges from the extant literature on the adoption of the Internet by small and medium-sized firms. In the late 1990s and early 2000s, a majority of these firms were slow in adopting the Internet. Also, benefits of the service in terms of increased sales and reduced costs were more tilted towards large firms than other firms. However, as time passed by and the technology became cheaper and more accessible, firms of all sizes, age groups, and sectors started adopting the Internet, thus making the service a necessity rather than a choice. Moreover, a majority of the studies on the adoption of the Internet by firms are done on developed countries (Oliveira and Martins, 2010). *However, scant attention has been given to the usage of the Internet and of websites by firms in general and their adoption by female-owned firms in particular—a literature gap this paper seeks to fill.* This study is necessary because the number of females as a part of the workforce is on the rise (see Table 1), thus, making it meaningful and necessary to investigate Internet adoption by female-owned firms.

**Contributions of this paper are threefold:** **1.** To the best of my knowledge, this is the first paper that studies the adoption of the Internet by female-owned firms. **2.** The paper investigates productivity and sales growth of female-owned firms that have Internet connections. And **3.** The paper uses a firm-level data set from the World Bank of more than 10,000 firm-level observations from all sectors of the economy for the year 2014, making the study current and a near-perfect representation of the economy as a whole.

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## RESEARCH METHODS

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The paper uses the World Bank's enterprise Surveys data set for the year 2014. The data set consists of more than 10,000 firm-level observations. In the data set a particular question was asked about the adoption of the Internet by the firms. The Surveys specifically asked questions regarding the adoption of the Internet. These questions were: 1. Does the firm have a high-speed Internet connection on its premises? 2. Does the establishment have its own website? And 3. Do you currently communicate with clients and suppliers by emails? The paper uses these specific questions to study Internet adoption. The key independent variable (Model 1) is a dummy variable that takes the form of "1" if the firms have access to the Internet and use the service to communicate with their clients and suppliers by emails, and the dummy variable takes the form of "0" otherwise. Also, the paper uses the same model to study whether firms have their own websites. Thus, an independent variable takes the form of "1" if the firms have their own websites and is zero otherwise.

### Measuring female-owned firms

The dependent variable is whether the firm is owned and managed by females (Model 1). The data set provides specific information on the structure of ownership of firms. This variable is based on a question from the Surveys. The Surveys specifically asked a question that "amongst the owners of the firm, are there any females?" The Surveys also asked a question whether firms have top managers as females. The paper uses these two questions together to form a variable that the firms is owned and managed by females. Answers to these questions may not correctly reveal the information regarding the number of female owners or percentage of ownership by females in the firms. Nevertheless, the answers to these questions provide information about the female ownership *with certainty*. In many studies, which use Enterprise Surveys data sets, a firm is considered to be female owned if at least one of the owners is a female (Aterido, Beck & Iacovone, 2011; Bardasi, Sabarwal & Terrell, 2011; Hansen & Rand, 2014).

Further, it is important to put together the above-mentioned two questions about the role of females in the firms because oftentimes firms that are owned by females are not necessarily managed by them. One important aspect of female-owned firms is the decision-making authority of their own businesses. Generally, husbands or male partners or male siblings, who may not be fully involved in day-to-day business operations, of these female—business owners make decisions that can have a long-lasting impact on operations and outcomes of businesses. One study suggests that firms

in which females have a part ownership, men make decisions in 77 percent of the business operations—a significantly high number making it critical to pay a closer look at decision-makers and not only at ownership (Aterido & Hallward-Driemeier, 2011). Thus, this decision making role played by minor male stakeholders or male non-owners affects the performance of these firms. Further, the information is available regarding whether top managers of firms are females. Thus, by using the same model (Model 1), analysis is performed for firms where top managers are females.

Once we know whether female-owned firms use the Internet and websites for their businesses, the next step in the investigation is to find out whether this adoption helps firms to enhance their performance (Clarke et al., 2015). To be specific, the performance is measured in terms of sales growth and labor product (Model 2). In this particular model, the key independent variable is the interaction term of firms owned and managed by females and adoption of the Internet by these firms. Additionally, the model controls for various firm-level characteristics to reduce selection bias.

Both empirical models use various firm-level characteristics as control variables in order to reduce the selection bias in these models. In particular, the models control for age, size, sector, export-oriented status of the firms, and access to finance. These controls are constructed as follows: For the control variable, age, there are three strata. The firms with age of less than 5 years are identified as young firms, the firms with age between 5 and 10 years old are termed as medium-aged firms and firms that have age in between 10 and 99 are viewed as old firms. As far as a size of the firms is concerned, firms with up to 19 employees are treated as small firms, firms that have employees in between 20 and 99 are treated as medium-sized firms, and firms that have more than 100 employees are treated as large firms (see Tables 3 and 4).

**Table 3.** Percentage of firms that are owned and managed by males and females vis-à-vis firms’ characteristics

Firm Characteristics	Firms that are owned and managed by females that use the technology (in %)	Firms that are owned and managed by males that use the technology (in %)
Company that uses email/web to communicate with clients (dmintuse)	95.32	86
Internet company either uses web to communicate with clients (dmintweb)	76	48
Internet - Company either uses e-mail to communicate with clients	95	14

<b>Firm Characteristics</b>	<b>Firms that are owned and managed by females that use the technology (in %)</b>	<b>Firms that are owned and managed by males that use the technology (in %)</b>
Age up to 5 years	6	7
Age 5-10 years	84	80
Age 10 to 99 years	79	74
Export-oriented status	37	15
Manufacturing-sector firms	74	22
Retail-sector firms	10	9
Services-sector firms	17	13

**Source:** based on author's calculations of the Enterprise Surveys (2014).

**Table 4.** Percentage of firms that are owned and managed by males and females vis-à-vis firms' characteristics

<b>Firm Characteristics</b>	<b>Firms where top managers are females and use the technology (in %)</b>	<b>Firms where top managers are males and use the technology (in %)</b>
Company that uses email/web to communicate with clients (dmintuse)	95	85
Internet company either uses web to communicate with clients (dmintweb)	79	51
Internet - Company either uses e-mail to communicate with clients	95	84
Age up to 5 years	6	7
Age 5-10 years	19	19
Age 10 to 99 years	75	74
Export-oriented status	30	14
Manufacturing-sector firms	68	78
Retail-sector firms	10	9
Services-sector firms	22	13

**Source:** based on author's calculations of the Enterprise Surveys (2014).

The data set offers extensive information about the sector to which these firms belong. In the model, three sectors are considered—manufacturing, retail and services. This sector classification is based on the primary products or services that the firms offer. This particular classification of the sector represents all the sectors in the economy, thus making the analysis a near-perfect representation of the economy as a whole. Further, the Surveys also have a question on whether the products are exported. Thus, the models

control for the export-oriented status of the firms to find out whether these firms are more adaptive to Internet services.

Finally, the models control for the access-to-finance status of the firms. This control is very important for two reasons: 1. It tells us whether firms are creditworthy and 2. If yes, it sends a signal that these firms have future profitable projects that can be totally funded by reserves and surplus, and that is why they need finance. This control variable is constructed as follows. It makes use of the question: "How much of an obstacle access to finance is." Five choices are given to the respondents to choose from: *no obstacle*, *minor obstacle*, *moderate obstacle*, *major obstacle*, and *a very severe obstacle*. In the variable, no obstacle takes a value of **1**. The responses for minor obstacles and moderate obstacles are combined and take a value of **2**. Finally, the responses for major obstacles and very severe obstacles are combined and take a value of **3**. Thus, the coefficient on this variable is interpreted as follows: if a regression coefficient is positive on this variable, an increase in this variable will increase the likelihood that the firms will have major or very severe obstacles in accessing credit.

**Model 1:**

$$y_i = \beta_0 + \beta_1 \text{Internet}_i + \text{FLC}_i + \mu_i$$

where the subscript "i" represents a firm in the country.

The dependent variable above is firms owned and managed by females or firms where top managers are females. The key independent variable is the adoption of the Internet or the usage of websites by firms. The model controls for various firm-level controls (such as age, size, sector, export-oriented status, and access to finance).

**Model 2:**

$$\text{Performance of firms}_i = \alpha_0 + \alpha_1 x_i + \text{FLC}_i + \mu_i$$

where the subscript "i" represents a firm in the country.

The key independent variable is an interaction term of firms owned and managed by females and firms that use the Internet. *The dependent variable is performance of the firms measured in terms of sales growth and labor productivity.* The same model (Model 2) is subsequently used where

the key independent variable, is now an interaction term of firms in which top managers are females and firms that use the Internet.

To compute sales growth and labor productivity, a method used in Clarke et al. (2015) is employed, which can be explained as follows. In order to compute sales growth, Enterprise Surveys data from the years 2010 and 2014, which form a panel data set, are employed. The Surveys specifically asks a question on sales revenues. The year 2010 is utilized as a base year. In order to compute sales growth, sales revenue numbers from 2010 and 2014 are employed. To make these two numbers comparable, GDP deflators for both years are used. In order to compute labor productivity, real sales for the year 2014 (using GDP deflator for 2014) are used. These real sales are divided by the number of full-time permanent workers to compute labor productivity. The model uses standard firm-level controls—age, size, sector, export-oriented status, and access-to-finance—to reduce any selection bias.

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## ANALYSIS AND EMPIRICAL RESULTS

Empirical analysis shows that firms that are owned and managed by females are more likely to use the Internet and websites for their businesses than their male counterparts (Model 1, see Table 5: Columns 1 and 3). Also, firms in which top managers are females are more likely to use the Internet and websites for their businesses than their male counterparts (Model 1, see Table 5: Columns 2 and 4). Thus, overall, these results clearly indicate that Indian firms owned and run by females, in comparison to those owned and run by males, have a higher propensity towards the use of the Internet.

Firm-level control variables show the expected signs for their regression coefficients. Thus, firms where top managers are females and are medium in size are more likely to use the Internet and websites in comparison to small firms where top managers are female. Also, the same results are obtained when large firms are compared to small firms. This indicates that the size of the firms matters when it comes to adoption of the Internet—the larger the firm, the more likely it is to have a propensity towards the use of the Internet. In addition, firms that are involved in export activities are more likely to use both—the Internet and websites. Interestingly, as far as sectors in the economy and firms where top managers are females are concerned, manufacturing-sector firms are less likely to use the technology than services-sector firms. However, being in the retail sector does not make firms more or less likely to use the technology than being in the services sector. Finally, the access-to-finance variable is only statistically significant for firms where top managers are females. This clearly shows that access to finance is a vexing problem when firms are solely managed and run by females.

**Table 5.** Empirical results of Model 1

Measurement of adoption of the Internet and Websites	Firms that are owned and managed by females Column 1	Firms where top managers are females Column 2	Firms that are owned and managed by females Column 3	Firms where top managers are females Column 4
Use of the Internet for communicating with customers and suppliers	0.333 (3.03)**	0.378 (4.76)**		
Use of websites	--	--	0.275 (4.26)**	0.403 (8.38)**
Firm age [dummy, the omitted age is up to 5 years]				
Medium-aged (5 to 10 years)	-0.033 (0.26)	0.057 (0.61)	-0.039 (0.30)	0.052 (0.55)
Old-aged (10 to 99 years)	0.058 (0.51)	0.044 (0.52)	0.059 (0.52)	0.055 (0.64)
Firm size [dummy, the omitted size is small firms (5 to 19 workers)]				
Firm size: medium (20 to 99 workers)	-0.041 (0.59)	0.164 (3.14)**	-0.058 (0.83)	0.119 (2.25)*
Firm size: large (more than 100 workers)	0.270 (3.70)**	0.454 (8.00)**	0.210 (2.75)**	0.346 (5.86)**
Export [dummy]	0.452 (7.17)**	0.369 (7.38)**	0.410 (6.39)**	0.303 (5.97)**
Sector type [dummy, the omitted sector is services sector]				
Sector type: manufacturing	-0.189 (2.56)*	-0.382 (7.24)**	-0.144 (1.93)	-0.314 (5.86)**
Sector type: retail	0.045 (0.41)	-0.080 (1.01)	0.071 (0.65)	-0.034 (0.43)
Access to finance status [dummy]	0.007 (0.17)	0.104 (3.49)**	0.007 (0.17)	0.110 (3.64)**
_cons	-2.235 (12.52)**	-1.983 (15.10)**	-2.106 (13.52)**	-1.903 (16.34)**
N	9,138	9,194	9,131	9,187

Notes: Dependent variable: 1. Firms that are owned and managed by females (columns 1 and 3); 2. Firms where top managers are females (columns 2 and 4); t-statistics are in parentheses. \*\*\*, \*\*, \* are statistically significant at 1, 5, and 10 percent significance levels respectively.

Source: based on author's calculations of the Enterprise Surveys (2014)

**Table 6.** Empirical results of Model 2

Measurement of performance of female-owned firms AND their adoption of the Internet	Sales growth Column 1	Labor productivity Column 2
Firms that are owned and managed by females AND use the Internet for communications with customers and suppliers	0.743 (0.29)	0.216 (1.48)
Firms that are owned and managed by females	0.101 (0.04)	-0.132 (0.93)
Firms that use the Internet for communications with customers and suppliers	0.449 (1.61)	0.154 (9.11)**
Firm age [dummy, the omitted age is up to 5 years]		
Medium-aged (5 to 10 years)	-2.045 (4.12)**	0.040 (1.61)
Old-aged (10 to 99 years)	-3.540 (7.64)**	0.064 (2.85)**
Firm size [dummy, the omitted size is small firms (5 to 19 workers)]		
Firm size: medium (20 to 99 workers)	0.570 (2.60)**	1.249 (94.57)**
Firm size: large (more than 100 workers)	0.523 (1.96)*	3.037 (188.40)**
Sector type [dummy, the omitted sector is services sector]		
Sector type: manufacturing	0.206 (0.74)	-0.043 (2.61)**
Sector type: retail	1.361 (3.36)**	-0.260 (10.89)**
Export [dummy]	0.422 (1.58)	0.189 (11.69)**
Access to finance status [dummy]	0.054 (0.40)	-0.045 (5.46)**
R2	0.02	0.83
N	8,225	9,138

Notes: Dependent variable: 1. Sales growth of firms (columns 1); 2. Labor productivity of firms (column 2); t-statistics are in parentheses. \*\*\*, \*\*, \* are statistically significant at 1, 5, and 10 percent significance levels respectively.

Source: based on author's calculations of the Enterprise Surveys (2014).

**Table 7.** Empirical results of Model 2

<b>Performance of firms where top managers are females AND their adoption of the Internet</b>	<b>Sales growth Column 1</b>	<b>Labor productivity Column 2</b>
Firms where top managers are females AND use the Internet for communications with customers and suppliers	0.787 (0.50)	0.095 (1.01)
Firms where top managers are females	-0.194 (0.13)	-0.004 (0.05)
Firms that use the Internet for communications with customers and suppliers	0.432 (1.53)	0.153 (8.98)**
Firm age [dummy, the omitted age is up to 5 years]		
Medium-aged (5 to 10 years)	-2.095 (4.23)**	0.038 (1.54)
Old-aged (10 to 99 years)	-3.563 (7.70)**	0.065 (2.89)**
Firm size [dummy, the omitted size is small firms (5 to 19 workers)]		
Firm size: medium (20 to 99 workers)	0.548 (2.50)*	1.248 (94.71))
Firm size: large (more than 100 workers)	0.449 (1.68)	3.033 (188.33)**
Sector type [dummy, the omitted sector is services sector]		
Sector type: manufacturing	0.233 (0.84)	-0.037 (2.26)*
Sector type: retail	1.387 (3.43)**	-0.253 (10.67)**
Export [dummy]	0.450 (1.69)	0.188 (11.69)**
Access to finance status [dummy]	0.036 (0.27)	-0.046 (5.60)**
R2	0.01	0.83
N	8,256	9,194

Notes: Dependent variable: 1. Sales growth of firms (columns 1); 2. Labor productivity of firms (column 2); t-statistics are in parentheses. \*\*\*, \*\*, \* are statistically significant at 1, 5, and 10 percent significance levels respectively.

Source: based on author's calculations of the Enterprise Surveys (2014).

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Further, it is essential to analyze whether adoption of the Internet for communications and the usage of websites by female-owned firms make them more productive than their male counterparts. To study this relationship, the paper analyses this issue by measuring performance in terms of sales growth and labor productivity (Model 2). In this analysis, the key independent variable is the interaction term of firms owned plus managed by females and adoption of the Internet by these firms (Model 2, see Table 6). Again, Model 2 is used for firms where top managers are females (Model 2, see Table 7). The empirical results show that adoption of the Internet by these firms does not make them more or less likely to have more sales or improved labor productivity. As expected, firms that use the Internet exhibit higher labor productivity than others (see Tables 6, 7 and Column 2). However, when the variable  $x_p$ , which indicated whether the firm is owned and managed by females and where top manager are females, is introduced into the model, the regression coefficients become statistically insignificant. This certainly indicates that adoption of the Internet in itself *does* lead to higher productivity; however, it disappears when the firms are owned and/or are run by females. Further, as a robustness check, tests were performed to determine whether the adoption of *websites* by these firms results in higher sales and labor productivity than their male counterparts. The results of this check also show that the usage of websites does not make these firms more or less likely to make them perform better than other firms.

## CONCLUSION

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Technology, in terms of usage of the Internet, plays a critical role in the development of any country, and India is no exception to this premise. Therefore, the adoption of the Internet by firms in general and by female-owned firms in particular, is a topic that took center stage in this paper. In order to study this phenomenon, the paper used the World Bank's Enterprise Surveys Program data set. The data set had more than 10,000 firms-level observations, which allowed studying the firms in various dimensions. The paper found out that female-owned firms in the country were more likely to use the Internet than their male counterparts. Also, in comparison to their male counterparts, these firms were more likely to use websites to communicate with their clients. Generally, the usage of the Internet by businesses, regardless of the gender of the owners/managers, leads to better performance of firms (Clarke *et al.*, 2015). Therefore, the paper analyzed whether the adoption of the Internet by firms *owned/managed by females* in India led to better performance. In order to measure the performance

of these Indian female-owned firms, productivity and sales growth were analyzed. The empirical results indicated that the adoption of the Internet by these firms did not make them more or less likely to have higher productivity and/or deliver higher sales growth. These results indicate that, although the female-owned firms have adopted the Internet more extensively than their male counterparts, this did not necessarily get transmitted into greater productivity or sales growth. Thus, these firms were missing out on an important opportunity to have better performance in spite of more extensive Internet adoption.

There can be various explanations for these surprising results. One of the potential reasons can be the quality of employees. Firms having Internet access on their premises does not necessarily mean that employees of these firms have the necessary skills and/or the required training to use the technology for the benefit of the firms that can eventually increase sales or productivity; some studies indicate that this is a very likely reason in other countries (Colombo et al., 2013; Hashim, 2015). Further, the speed of the Internet connection also plays a decisive role in the level of increased productivity. The extant literature suggests that a basic broadband Internet connection does not have a positive impact on the performance of the firms, but a high speed broadband connection does (Bertschek, 2012; Grimes et al., 2012). Additionally, a time lag may exist in the adoption of Internet and its impact on productivity of firms (Susanto Basu & Fernald, 2007). Finally, the adoption of the Internet by female-owned firms may lead to results in intangible forms such as increased customer service satisfaction and convenience (Brynjolfsson & Hitt, 2000). If this is the case, some time may be needed to observe the effect of this increased customer satisfaction into higher sales and productivity.

It can be further argued that there may be economic reasons behind the results obtained in this paper. Part of the problem can be attributable to the fact that India has a cash-based economy. Additionally, it is a country where more than 70 percent of the economy belongs to the informal sector. This makes it impossible to keep track of various parties involved in business processes. To this end, the current Indian government has been undertaking bold economic reforms. One of the activities that the current Government has undertaken recently is to demonetize the economy and encourage people in the country to use either plastic money or mobile money (cell-phone-based monetary transactions). These reforms, although extremely painful in the beginning, especially for the poor in the country, have a tremendous potential to change the way businesses carry out their financial transactions and the way the economy functions. For example, if large parts of the economy carry out financial transactions using digital money, it will be treated as a formal

economy. Also, this process can lead to the generation of electronic records of transactions and can thus attract taxes, thereby increasing the revenues of the government. Most importantly, businesses will have easy access to data bases on their clients. This set up will lead to enhanced repeat business, better products, and customer loyalty. In the long run, this process will result in increased sales growth, employment, and government revenues.

The current study has a few limitations. It only looked at female-owned firms in India. Because, no specific questions on the adoption of the Internet were asked in the data set from the year 2010, a comparative study vis-a-vis the year 2014 for adoption of the technology was not possible. The current study suggests many exciting avenues for future research. For example, the same kind of empirical analysis can be performed on other developing countries, such as Brazil, Mexico, and Turkey. Also, it will be interesting to determine why male-owned firms in India have a lower Internet adoption rate than their female counterparts and how this affects their productivity and sales.

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### **Abstract (in Polish)**

*Internet całkowicie przekształcił nasze życie indywidualnie na wiele sposobów, począwszy od sposobów komunikowania się poprzez sposób, w jaki towarzyszy nam przy robieniu zakupów i podróżach. Firmy nie są wyjątkiem od tej przesłanki. W artykule tym analizujemy wykorzystanie Internetu przez kobiety będące właścicielkami firm w Indiach. Wykorzystujemy zestaw danych Programu ankiety dla przedsiębiorstw Banku Światowego na rok 2014, aby zbadać wykorzystanie Internetu przez ponad 10 000 firm w kraju. Po sprawdzeniu dużej liczby charakterystyk na poziomie firmy, uzyskane wyniki empiryczne wskazują, że kobiety będące właścicielkami firm*

*częściej korzystają z Internetu niż ich partnerzy płci męskiej. Jednak kolejna analiza empiryczna wskazuje, że bardziej intensywne wprowadzanie Internetu przez te kobiety, niekoniecznie przekłada się na lepsze wyniki. Wykorzystanie Internetu nie powoduje, że przedsiębiorstwa będące własnością kobiet mają mniej lub bardziej prawdopodobny wzrost wydajności i wzrostu sprzedaży w przeciwieństwie do ich partnerów.*

**Słowa kluczowe:** Internet; kobiety; produktywność; wzrost sprzedaży w Indiach.

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