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RESEARCH ARTICLE

Scale Adaptation of Innovation-Outsourcing in Companies*

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Abstract

In line with the strategic management approach which was developed in the light of changes in production and markets, there is an emphasis in the literature of this field that companies need to be well managed in order to survive, to benefit from strategic management, and to have a sustainable competitive advantage. This study aimed to adapt and apply a scale of innovation and outsourcing. While adapting the scale, in addition to the data from the qualitative research, three different scales were used in the selection. We arranged a questionnaire and created new questions. The questionnaire consists of eight chapters: the characteristics of companies, outsourcing, supplier relations, suppliers' satisfaction level, innovation process, innovations in the last five years, and outsourcing-innovation. We collected the data from companies in Turkey, which are on the Fortune 500 list. We analyzed the data with SPSS 23 and AMOS 20. As a result of exploratory and confirmatory factor analyses, the outsourcing scale was composed of 3 dimensions and 20 items. While the innovation scale consisted of 12 items in one dimension. The reliability coefficient of the outsourcing scale is 0.912, and the innovation scale is 0.911. The low number of items facilitates its applicability.

Keywords

Outsourcing, Innovation, Scale Adaptation, Validity, Reliability

Introduction

The term 'resource' was first used in connection with natural resources, which throughout the history of the world have always been distributed in various types and amounts to different geographical locations. With the development of industry after the industrial revolution and the creation of new means of production along with the invention of new products, other types of resources such as electricity, oil, and natural gas were brought to the agenda of countries and businesses (Orhan, Genç Yılmaz and Karadeniz, 2018 p. 3). As service and industry sectors continue to evolve, so the need for different types of resources remains a high priority. While the differentiation of resource types has emerged as a result of changing production

* The scale adapted in this paper can be requested from the authors. This study was derived from the doctoral study titled "The Relationship Between Outsourcing and Innovation in Businesses" conducted at Pamukkale University Social Sciences Institute under the supervision of Prof. Dr. Ayşe İRMİŞ.

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patterns, it has also led to the emergence of new production processes. Differentiation of resources and interaction between resources has created the process of outsourcing, where many business needs can be supplied. Within the framework of the strategic management approach, the fact that companies have a sustainable competitive advantage is the most crucial factor in their survival. In this context, outsourcing is seen as an essential method in providing a competitive advantage.

Another area in which it is important for businesses to achieve sustainable competitive advantage is that of innovation. The successful practice of innovation in the world of commerce has given rise to many benefits such as an increase in profitability, a decrease in costs, and an increase in market share. Moreover, this has provided a competitive advantage and an increase in productivity while also creating new markets. When considered in terms of innovation and outsourcing, it is clear that businesses can achieve innovation in different ways. Businesses can innovate by focusing on their core competencies and by supplying standard outsourcing, or they can transform these sources into innovation by choosing innovative suppliers. Another option is to provide innovation directly from an outsource. Accordingly, the purpose of this research is to present how to measure the innovation and outsourcing relationship in terms of businesses on the Fortune 500 list. For this purpose, we tried to adapt a scale that measures the outsourcing and innovative activities of companies.

This study considers research already conducted in this field, including data, method, and findings. In conclusion, we summarize the research and include suggestions.

Literature

As far as literature in this field is concerned, no research has yet been found in which all types of outsourcing and innovative activities of a company are discussed together. A small number of studies have focused on the impact of outsourcing on the innovation of the enterprise, but only in certain areas. In previous studies the outsourcing principles and innovations of companies have generally been discussed separately. However, in our study we examine the relationship between outsourcing and innovation. In other studies, outsourcing was evaluated within the scope of satisfaction with outsourced services, relations with suppliers, written agreements, and collaborations with suppliers. Some previous studies attempted to assess innovation within the scope of the openness of the enterprises, market-oriented activities, openness to learning, competitive view, and innovation systems.

Calantone et al. (2002) analyzed the learning orientation, firm innovation capability, and firm performance in large-scale businesses operating in the technology field in the United States. In order to create the items of the scale used within the scope of the study, 25 people working as assistant general managers responsible for R&D were interviewed, and sub-

dimensions were determined. The items under each sub-dimension were prepared using different scales. Reliability coefficients of the sub-dimensions were measured as 0.80, 0.79, 0.72, 0.75, 0.89 and 0.85. The deputy general managers responsible for R&D of 187 companies from the production and service sectors were asked to participate in the survey. The result of the study showed that the learning tendency has critical importance in terms of innovation ability and performance of companies.

Arikan (2008) examined the dynamics of the innovation of businesses operating in Turkey and determined the dynamics of innovation together with quantitative and qualitative research methods. The questionnaire used in the study was created using various scales in addition to qualitative findings. The survey participants were selected from a wide range of sectors including banking/finance, e-commerce, electronics, IT, telecommunications, the automotive industry, food, textile, chemistry, construction, the pharmaceutical sector, health, energy, management and consulting, airlines, tourism, fuel, and industrial products. The survey was completed by middle and senior managers with a good command of the organizational culture. Reliability coefficients of the survey sub-dimensions were measured as 0.93, 0.95, 0.38 (non-factor), 0.88, 0.89, 0.94 and 0.92. In line with the findings obtained from the study, it was stated that the fact that businesses focus on market, learning, and entrepreneurship were the factors that determine their innovation culture.

Bengtsson, von Haartman and Dabhilkar (2009, p. 35-47) aimed to compare the outsourcing and integration strategies of companies operating in Switzerland in terms of low cost and innovation. In their study, a questionnaire consisting of 51 questions was used as a data collection tool. The data of 267 companies with more than 50 employees and producing metal goods, machinery, office equipment and computers, electronics, equipment for telecommunications, and vehicles were obtained. The data were analyzed using descriptive statistics and reliability analysis methods. The reliability coefficient of the scale, which consisted of two sub-dimensions, was 0.84 and 0.87. As a result of the study, it was revealed that, for businesses, the choice of a low-cost and innovative supplier is just as crucial as that of outsourcing.

Çetinkaya (2009) used a structured questionnaire technique for the determination of bilateral governance and the dynamics between companies in the context of outsourcing in enterprises operating in Istanbul which were taken from the Istanbul Chamber of Industry (ISO) list. The survey was created based on the scales used in different studies, and questions about organizational quality were added. The reliability values of the sub-dimensions of the survey applied to 128 enterprises were 0.83, 0.86, 0.88, 0.67 (low), 0.88 and 0.76. Validity analysis, reliability analysis, factor analysis, and descriptive statistics were used in the research. The results showed that the level of cost and mutual satisfaction are important factors in the relations with suppliers.

İraz, Çakıcı and Tekin (2014, p. 51-68) evaluated the outsourcing of SMEs operating in Konya in terms of innovation management. A survey was applied to 42 companies, the aim of which was to measure the outsourcing levels of SMEs in terms of innovation manage-

ment. The scale used in the study had previously been employed by Gül (2005) and Murat and Kulualp (2010, p. 49-65). The reliability coefficients of the scale consisting of five sub-dimensions were found as 0.94, 0.93, 0.86, 0.98, and 0.97. In line with the findings obtained in the study, it was determined that the priority of benefiting from external sources on innovation management was 40%.

Özçifçi and Sariçay (2014, p. 387-404) discussed the innovation activities of 105 medium and large-scale companies operating in the Kayseri Organized Industrial Zone with more than 50 employees. The scale employed in the study was developed by considering the scales used in previous studies. The equivalent scale method, which is one of the internal consistency methods, was used to determine the reliability of the scale. Reliability coefficients of the dimensions in the scale were found as 0.76, 0.65, 0.66, and 0.82. The correlation analysis method was used to determine the relationship between business size and innovation activities. The results obtained in the research showed that the majority of companies are highly innovative, and that there is a relationship between company size and innovation.

Haartman and Bengtsson (2015, p. 1295-1311) evaluated the impact of global outsourcing and supplier integration on product innovation in manufacturing businesses. In their study, the data was obtained from an International Purchasing Survey conducted in 679 manufacturing companies operating in Europe, the United States, and Canada in 2009. The reliability coefficients of the two sub-dimensions were found as 0.85 and 0.78. As a result of the study, it was revealed that global outsourcing has no direct effect on product innovation.

Bardakçı (2018) used a questionnaire to determine the importance of innovation as a core competence strategy in 282 of the 500 companies of Borsa Istanbul (BIST). The scale developed by Günay (2007) was used in the preparation of the survey questions. As a result of the research, it was determined that the organizational and process innovations applied in the companies differed according to their legal status.

Bui, Leo and Adalakun (2019, p. 1-10) aimed to determine the level of strategic innovation by examining external resources used by large-scale companies in the information technology sector. In the study, a cross-sectional survey method consisting of two sub-dimensions was used as a data collection tool. Questions were developed from Ragin (2000; 2008), Schneider and Wagemann (2012) scales and checked by an outsourcing specialist. The results obtained from 41 companies, which are included in the International Association of Outsourcing Professionals and which mostly operate in the United States, showed that a multiple outsourcing strategy could lead to strategic innovations.

Yıldız and Çiğdem (2019, pp. 1761-1777) analyzed the intermediary role of innovative supply on the innovation performance of the innovation strategy within the sample of Turkey's 1,000 largest exporting companies. In the survey, the supplier innovation scale based on the

research of Kim and Chai (2017, p. 42-52), the firm innovation strategy scale of Jajja, Kannan, Brah and Hassan (2017, p. 1054-1075) and the product innovation performance scale of Prajogo and Sohal (2006, p. 296-312) were used in order to conduct the study. Data was collected from 115 businesses operating in the food, textile, plastic/chemical, construction, machinery and electronics industries. The reliability coefficients of the scale variables were found to be 0.78, 0.90, and 0.85. As a result of the study, it was determined that the company innovation strategy significantly affected innovation performance and supplier innovation.

Zafar (2019) evaluated the contradictions of the top executives of innovative companies in terms of outsourcing and innovation. Within the scope of the study, which used a questionnaire as a data collection tool, questions were sent to 260 randomly selected people from 20 countries (Finland, Sweden, Denmark, Germany, Spain, Netherlands, Switzerland, Cyprus, USA, Canada, England, Singapore, Malaysia, Taiwan, India, Pakistan, United Arab Emirates, Saudi Arabia, Oman, and Egypt). The data set consisted of responses from 112 participants from about 60 different businesses. In the study, it was seen that the product development department managers wanted to innovate with external cooperation.

Table 1 contains a detailed summary of the studies on outsourcing and innovation scales:

Table 1

Empirical Literature Summary

Author	Research Topic	Dataset	Method	Findings
Calantone et al. (2002)	Learning orientation, firm innovation capability, and firm performance	187 large-scale technology enterprises (USA)	Survey (validity analysis, confirmatory factor analysis, structural equation model)	Learning disposition is critical to the firm's innovation capability and performance.
Arıkan (2008)	Evaluating the dynamics of innovation in Turkey	122 companies (Turkey)	Interview, Questionnaire (reliability analysis, factor analysis, hierarchical regression method)	The fact that businesses are market and entrepreneurial oriented are the factors that determine how businesses have an innovation culture.
Bengtsson et al. (2009)	Low cost versus innovation: contrasting outsourcing and integration Strategies in manufacturing	267 companies with more than 50 employees (Switzerland)	Survey (descriptive statistics, reliability analysis)	In outsourcing, the selection of an innovative supplier is as important as the cost.
Çetinkaya (2009)	Bilateral governance in outsourced services: inter-organizational dynamics and consequences	128 companies (Istanbul)	Survey (validity analysis, reliability analysis, factor analysis, descriptive statistics)	Cost and mutual satisfaction levels in relationships with suppliers are essential factors in outsourced companies.
İraz et al. (2014)	A study on outsourcing by SMEs in terms of management innovation	42 companies (Konya)	Survey (reliability analysis, two-way ANOVA, variance analysis)	The effect of priority in the utilization of external resources on innovation management is 40%.

Author	Research Topic	Dataset	Method	Findings
Özçifçi and Sarıçay (2014)	Examining innovation activities of companies	105 companies (Kayseri)	Survey (reliability analysis, correlation)	The vast majority of businesses are innovating at a high level; there is a relationship between business size and innovation.
Haartman and Bengtsson (2015)	The impact of global purchasing and supplier integration on product innovation	679 production businesses (Europe, USA, Canada)	Survey (t-test, factor analysis, regression analysis)	Global outsourcing has no direct impact on product innovation.
Bardakçı (2018)	The importance of innovation as a core competency strategy	282 companies Borsa İstanbul (BIST) 500 companies	Survey (descriptive statistics)	Organizational innovations and process innovations applied in businesses differ according to the legal status of the companies.
Bui et al. (2019)	Achieving strategic innovation through information technology outsourcing	41 large scale businesses (US)	Cross-sectional survey (fuzzy cluster analysis)	Multiple outsourcing strategies can lead to strategic innovations.
Yıldız and Çiğdem (2019)	The role of supplier innovativeness in the effect of innovation strategy on innovation performance	115 enterprises of Turkey's 1000 largest exporters	Survey (structural equation model, Sobel test)	Company innovation strategy significantly affects innovation performance and supplier innovation.
Zafar (2019)	The outsourcing innovation paradox	60 innovative businesses (20 countries)	Survey (Pearson correlation, reliability analysis, validity analysis)	Product development department managers want to innovate with outsourcing alliances.

The tables were created by the authors.

Data

In this study, Turkey's Fortune 500 list is determined as the population. This list of manufacturing, trade, services and construction companies covering all areas comprise Turkey's largest 500 companies and is considered as a reference in both business and academia (www fortuneturkey.com, 2019). The list is prepared in July of each year based on the balance sheets of the previous year. Large enterprises leading the list are ranked according to Turkey's sales volumes combined with determined and key financial indicators. Being ranked in the list of Fortune Magazine, which is the most reputable business magazine in the world and published in the USA, is seen as an indicator of respectability for businesses.

Method

Within the scope of this study, we adapted the outsourcing and innovation scale in the companies. We used qualitative research methods primarily to form a basis for the questions to be asked and the dimensions to be examined. This is because the survey method, which is one of the quantitative research techniques, would not be sufficient by itself in revealing the

correct results. Within the scope of qualitative research, we tried to get information about the outsourcing of companies, outsourcing processes, innovation structures, and innovation processes. We used the data from previous interviews as a source in selecting the questionnaire questions to be applied within the scope of quantitative research, organizing these questions, and creating new ones.

The data set obtained from the questionnaire sent to 251 companies constitutes the sample group of the research. In the research, the scales used for the relationship between innovation and outsourcing were the scales used in Çetinkaya's (2009) and Arıkan's (2008) scales, and the scale used in the article published by Calantone et al. (2002). Although there are questions in the scales investigated which contain items that are defining factors for innovation and outsourcing, there is no single questionnaire that considers all these factors together and reveals the relationship. A list was created with expressions that were understandable and plain, which could explain the relationship between innovation and outsourcing among the measurement tools examined, and which did not contain more than one thought/judgment. For the suitability of the statements, expert opinions of ten business owners and/or senior executives, seven academicians from management-organization and statistics departments, and one Turkish Language and Literature teacher were consulted. As a result of the evaluation, 52 question statements were found appropriate and determined to be used on the scale.

The adapted scale includes seven questions about outsourcing, seven questions about supplier relationships, seven questions about collaborations with suppliers, eight questions about suppliers' satisfaction, eight questions about the innovation process, and eight questions about innovations in the past five years. The 45-phrase questions in the questionnaire are rated as 5-point Likert type (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree, and 1 = Very Unsatisfied, 2 = Unsatisfied, 3 = Neutral, 4 = Satisfied, 5 = Very satisfied).

The research company contacted all companies in the research population via telephone and sent online prepared questionnaires to those who agreed to participate in the research. 251 suitable pieces of data were obtained for the analysis. The resolution of the information collected from the scale application was made in SPSS 23 and AMOS 20 package programs. Cronbach alpha coefficient was used for reliability. Frequency and ratios were used to summarize descriptive statistics.

We adapted questions from the scales developed by certain previous studies. From Çetinkaya's (2009) study (*Bilateral Governance in Outsourced Services: Interorganizational Dynamics and Consequences*) which tested the validity and reliability of outsourcing in 128 companies operating in Istanbul, we adapted question numbers 3, 6, 9, 10, 11, 12, 15, 16, 17, 18, 24, 40, 44, 46, 47, 48, 49, 50, 51, 52, 53, 57, 59, 60, 65, 66. From Arıkan's (2008) study entitled *Evaluating the Dynamics of Innovation in Turkey: The Impact of Innovation*

on *Business Performance* carried out in 122 companies from different sectors in Turkey, we used question numbers 3, 9, 13, 51, 52, 53, 54, 55, 56 from the scale which tested validity and reliability. From Calantone et al.'s (2002) article under the title *Learning Orientation, Firm Innovation Capability, and Firm Performance*, question numbers 1, 3, 4, 5, 6 from the scale developed by the study applied to 187 senior R&D managers in the US industry were adapted to the scale in this study. Validity is a concept related to how accurately a measurement tool measures the variable it attempts to measure. Along with the newly added questions, 52 statements regarding the relationship of outsourcing and innovation were found by eight experts to be appropriate.

In the adapted scale, there are a total of 45 items, of which 39 are positive, and six are negative. Questions 5, 6, 7, 8, 9, 12, 13, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48 and 49 have positive points, while items 10, 11, 14, 16, 17 and 38 have negative points. The positive items are scored as 1, 2, 3, 4, 5, and the negative items are scored as 5, 4, 3, 2, and 1. The total score is calculated as a result of the degrees given to each item. The lowest score which could be obtained from the scales is 45, and the highest score is 225.

In this study, exploratory factor analysis, confirmatory factor analysis, and correlations were used to examine the relationship between factors.

Findings

In the research, we carried out exploratory factor analysis to determine the related variables and to examine the order of the answers given to the scale. In the eligibility determination stage, the Bartlett Sphericity Test (which is suitable for innovation and outsourcing with a significance (sig.) Value of 0,000) and the Kaiser-Meyer-Olkin Test (outsourcing Test value for 0.896; Test value for innovation 0.9005 - very good) were applied. Eight of the 52 expressions in the questionnaire, according to the eigenvalue in the factor determination stage, were thought to disrupt the intra-factor fit and factor reliability. These statements were excluded from the scale. Five expressions on two separate factors were canceled because they do not have a sufficient number of questions that would create a dimension. Expressions removed from the scale are given in Table 2.

Table 2

Expressions Extracted from the Scale as a Result of Factor Analysis

- 10. We think that our business has lost control of outsourced services.
- 11. In outsourcing, costs arise that we could not estimate.
- 14. It is challenging to obtain data from suppliers on their performance and costs.
- 16. Our business spends a lot of time and effort on checking its suppliers' products/services and processes.
- 17. We do not have specific standards to measure suppliers' performance.

Table 2

Expressions Extracted from the Scale as a Result of Factor Analysis

- 18. It will be difficult/costly for our business to switch suppliers in terms of time and resources.
- 19. Our costs have decreased.
- 20. We were able to focus on our core business.
- 33. We are able to entrust company privacy
- 34. Our business often tries new ideas.
- 35. Our business looks for new methods to operate.
- 36. Our business is creative in operational methods.
- 38. In our business, innovation is perceived to be risky and exposed to resistance.

After the statements in Table 2 were removed, we performed factor analysis. Three factors for outsourcing and one factor for innovation were determined. Factor dimensions of innovation and outsourcing are given in Table 3. As a result of the rotation made on the scale of innovation and outsourcing, the factors are explained by 52.3% and 60.3% of the total variability, respectively. After that, the distribution of the variables according to these factors was determined. In this study, we used the varimax rotation method. As a result of the reliability analysis, we calculated the scale of innovation and outsourcing to be highly reliable according to the criterion of $0.80 \leq \alpha < 1.00$ (α (innovation) = 0.911 and α (outsource) = 0.912).

Table 3

Factor Dimensions According to Factor Analysis Results

Factors	Questions
Outsourcing Factor 1	5, 6, 7, 8, 9, 12
Outsourcing Factor 2	13, 21, 22, 23, 24, 25, 30
Outsourcing Factor 3	15, 26, 27, 28, 29, 31, 32
Innovation Factor 1	37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49

Table 4 shows the factor loads of the innovation scale:

Table 4

Exploratory Factor Analysis of Innovation Scale Results of Single Factor Structure: Factor Loadings According to Varimax Rotation

	Component
	1
It has successfully implemented many new products/services.	0.827
It has developed many new product/service ideas.	0.812
It has implemented many new planned strategies.	0.809
It has created many new business systems.	0.798
It has planned many new strategies.	0.758
With its products/services, it has accessed many new markets that had not been entered before.	0.753
	Component
	1
In its new products and service offers, our business uses the latest technology on the market.	0.698
Our business is usually among the first to enter the market in new products and services.	0.695
Our new product promotions have increased in the last five years.	0.689
Our company has obtained many new patents.	0.628

Our company has used open innovation. (It made the innovation in collaboration with other businesses.)	0.622
	Component
	1
Our business carries out innovative activities in partnership with other businesses.	0.524
Eigenvalues	6.275
Explained Variance Ratio	52.3%

As seen in Table 4, the innovation scale is explained with a single factor. The loading values of the items in this factor range between 0.827 and 0.524. All of the 12 items in the scale explain 52.3% of the total variance.

Table 5 shows the factor loads of the outsourcing scale:

Table 5

Outsourcing Scale Exploratory Factor Analysis 3 Factor Structure: Factor Loadings Results According to Varimax Rotation

	Component		
	1	2	3
Sufficiency of supplier resources	0.800		
Overall performance	0.782		
The experience and knowledge of the supplier in the sector	0.780		
Knowledge transfer	0.748		
Communication	0.726		
Providing flexibility in conditions	0.713		
The parties adapt easily when an unexpected situation arises.	0.480		
We achieved differentiation in our market compared to competitors.		0.818	
We gained effectiveness in innovative products and processes.		0.818	
We achieved competencies and technologies that require specialization.		0.807	
Our experience and knowledge in the sector have increased.		0.776	
Our performance has generally improved.		0.714	
We are producing innovative products		0.538	
Suppliers meet our innovation expectations.		0.438	
Outsourcing is strategic for our business.			0.837
Outsourcing is integrated into our business.			0.787
Outsourcing has a high impact on the total profitability of our business.			0.648
With outsourcing, we were able to adapt to our customers' demands more easily.			0.606
Emerging situations are regarded as a shared responsibility by both partners.			0.564
Outsourcing has made our customers see us in a more favorable light over our competitors.			0.550
Eigenvalues	7.635	2.718	1.586
Explained Variance Ratio	38.8%	13.6%	7.9%

In Table 5, the loading values of items in the first factor range from 0.80 to 0.48, in the second factor they range from 0.818 to 0.438, and in the third factor the range is from 0.837 to 0.550. The first factor explains 38.8% of the variance; the second explains 13.6%, and the third explains 7.9%. All items of the scale explain 60.3% of the total variance. In line with the factor analysis conducted, the questions about outsourcing are divided into three dimensions, and the questions about innovation are accumulated into one dimension. Outsourcing

dimensions are the importance of outsourcing, results of outsourcing and satisfaction in outsourcing.

In the study, we obtained the reliability coefficient of the innovation and outsourcing scale as 0.911 and 0.912 respectively, and defined this as highly reliable.

We applied the Confirmatory Factor Analysis to determine the measurement model indicating the relationship between hidden variables observed in the innovation scale. We used the Maximum Likelihood Method in the estimation. The distribution of the items by dimensions is given below:

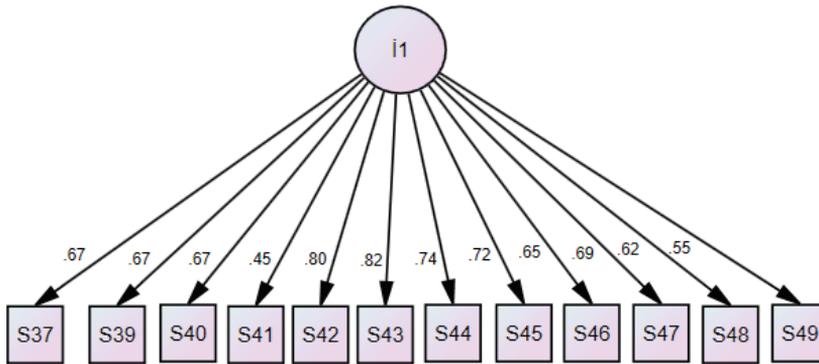


Figure. 1 Distribution of the Innovation Scale by Item Dimensions

In Figure 1, it can be seen that the coefficients between I1 and the items of this dimension vary between 0.45 and 0.82. The variability of I1 dimension is explained by S43 (81.8%) and S41 (45.1%). The coefficients in the model are all significant ($p = 0.000$). The fit values obtained as a result of the analysis are given in Table 6. According to Table 6, it can be said that the fit of the one-dimensional model is confirmed with the data.

Table 6

Innovation Fit Index Results

Fit Indices	Good Fit	Acceptable Fit	Calculated Value
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.1$	0.082
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI \leq 0.95$	0.955
χ^2/df	< 2	< 3	2.698
IFI	$0.95 \leq IFI \leq 1$	$0.90 \leq IFI \leq 0.95$	0.956

Fit indices limit values (Schermelleh-Engel and Moosbrugger, 2003)

We applied the Confirmatory Factor Analysis to determine the measurement model, which also shows the relationship between hidden variables observed in the outsourcing scale. We

used the Maximum Likelihood method in the estimation. The distribution of the items by dimensions is given below:

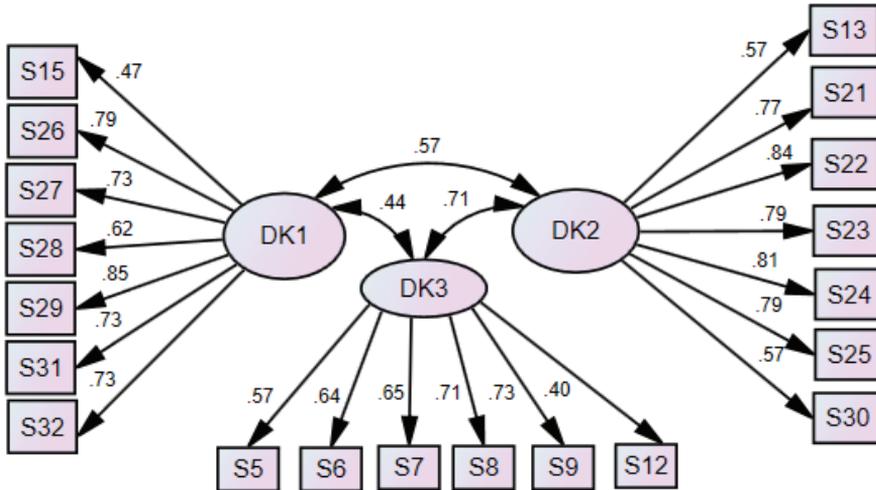


Figure. 2 Distribution of Outsourcing (DK) Scale by Item Dimensions

In Figure 2, the coefficients between DK1 and the items of this dimension are in the range of 0.47-0.85, the coefficients between DK2 and the items of this dimension are in the range of 0.57-0.84, the coefficients between DK3 and the items of this dimension are in the range of 0.40-0.73. The variability of DK1 dimension is at most S29 (85.3%), and at least S15 (47.2%); the variability of DK2 size is explained by S22 (83.7%), at least S13 and S30 (57%) and the variability of DK3 size is at most S9 (73.2%), and at least S12 (40.5%). We found all the coefficients in the model ($p = 0.000$) to be significant. When we examined the correlations between sub-dimensions, we determined the relationship between DK1, DK2, and DK3 as a statistically significant ($p = 0.000$). These results are shown in Table 7:

Table 7

Correlations between sub-dimensions

	DK1	DK2	DK3
DK1	1		
DK2	0.571	1	
DK3	0.436	0.706	1

$p < 0.05$

There is a similar relationship between all sub-dimensions. The correlation between the importance of outsourcing (DK1) and the results of outsourcing (DK2) is 0.57, the correlation between the importance of outsourcing (DK1) and satisfaction in outsourcing (DK3) is

0.44, the correlation between the results of outsourcing (DK2) and satisfaction in outsourcing (DK3) is 0.71. In this case, the emphasis on outsourcing is related to the outcomes of outsourcing and satisfaction in outsourcing. It is also understood that the results of outsourcing are highly correlated with satisfaction in outsourcing. The fit values obtained as a result of the analysis are given in Table 8. According to Table 8, it can be said that the compatibility of the three-dimensional model with the data is confirmed.

Table 8

Outsourcing Fit Index Results

Fit Indices	Good Fit	Acceptable Fit	Calculated Value
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.1$	0.078
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI \leq 0.95$	0.904
χ^2/df	< 2	< 3	2.535
IFI	$0.95 \leq IFI \leq 1$	$0.90 \leq IFI \leq 0.95$	0.905

Fit indices limit values (Schermeleth-Engel and Moosbrugger, 2003)

Results and Discussion

In this study, we carried out an adaptation of a questionnaire to measure the relationship between innovation and outsourcing. We chose companies ranked on the Fortune 500 list in Turkey for analysis of the validity and reliability of the questionnaire. Exploratory and confirmatory factor analysis was performed on the data obtained from the 251 companies on this list. As a result of the exploratory factor analysis, the outsourcing scale was obtained in three dimensions. The first dimension consisted of six items, the second dimension consisted of seven items, and the third dimension consisted of seven items. The innovation scale consisted of 12 items and one dimension.

Following the exploratory factor analysis, we performed the confirmatory factor analysis to confirm the scale. As a result of the confirmatory factor analysis, it can be said that all the items in the scale represent the dimension they are related to in a meaningful way. The model fit values obtained for innovation and outsourcing are among the acceptable values. The 12-item one-dimensional innovation scale and 20-item and three-dimensional outsourcing scale can be used to measure the innovation and outsourcing of businesses and to examine the relationship between them. The low number of items in the scale facilitates applicability. We think that our study will be useful in further research related to this subject.

The scale, adapted to measure the relationship between innovation and outsourcing, can be applied in different sector groups, industrial zones, industrial chambers, and exporter unions by experts who want to research sectoral, regional, and local contexts. Since the study was carried out with the data obtained from companies operating in both the production and service sectors, it is essential in terms of its contribution to literature. We predict that the Inno-

vation-Outsourcing scale will contribute to strategic management, supply chain management, and innovation management studies with different sample groups in the future.

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