Journal of Economics, Business & Organization Research

Year:2022, Vol:4, Issue:1, pp. 13-31

**Article Type:** *Research*

**Citation:** *Bakan, I. and Sezer, B. (2022). The Effect of Agglomeration on Innovation: An Empirical Study, Economics, Business and Organization Research, 4(1), pp. 13-31*

# THE EFFECT OF AGGLOMERATION ON INNOVATION: AN EMPIRICAL STUDY

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## Abstract

The purpose of this research is to examine the effect of agglomeration on innovation. The research's population constitute business owner and managers operating in the furniture sector in İnegöl, Bursa, in the TR41 region in Turkey. 225 business, which are members of İnegöl Furniture Industrialists Association (İMOS) that is consisted of clustered firms, were chosen as the sample frame. Simple random sampling method, which is a probability-based sampling technique, was used to determine the number of samples. Reached sample size is 384 for this research. The obtained datas were analyzed with SPSS 21 package programme. The data obtained by face-to-face survey method were tested with frequency, factor, reliability, correlation, and regression analysis. The analyses revealed that agglomeration significantly increased firm innovation level. In addition, agglomeration has statistically significant and positive effect on innovation in the clustered firms were determined.

***Keywords:*** *Agglomeration, Innovation, Cluster, Geographic Concentration, Furniture Sector, Bursa, Turkey.*

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***Received:*** *24.05.2022* ***Accepted:*** *21.06.2022* ***Published Online:*** *31.08.2022*

## 1. INTRODUCTION

Porter (1998: 77-85) calls today's economic structure as "cluster". According to him, clusters occur geographical concentration of interconnected businesses and institutions in certain areas. Silicon Valley and Hollywood is the best-known clusters in the world. Location plays vital role for companies to create competitive advantage. He points out geographically concentrated companies are more innovative and successful in many fields. Being a part of well-developed cluster have many advantages for a company. Mean operate more productively, accessing information and technology, easy to attract qualified and experienced person, better access to suppliers, lower transaction cost, minimize need for inventory, eliminate importing costs and delays, lower risk of suppliers' commitment, proximity improve communication among companies and better alternative to vertical integration, etc. If one firm performs well, the other chance will increase, one's success means another's' success, so in cluster region all firms have mutually dependent each other.

One of the most remarkable features of economic activity is concentration of industries geographically. Some researchers have shown that firms located in cluster region have superior performance than other firms (Nestle et al, 2019: 563). Industry agglomeration has significantly benefited for firms (Burki and Khan, 2013: 2).

Porter (1998: 77) has expressed that professionally specialized institutions can share benefits being close to each other such as banks, funds, securities traders, insurance firms. It is found that in centrally located areas financial agglomeration has positive effect on energy efficiency in China's big and mega cities (Qu et al, 2020: 1).

The concept of innovation means new markets, new developed products, methods, new techniques, new structures are essential for the organizational success. However, today's gradually growing uncertain environmental conditions have shown that innovation efforts should not be limited within the organizations inbound. Hence, the need for open innovation, which requires communication and information sharing among companies and the other institutions, is increasing (Kaynak and Maden, 2012: 31).

It is stated that if companies or busineses are willing to improve their technology and to advance their interaction with the external environment, they should use internal ideas besides external ideas, namely they should use both of them at the same time in balanced way. (Chesbrough, 2003: xxiv; Parveen et. al, 2015: 335). According to Chesbrough as well as

companies use the information that they produce through their own internal processes, they also use information, which is created outside the company. Thus, the input and output of information to the firm is provided and the process of revealing innovation is accelerated. Competitive power can be achieved by making best usege of internal and external information and ideas together (Chesbrough, 2006: 3 cited in Seyfettinoğlu and Taşdoğan, 2014: 9).

In this paper, the basic concept of agglomeration and innovation will be discussed, the effect of agglomeration on innovation will be analyzed, and obtained data will be interpreted. Thereby, this study contributes to the literatures of agglomeration and innovation as we explain the concept of agglomeration and innovation.

## 2. LITERATURE REVIEW

### 2.1. Innovation

Innovation is one of the core capabilities of today's business world (Lin and Chen, 2007: 127), and become one of main features which companies are striving hard to improve their internal and external environment in this decade (Reguia, 2014: 140). Porter (1990: 75) explains innovation as both new technologies and new business models, but states that innovation is the focus of economic welfare. Nonaka and Takeuchi (1995: 3) explain that the key of creating new knowledge is “innovation”.

Innovation is seen as the main factor of the economic growth process for being a force that encourages uninterrupted development (Marins, 2008: 13). According to Sviokla et al., (2011: 3), innovation occurs because of continuous improvement. Gunday et al., (2011: 663) mentions that innovation is an indispensable element of corporate strategy. Owing to innovation, firms could leave a positive image or impression on customers’ perception, obtain sustainable competitive advantage, have more productive production process, and show better performance in the market.

In the most general sense, innovation is known as developing new goods, new services and processes (Schillo and Robinson, 2017: 34); new idea, way of doing things, service, production, procedure that is considered new for personal or related group (Gök and Çelik, 2017: 217). Apart from these, it has many benefits such as contributing to economic growth, increasing the welfare of the society (Schillo and Robinson, 2017: 34); technological creativity (Fritsch and Stuetzer, 2009: 8).

Creating knowledge and new value, sharing knowledge requires connected networks of participants (Krause and Schutte, 2015: 165). Borch and Marina (2015:20) emphasized how colloborative efforts are important for the new product development in their article. According to their findings, if there is a good relationship with external providers and collaboration with other institutions, firm will increase the speed and quality of new product development. It is stated that improvement's source is innovation and open innovation plays the role of a tool for genereting new solutions through the utilization of the environment (Stanisławski, 2020: 2). By means of open innovation processes, small and medium sized enterprises can attend, other stakeholders to design and develop new product, because they cannot affort R&D cost by themselves (Piller and Walcher, 2006: 308).

It is declared that there are four innovation types, which are production, process, organizational and marketing innovation, by OECD Oslo Manuel (2005). Product innovation is defined as an entirely new product or service, or a product or service with improved features related to its intended uses. Innovation related to new production or delivery implementation is called as process innovation. Marketing innovation is introduced new implementation marketing method or considerable changes such as designing, packaging, pricing, or product promoting. Organizational innovation is explained new way of implementation of organizational method, workplace organization or firm's business practices (OECD Oslo Manuel, 2005).

### 2.2. Agglomeration

Agglomeration began to draw attention from researchers in academic field as a new concept. It seems that the term of "agglomeration" and "cluster" are used interchangeably in some studies (Tsuji et al., 2007; Nestlet et al., 2019). Thereby, it is stated that some researchers prefer to call geographic concentration of companies that compete in the same area as "hot spots" rather than cluster or agglomeration (Pouder and John, 1996: 1192).

According to Porter (1998: 78) agglomeration provides competitive advantage for firms. He explains that agglomerations cover suppliers' inputs which have distinctive features such as components, machinery, and services, and providers of specialized infrastructure". Duranton and Kerr (2015: 4) express that agglomeration have benefits for firms to ship and sell their products on larger markets due to collaboration it provides. It makes more available to get information about local competitors for managers (Van Oort and Stam, 2009: 3).

Agglomeration improves urban labor productivity significantly and it is beneficial for economic development, beside these, it is importance is indisputable for regional economy. However, it has crowded effect on energy consumption, pollutant emissions and aggravating environmental pollution (Feng et al., 2019: 12).

Tsuji et al. (2007: 60) have studied on automobile industry and answered some questions as why certain location attract firm and why firms agglomerate. Existence of raw materials, well-organized infrastructure (railways, canals, highways, ports), a large pool of quality labor, important crossing points (roads, telecommunications, banking services), new business emerged based on accumulated knowledge related main industry, support of the city government (tax and financial incentives and infrastructure supplies) are listed as incentive factors for encouraging others to come and agglomerate.

Agglomeration called as regions where people and resources concentrate. Although these resources are physical, but more importantly include human capital, knowledge, learning capability and flexible institution. Regions tend to be center of agglomeration. Diversity of knowledge, expertise, learning capability and resources found in these regions, so that makes them centers of innovation (Johansson et al., 2009: 3).

Agglomeration plays crucial role in speeding flow of ideas. We acquire most of the information from people close to us or who are around us. The gathering of qualified human resources in big cities or megacities increases the interaction and communication among them. This increases both the individual capital of people in a special sense and the speed of information and development of new ideas in general (Glaeser, 2010: 9).

## 3. RESEARCH METHODOLOGY

The purpose of this paper is to investigate the effect of agglomeration on innovation. To make clear this question and verify hypotheses an empirical study was conducted in furniture sector in İnegöl, Bursa. The research universe of this study consists of the manager / manager and business owner / partners employed in the furniture sector operating in the İnegöl district of Bursa, in the TR41 region. As the sampling frame, 225 firm that are members of İnegöl Furniture Manufacturers Association (İMOS) were selected.

IMOS was established to gather İnegöl furniture firms under one roof and was awarded with a bronze label by the European Union Cluster Perfectionism Secretariat. Especially by combining Porter's clustering strategy with local culture and conditions, it is thought to be a

striking framework for the research universe as it is one of the most important clusters in our country. Bursa Eskişehir Bilecik Development Agency (BEBKA) with the support in terms of being institutions with Turkey's first furniture design center also has an important value for this research (İNMOB, 12.12.2020).

### 3.1. Data and Variables

For a 95% confidence interval, the sample size should be at least 384 for 1 million or even 10 million populations (Yıldırım and Şimşek, 2016: 132). The sample size reached for this research consists of 384 participants. 384 participant was selected by using random sampling method. Therefore, it can be said that the sample size is large enough to represent the sample and the size required by the statistical analysis.

In order to apply the questionnaire prepared within the scope of the research, 67 managers were visited in their offices, face-to-face survey method was conducted with them and a pilot study was implemented to determine comprehensibility of the questionnaires and the reliability of the scales. Necessary changes and corrections were made on the questionnaire in accordance with the feedback obtained because of the pilot study. It was decided to distribute the questionnaires by hand and apply face-to-face survey method.

İnitially, although 550 questionnaires were distributed by hand, 384 questionnaires were found available. The return rate of the questionnaires are percentage 69, 8. In this study, existing scales were used to measure variables. Agglomeration scale consisting of 5 indicators was adapted from Nestle et al. 2019 who has been developed the agglomeration scale in accordance with the statements which is consisted Marshall (1980)’s study about agglomeration effect.

Innovation scale was adapted from Özdevecioğlu and Biçkes (2012) who has been translated from English to Turkish was used. The original innovation scale developed by Henard and Szymanski (2001). The related scale consists of 4 dimensions and 24 indicators: product innovation (5 statements), strategy innovation (5 statements), process innovation (11 statements), and market innovation (3 statements).

A five-point Likert type scale was used ranging from 1 (totally disagree) to 5 (totally agree) to measure the attitudes of the participants. First, 67 manager and expert were visited in their offices and a pilot study was conducted checking the reliability and intelligibility of the scales. Some small revisions were made on the questionnaire in the accordance with the feedback obtained from respondents’ comments.

Because of the literature review, attention has been paid to the selection of scales that are frequently used by researchers and thought to be the most suitable for the research model and sample group. The scale questions, originally in English, were carefully translated into Turkish and the opinions of scientists who experts in their field were consulted on the comprehensibility of the translations and the protection of the meaning integrity.

### 3.2. Research Design

In this knowledge age, agglomeration and innovation seems as the most important aspects that support growing, maintaining, renewing, and sustaining regional economic systems. The agglomeration of industries in a particular city or region facilitates the distribution of knowledge among businesses, which leads to innovation. Agglomeration plays crucial role growth and innovation. (Van Oort and Stam, 2009: 3).

Scholars have mentioned a variety of reasons that help to clarify agglomeration's positive effects on firm. According to Nestle et al. (2019: 563) all the positive effect of agglomeration contributes to the information exchange; this means increased information sharing and reduction of hidden information. As a result, agglomeration effects in cluster initiatives promotes generation and collection of knowledge (Tsuji et al., 2007: 60; Johansson et al., 2009: 3), knowledge acquisition about competitor (Van Oort and Stam, 2009: 3). In cluster initiates, cooperation's/ competition (Porter, 2008: 258) or collaboration with related members increases social interaction (Glaeser, 2010: 9) and network activities (Nestle et al., 2009: 564).

Creating new knowledge (Nanoka and Takeuchi, 1995: 3), internal and external information flow (Chesbrough, 2003: 3), social interaction and trust between organizations in cluster initiative creating innovation-friendly environment (Nestle et al., 2009: 565). Agglomeration means geographical clustering plays critical role in job creation and technological innovation (Pouder and John, 1996: 1192). According to Porter (1990) proximity and shared resource, arrangements contribute to innovative environment. It is claimed that entrepreneurial spirit that emerged with the cluster and it leads innovation culture and dramatic changes that is supported by suppliers, idea creators, labor pool and competitors (Saxenian, 1994 cited in Pouder and John, 1996: 1204). Industrial clusters are source of innovation leading to productivity growth (Porter, 1998: 80).

As a result, it is considered that agglomeration provide a favorable ground for innovation. Thus, hypotheses were proposed below:

**H1.** "Agglomeration has a positive effect on innovation".

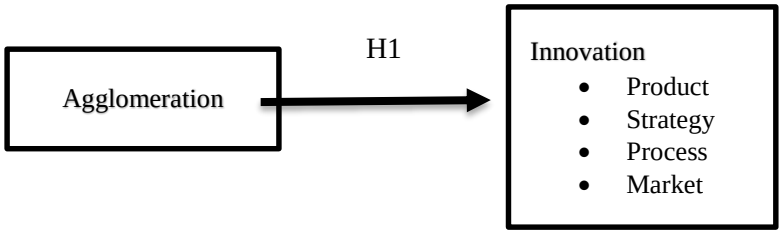
H1a. "Agglomeration has a positive effect on product innovation".

H1b. "Agglomeration has a positive effect on strategy innovation".

H1c. "Agglomeration has a positive effect on process innovation".

H1d. "Agglomeration has a positive effect on market innovation".

**Fig 1.** Research Model and Hypotheses




## 4. RESEARCH FINDINGS

The aim of this study is to investigate whether agglomeration has an effect on innovation. The descriptive statistics of the sample is as presented in Table 1:

**Table 1.** Descriptive Statistic

| Demographic Features | Number of Participant | (%) | Demographic Features | Number of Participant | (%) |
|---|---|---|---|---|---|
| **Gender** | | | **Legal Statu of The Company** | | |
| Female | 151 | 39,3 | One Man Company | 164 | 42,7 |
| Male | 233 | 60,7 | Joint Stock Company | 81 | 21,1 |
| | | | Limited | 124 | 32,3 |
| **Total** | **384** | **100** | **Total** | **369** | **96,1** |
| **Age** | | | **Working Hour** | | |
| 18-25 years old | 67 | 14,7 | 1-3 year | 87 | 22,7 |
| 26-30 years old | 84 | 21,9 | 4-6 year | 62 | 16,1 |
| 31-35 years old | 77 | 20,1 | 7-9 year | 44 | 11,5 |
| 36-40 years old | 72 | 18,8 | 10-12 year | 49 | 12,8 |
| 41-45 years old | 33 | 8,6 | 13-15 year | 20 | 5,2 |
| 46-50 years old | 23 | 6,0 | 16-18 year | 18 | 4,7 |
| 51 years old and above | 28 | 7,3 | 19-21 year | 16 | 4,2 |
| | | | 22-24 year | 6 | 1,6 |
| | | | 25 year and above | 38 | 10,0 |
| **Total** | **384** | **100** | **Total** | **340** | **88,5** |
| **Education Level** | | | **Number of Employees** | | |
| Primary | 23 | 6,0 | Less than 10 | 104 | 27,1 |
| High School | 112 | 29,2 | Less than 50 | 157 | 40,9 |
| Associate degree | 88 | 22,9 | Less than 250 | 88 | 22,9 |
| Bachelor's Degree | 137 | 35,7 | More than 250 | 30 | 7,8 |
| Postgraduate | 24 | 6,3 | | | |
| **Total** | **384** | **100** | **Total** | **379** | **98,7** |
| **Year of Company Establishment** | | | **Employees Position** | | |
| Before year of 1980 | 30 | 7,8 | CEO/General Manager | 106 | 27,6 |
| 1981-1985 | 22 | 5,7 | Human Resource Manager | 63 | 16,4 |
| 1986-1990 | 29 | 7,6 | Marketing Manager | 55 | 14,3 |
| 1991-1995 | 23 | 6,0 | Sales Manager | 35 | 9,1 |
| 1996-2000 | 69 | 18,0 | Foreign Trade Manager | 37 | 9,6 |
| 2001-2005 | 49 | 12,8 | Accounting Manager | 45 | 11,7 |
| 2006-2010 | 56 | 14,6 | Production Manager | 43 | 11,2 |
| 2011-2015 | 35 | 9,1 | | | |
| 2016-2019 | 23 | 6,0 | | | |
| **Total** | **336** | **87,5** | **Total** | **384** | **100** |

According to the Kolmogorov-Smirnov test result in Table 2, it has been determined that all the propositions are statistically significant, so it was seen that the distribution was not normal. For this reason, non-parametric tests were performed.

**Table 2.** Tests of Normality

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | **Statistic** | **df** | **Sig.** | **Statistic** | **df** | **Sig.** |
| **Üİ1** | ,261 | 372 | ,000 | ,761 | 372 | ,000 |
| **Üİ2** | ,276 | 372 | ,000 | ,752 | 372 | ,000 |
| **Üİ3** | ,265 | 372 | ,000 | ,741 | 372 | ,000 |
| **Üİ4** | ,254 | 372 | ,000 | ,762 | 372 | ,000 |
| **Üİ5** | ,266 | 372 | ,000 | ,735 | 372 | ,000 |
| **Sİ1** | ,268 | 372 | ,000 | ,757 | 372 | ,000 |
| **Sİ2** | ,249 | 372 | ,000 | ,776 | 372 | ,000 |
| **Sİ3** | ,242 | 372 | ,000 | ,804 | 372 | ,000 |
| **Sİ4** | ,254 | 372 | ,000 | ,781 | 372 | ,000 |
| **Sİ5** | ,289 | 372 | ,000 | ,752 | 372 | ,000 |
| **SÜRİ1** | ,266 | 372 | ,000 | ,781 | 372 | ,000 |
| **SÜRİ2** | ,290 | 372 | ,000 | ,808 | 372 | ,000 |
| **SÜRİ3** | ,306 | 372 | ,000 | ,784 | 372 | ,000 |
| **SÜRİ4** | ,290 | 372 | ,000 | ,786 | 372 | ,000 |
| **SÜRİ5** | ,285 | 372 | ,000 | ,772 | 372 | ,000 |
| **SÜRİ6** | ,261 | 372 | ,000 | ,800 | 372 | ,000 |
| **SÜRİ7** | ,274 | 372 | ,000 | ,772 | 372 | ,000 |
| **SÜRİ8** | ,260 | 372 | ,000 | ,768 | 372 | ,000 |
| **SÜRİ9** | ,268 | 372 | ,000 | ,791 | 372 | ,000 |
| **SÜRİ10** | ,251 | 372 | ,000 | ,786 | 372 | ,000 |
| **SÜRİ11** | ,256 | 372 | ,000 | ,773 | 372 | ,000 |
| **Pİ1** | ,266 | 372 | ,000 | ,743 | 372 | ,000 |
| **Pİ2** | ,265 | 372 | ,000 | ,768 | 372 | ,000 |
| **Pİ3** | ,279 | 372 | ,000 | ,767 | 372 | ,000 |
| **AGET1** | ,266 | 372 | ,000 | ,798 | 372 | ,000 |
| **AGET2** | ,248 | 372 | ,000 | ,816 | 372 | ,000 |
| **AGET3** | ,255 | 372 | ,000 | ,782 | 372 | ,000 |
| **AGET4** | ,263 | 372 | ,000 | ,783 | 372 | ,000 |
| **AGET5** | ,265 | 372 | ,000 | ,796 | 372 | ,000 |

a. Lilliefors Significance Correction

**Table 3.** KMO and Bartlett's Test

| | | |
|---|---|---|
| **Kaiser-Meyer-Olkin Measure of Sampling Adequacy.** | | ,963 |
| **Bartlett's Test of Sphericity** | **Approx. Chi-Square** | 10082,246 |
| | **df** | 276 |
| | **Sig.** | ,000 |

**Table 4.** Total Variance Explained

| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| **Com.** | **Total** | **% of Variance** | **Cumulative %** | **Total** | **% of Variance** | **Cumulative %** | **Total** | **% of Variance** | **Cumulative %** |
| 1 | 15,939 | 66,414 | 66,414 | 15,939 | 66,414 | 66,414 | 5,184 | 21,599 | 21,599 |
| 2 | 1,320 | 5,498 | 71,913 | 1,320 | 5,498 | 71,913 | 5,048 | 21,033 | 42,632 |
| 3 | ,953 | 3,972 | 75,885 | ,953 | 3,972 | 75,885 | 4,726 | 19,690 | 62,322 |
| 4 | ,771 | 3,212 | 79,096 | ,771 | 3,212 | 79,096 | 4,026 | 16,774 | 79,096 |
| 5 | ,569 | 2,370 | 81,466 | | | | | | |
| 6 | ,498 | 2,073 | 83,539 | | | | | | |
| 7 | ,442 | 1,843 | 85,382 | | | | | | |
| 8 | ,402 | 1,675 | 87,058 | | | | | | |
| 9 | ,343 | 1,428 | 88,486 | | | | | | |
| 10 | ,315 | 1,311 | 89,797 | | | | | | |
| 11 | ,276 | 1,151 | 90,948 | | | | | | |
| 12 | ,259 | 1,080 | 92,029 | | | | | | |
| 13 | ,239 | ,996 | 93,025 | | | | | | |
| 14 | ,231 | ,964 | 93,989 | | | | | | |
| 15 | ,211 | ,880 | 94,869 | | | | | | |
| 16 | ,195 | ,814 | 95,683 | | | | | | |
| 17 | ,179 | ,744 | 96,427 | | | | | | |
| 18 | ,144 | ,599 | 97,027 | | | | | | |
| 19 | ,143 | ,594 | 97,620 | | | | | | |
| 20 | ,132 | ,548 | 98,168 | | | | | | |
| 21 | ,122 | ,509 | 98,678 | | | | | | |
| 22 | ,117 | ,488 | 99,166 | | | | | | |
| 23 | ,104 | ,433 | 99,599 | | | | | | |
| 24 | ,096 | ,401 | 100,000 | | | | | | |

Extraction Method: Principal Component Analysis.

As a result of exploratory factor analysis, total variance explained result was 79,096%. This result indicates that the questionnaire has content validity (Eren, 2016: 117).

**Table 5.** Rotated Component Matrix

| | **Compenent** | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Üİ1 | ,715 | | | |
| Üİ2 | ,771 | | | |
| Üİ3 | ,791 | | | |
| Üİ4 | ,781 | | | |
| Üİ5 | ,736 | | | |
| Sİ1 | ,577 | | | |
| Sİ2 | | | | ,620 |
| Sİ3 | | | | ,709 |
| Sİ4 | | | | ,787 |
| Sİ5 | | | | ,639 |
| SÜRİ1 | | | | ,616 |
| SÜRİ2 | | ,747 | | |
| SÜRİ3 | | ,737 | | |
| SÜRİ4 | | ,723 | | |
| SÜRİ5 | | ,706 | | |
| SÜRİ6 | | ,643 | | |
| SÜRİ7 | | ,680 | | |
| SÜRİ8 | | ,549 | | |
| SÜRİ9 | | | ,624 | |
| SÜRİ10 | | | ,628 | |
| SÜRİ11 | | | ,683 | |
| Pİ1 | | | ,750 | |
| Pİ2 | | | ,750 | |
| Pİ3 | | | ,688 | |

In the next stage of the analysis, Exploratory Factor Analysis (EFA) was conducted to determine whether the theoretical basis of the research was confirmed or not. As shown in Table 3, the results of the KMO and Bartlett Test, which are the criterion of sample adequacy, show that sufficient sampling has been achieved (KMO: ,963; Bartlett $p<0.01$). The second test for EFA is the commonality test. As a result of this test, it was seen that any proposition was similar to any other proposition and factor analysis could be continued. All results are above 0.5. It means that the sample gave homogeneous responses (Eren, 2016: 117). As in the theoretical background of the research, four factors were determined as a result of the EFA (Table 5). Sİ1, SÜRİ1, SÜRİ9, SÜRİ10 and SÜRİ11 are deleted because propositions are listed under the another factor.

In this part of the study the scales' validity and reliability was evaluated. Reliability can be confirmed if the Cronbach Alpha values higher than the value of 0.700 suggested by Nunnaly (1967) (Vila and Kuster, 2007: 26; Deng and Dart, 1994). As the Cronbach Alpha's coefficients

for agglomeration and dimension of innovation in Table 6 show that all indicator loadings satisfy this requirement. The reliability analysis results are presented in Table 6:

**Table 6.** Reliability Results of The Scales

| Scales | (N of İtems) | Cronbach's Alpha (a) |
|---|---|---|
| **Agglomeration** | 5 | 0,890 |
| **Innovation** | 19 | 0,978 |
| Product Innovation | 5 | 0,946 |
| Strategy Innovation | 4 | 0,931 |
| Process Innovation | 7 | 0,950 |
| Market Innovation | 3 | 0,922 |

Spearman correlation and linear regression analysis were used in this research as the statical methods. In the first phase of the analysis, Spearman Correlation analysis was used to explore the relationship between agglomeration and dimensions of innovation (Table 6).

If the coefficient takes values that greater than 80, it shows that there is a high relationship between variables, a strong relationship when it takes a value between 60 - .80, a moderate relationship when it takes values between 40 and 59, and a low relationship between 20 and 39 (Şencan, 2005: 253). As shown Table 7, all indicator loadings satisfy this requirement.

**Table 7.** Correlation Analysis Results

| Variables | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1.Product In. | 1 | | | | |
| 2.Strategy | ,697** | 1 | | | |
| 3.Process | ,623** | ,675** | 1 | | |
| 4.Market | ,590** | ,567** | ,715** | 1 | |
| 5.Agglomeration | ,593** | ,442** | ,488** | ,441** | 1 |

** Correlation is significant at the 0.01 level (2-tailed).

The Spearman correlations reveal that the highest relationship is between agglomeration and product innovation ($r = 0.593$, $p < 0.001$) ans the lowest relationship is between agglomeration market innovation.

Regression analysis was performed to test the H1 and sub-hypotheses predicted in the research model. The data obtained regarding the effect of agglomeration on product innovation which is the dependent variable (H1a), are presented in Table 8.

**Table 8.** Regression Analysis Result

| **Model** | **Unstandardized Coefficient** | | **Standardized Coefficient** | | | |
|---|---|---|---|---|---|---|
| **Independent Variable** | **B** | **Std. Error** | **Beta (β)** | **t** | **Sig.** | **Durbin Watson** |
| (Constant) | 1,702 | ,188 | | 9,048 | ,000 | |
| Agglomeration | ,610 | ,045 | ,571 | 13,542 | ,000 | 1,816 |
| **$R$: , 571, $R^2$: ,326; Adjusted $R^2$: ,324; Std. Error: ,70984; F: 183,388** | | | | **Model (p): ,000** | | |

Dependent Variable: Product Innovation

The managers and firm owners' perception about the effect of agglomeration on product innovation was tested with regression analysis. The regression model is statistically significant (F=183,388; p <0.001). According to the results of regression analysis as can be seen clearly in Table 8, agglomeration has positive effect on product innovation (β=,571; p <0.001). Results show that the adjusted R-Squared value of 0.324 indicates that 32,4 % of the variance in product innovation can be accounted by the agglomeration. The findings confirm that H1a "Agglomeration has a positive effect on product innovation" is supported.

The data obtained regarding the effect of agglomeration on strategy innovation which is the dependent variable (H1b), are presented in Table 9.

**Table 9.** Regression Analysis Result

| **Model** | **Unstandardized Coefficient** | | **Standardized Coefficient** | | | |
|---|---|---|---|---|---|---|
| **Independent Variable** | **B** | **Std. Error** | **Beta (β)** | **t** | **Sig.** | **Durbin Watson** |
| (Constant) | 1,730 | ,197 | | 8,802 | ,000 | |
| Agglomeration | ,585 | ,047 | ,538 | 12,429 | ,000 | 1,990 |
| **$R$: , 538, $R^2$: ,290; Adjusted $R^2$: ,288; Std. Error: ,74160; F: 154,478** | | | | **Model (p): ,000** | | |

Dependent Variable: Strategy Innovation

The regression model is statistically significant (F=154,478; p <0.001). Adjusted R-Squared value of 0.288 indicates that 28,8 % of the variance in strategyt innovation can be accounted by the agglomeration. As shown Table 9, agglomeration has positive effect on strategy innovation (β=,538; p <0.001). The findings confirm that H1b "Agglomeration has a positive effect on strategy innovation" is supported.

The data obtained regarding the effect of agglomeration on process innovation which is the dependent variable (H1c), are presented in Table 10.

**Table 10.** Regression Analysis Result

| Model | Unstandardized Coefficient | | Standardized Coefficient | | | |
|---|---|---|---|---|---|---|
| Independent Variable | B | Std. Error | Beta (β) | t | Sig. | Durbin Watson |
| (Constant) | 1,720 | ,181 | | 9,489 | ,000 | |
| Agglomeration | ,580 | ,043 | ,569 | 13,371 | ,000 | 1,939 |
| $R$: , 569, $R^2$: ,324; Adjusted $R^2$: ,322; Std. Error: ,66870; F: 178,780 Model (p): ,000 | | | | | | |

Dependent Variable: Process Innovation

Participants' perception about the effect of agglomeration on process innovation was tested with regression analysis. The regression model is statistically significant (F=178,780; p <0.001). According to the results of regression analysis as can be seen clearly in Table 10, agglomeration has positive effect on process innovation (β=,569; p <0.001). Results show that the adjusted R-Squared value of 0.322 indicates that 32,2 % of the variance in process innovation can be accounted by the agglomeration. The findings confirm that H1c "Agglomeration has a positive effect on process innovation" is supported.

The data obtained regarding the effect of agglomeration on market innovation which is the dependent variable (H1d), are presented in Table 11.

**Table 11.** Regression Analysis Result

| Model | Unstandardized Coefficient | | Standardized Coefficient | | | |
|---|---|---|---|---|---|---|
| Independent Variable | B | Std. Error | Beta (β) | t | Sig. | Durbin Watson |
| (Constant) | 1,854 | ,191 | | 9,692 | ,000 | |
| Agglomeration | ,572 | ,046 | ,544 | 12,504 | ,000 | 1,810 |
| $R$: , 544, $R^2$: ,296; Adjusted $R^2$: ,294; Std. Error: ,70559; F: 156,353 Model (p): ,000 | | | | | | |

Dependent Variable: Market Innovation

The managers and firm owners' perception about the effect of agglomeration on market innovation was tested with regression analysis. The regression model is statistically significant (F=156,353; p <0.001). According to the results of regression analysis as can be seen clearly in Table 11, agglomeration has positive effect on market innovation (β=,544; p <0.001). Results show that the adjusted R-Squared value of 0.294 indicates that 29,4 % of the variance in market innovation can be accounted by the agglomeration. The findings confirm that H1d "Agglomeration has a positive effect on market innovation" is supported.

## 5. CONCLUSION

In this study, agglomeration effects on innovation was examined. Research findings indicate that agglomeration has positive effect on all dimension of innovation in cluster region

in İnegöl furniture sector in Bursa. Findings belongs to this research features being the first empirical evidence in Turkey related to agglomeration and innovation in clustered firms. It is believed that this study would contribute to the cluster theory, which was first put forward by Porter (1998). This study shows that agglomeration is beneficial for furniture sector where firms could learn and support each other in terms of information sharing, knowledge spillovers, accessing specialized business services and availability of infrastructure.

With the end of the study, it could be said that agglomeration have a statistically significant and positive effect on innovation in clustered region. Our findings are consistent with some researcher of Nestle et al. (2019) which confirmed that innovation activities are affected by firm agglomeration. Pouder and John (1996) stated that an innovative environment is created by three factor. First is agglomeration economies, second institutional forces, and the last one is managers' mentaldesigns. Agglomeration forces influence innovative activities (Carlino and Kerr, 2014: 16). In addition, there is a negative relationship between industry agglomeration and technical inefficiency of firms according to obtained data Pakistan's manufacturing sector (Burki and Khan, 2013: 1).

With the contribution of the findings from the research, it could be said that there are enough skilled labors, the skilled labor has high level of qualification in clustered regions in İnegöl, Bursa. Therefore, geographic proximity allows high level of productivity. Cluster members have many advantages such as having well-design infrastructure for their business sector. And it is possible to say that employees change their job and find one in competitors' firms easily. Fritsch and Stuetzer (2009) approved that creative people who are accepted as main source for attracting innovative activities, live or work in the agglomerations. Porter (1990) discusses concentration in the local market allow for sharing many kinds of inputs and access labor pool that consisted experienced and well-trained employees. Thus, flow of knowledge occurs between these linkages.

The company's products have superiority over competing products, the level of meeting the expectations and needs of consumers, level of consistency between product prices and benefits, the level of technological sophistication perceived by customers and degree of perceived originality and novelty of products, the firms' marketing ability and technological capabilities create a new product successfully, new product development commitment, the timing of a product's marketing, level of use of procedures and communication between

departments for producing new products are well enough in cluster region in Bursa. According to Duranton and Kerr (2015: 4), this collocation/ communication is beneficial for firms to ship and sell their products on larger market. Industrial clusters allow members to gain experience at lower costs, so if a firm decide to be innovative, it can reach external source quickly what it requires doing innovation (Porter, 1998: 79).

In addition to providing an advanced understanding of the relationship between agglomeration and innovation, this study has inherent limitations. The sample of this study is limited to Turkish firms located in the Bursa, İnegöl cluster region. Therefore, it is not possible for now to say anything clear about whether this relationship will be positive in other regions or another country. Hence, new research on this subject is needed in different clustered regions.

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