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RESEARCH ARTICLE **Open Access**

Innovation Capability Based on Clustering and Ranking Approach (Case Study: Food and Beverage Industries of Urmia Metropolis)

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Abstract
Innovation capability refers to a complete set of characteristics of the organization that facilitates innovation strategies, and the food industry plays a pivotal role in the processing of agricultural raw materials and food supply. The aim of the present study was to Identify and Analyze of the dimensions of innovation capability, clustering and ranking indexes in Urmia food industries. The sample size of the statistical population encompassing 221 companies was equal to 143 according to Cochran's formula. Obtaining required information was based on field study method. In the applied part of the study, exploratory factor analysis, clustering with K-MEANS algorithm and cluster ranking based on AHP technique were used. The results of the exploratory factor analysis showed that the relationship of each item with the factors classified into three categories was properly expressed. Companies with similar features but different from other clusters were put into 8 clusters. Finally, according to the weights of study variables, "human", "operability" and "structural" factors ranked first, second and last respectively.

Keywords: Innovation Capability, exploratory factor analysis, Clustering, Ranking, Food industries

Introduction

Innovation is considered as a key driver for long-term success of firms in today's competitive markets and Businesses with the capacity to innovate are able to respond to market challenges faster and better than non-innovative companies (Yu sheng & Ibrahim, 2020). Innovation and creativity are valuable sources for acquiring competitive advantage. In current circumstances that organizations face the burden of competitiveness pressures, new technologies and uncertain environments they have to conquer their competitors and develop innovative-creative approaches in order to survive, progress and meet their needs (Müceldili et al, 2013). Organizations need to develop innovation capability along with generating due business ideas in order to manage innovation process (Aryanto et al, 2015). In recent years consumers and legislation have been pushing companies to design their activities in such a way as to reduce negative environmental impacts more and more (Mohammadi, & Ehtesham Rasi, 2022). This issue is considered a competitive advantage for managers of innovation-oriented companies.

Innovation capability is defined as a complete set of characteristics of the

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organization that supports the implementation of innovative strategies (Burgelman et al., 2004). The newest approach that most researchers are focusing on today is the capabilities approach. In the same approach for evaluating innovation, innovation capabilities are analyzed. Innovation capabilities mean organizational knowledge, skills and learning used for innovation in organizations (Lisboa et al., 2011).

Innovation comprises a risky activity with positive and sometimes negative results on company performance; like environmental changes, increase in costs, employee dissatisfaction or unnecessary changes (Jimenes & Valle, 2011). Recently, innovation has become an interesting issue for researchers. Because of environmental uncertaintypursuing innovation in order to achieve competitive advantage is considered a vital issue and perhaps is the only way that a given business may hope to succeed through its implementation (Li et al, 2010). Innovation is utilized in all human related fields like production development, management methods and etc. (Tohidi & Jabbari, 2012). As such, West Azerbaijan food industries due to the variety in production, numerous suppliers of raw materials and also various types of summer fruits need innovation more than any other organizations in the region. Innovation capability results in producing innovative products which consequently turns up competition and motivation for innovation in the region. If the managers could enhance their risk taking culture, the same culture would be an appropriate infrastructure for creating and developing innovation capability. Innovation as the driving force of growth and change in industry can increase the flexibility and adaptive strength of the organizations concerning their surrounding environment. The question is how companies develop their innovation activities and evaluate them? Innovation related research do not explore the advent of innovation and its evaluation because it is assumed that companies own the capability beforehand, so that the focus of research in this regard is on improving innovation. With no doubt effective development of innovation capability in companies in order to adapt to globalization, and also concerning the dynamic and competitive market environment are among the issues cannot be overlooked (Shane & Ulrich, 2004).

Clustering is one of the important corresponding methods in data mining. Clusters can be mutually unique, hierarchical, or overlapping. Clustering has various algorithms (Ahani et al., 2019, p. 100). Among which in the present study K-means technique was used. Therefore, due to the lack of managers' and organizational employees' knowledge on innovation capabilities in organizations, the current study is to provide sufficient understanding of creating, improving and analyzing the innovation capability in organizations for managers and proceed to clustering and ranking the food industry in Urmia.

Research in the field of innovation can be placed in two groups: Common studies on innovation and the study of innovation in the field of capabilities. Studies on innovation capability are also dispersed in terms of content. Food industry for its important role in economy and dynamism, health and provision of country's foodstuff is selected as the aim of the current study.

Literature Review

The present study like the other related studies; Namaayande & Zarei (2021), Doulabi et al(2020), Foss & Saebi (2018),Shiva et al (2017), Thomas et al (2017), Gieske et al (2016) paid attention to the importance and necessity of the concept of innovation in organizations. From the perspective of evaluating innovation capabilities, the present study is in line with the results of the studies conducted by Shafiei & Karbasikheir (2017)

and Hagigi et al (2015). In research of Yu Sheng & Ibrahim (2020), Data for the study were obtained from 450 respondents comprising bank employees and customers in the Kumasi metropolitan area in Ghana. An exploratory factor analysis, confirmatory factor analysis, and structural equation modeling were used to analyze the data via Smart PLS 3 and SPSS V.22. the findings revealed a significant and positive relationship between the dimensions of innovation (market, process, and product innovations) and firm performance. The practical implication is that, choosing the appropriate innovation types can enhance bank performance as well as satisfy customer needs.

Badri & Nowdehi (2017) evaluated three components of innovation in service, process and management. They also, suggested that the education managers must provide the grounds for creating innovation capabilities for their subordinates through practicing leadership style.

Basaghzadeh (2011) showed that knowledge sharing has a meaningful relationship with process innovation and managerial innovation. Ya'aghoubi et al (2017) divide the dimensions of innovation capability and their relations into domestic and foreign categories. They regarded organizational environmental capacity and interactions as an important innovation capability which can influence the development of organizational innovation. Saunila & Ukko (2012) with target of clarify the concept of innovation revealed the relationship between innovation capability and business performance in organization.

To describe the variables of the present study library studies and to collect required data survey methods (questionnaire) were used. The questionnaire was prepared in accordance to the questionnaire proposed by Haghighi et al (2015) with due changes according to the variables under the study in the current research including three indexes. Three variables of innovation capability were derived out of the researcher made questionnaire including 20 items as follow: human, structure and operability factors. After reviewing and modifying the items, reliability and validity of the questionnaire were obtained,and distribution among company managers to collect required data, and conducting related interviews among study's statistical sample were done. The population included 221 companies from among which a sample size encompassing 143 companies was selected based on Cochran's formula.

In order to analyze findings, identifying and determining the dimensions of innovation capability, statistical calculations, and quantifying the study variables the following software were used. In the present study, exploratory factor analysis of items of the questionnaire showed that all questions carry the factor load above 0.1 and the meaningful values are more than 1.96 meaning that they measure exactly the predicted variables in the questionnaire.

In the second section, via K-MEANS technique, a wide range of manufacturing food industry companies in Urmia metropolis, having different characteristics, were clustered in similar groups. In the next step through Analytic Hierarchy Process (AHP) the clusters were ranked. Also, the analysis by means of SPSS and EXPERT CHOICE software were done at meaningfulness level of 0.05.

The aim of the present study was to identify and determine the dimensions of innovation capability among managers and companies, and also clustering and ranking the same dimensions and introducing improvement strategies for increasing the innovation capability in food industries of Urmia metropolis. Other researches have mostly emphasized and studied the concept of innovation, but the present study aiming to fill this study gap, while paying attention to the aspects of capabilitiesconcerning innovation, tried to identify and analyze the components

through a general and systematic view. As such, three main questions were answered. In this study the hypotheses are represented in the form of questions. The main question and sub-questions of the study are as follow:

1. Which are the dimensions of innovation capabilities in active food and beverage industries in Urmia metropolis?
2. What is the clustering of food industries based on dimensions of innovation capability in Urmia metropolis?
3. How are the clusters of food industry in Urmia metropolis ranked?

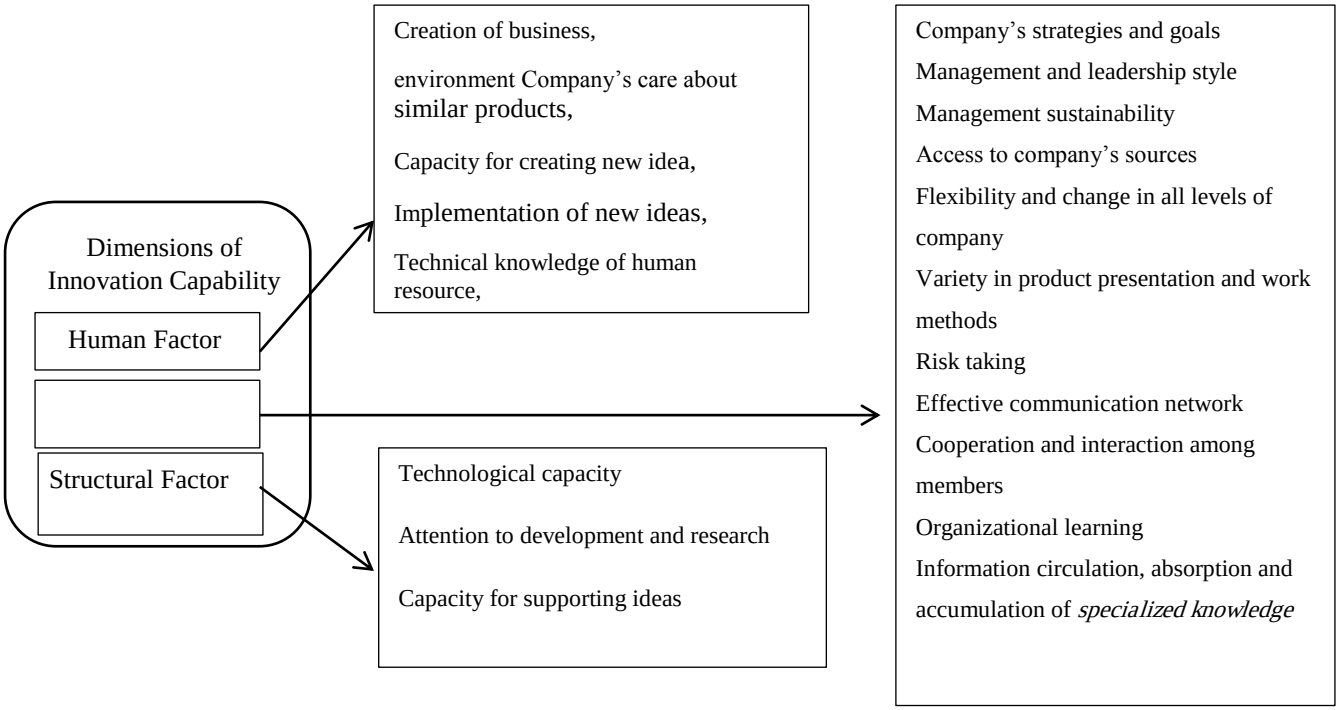

Diagram 1: Conceptual model based on research variables

Research Methodology

The present research is descriptive in terms of purpose, applied in terms of data collection and in terms of method is field research. The spatial scope of this research is Urmia Food and Beverage industries. The total number of companies consists of 432 companies, of which the total number of active companies includes 221 companies forming the statistical population of the present study. In this study, to determine the sample size of the statistical population of 221 companies, Cochran's formula was used, based on which 143 companies were selected.

$$n = \frac{Z^{2}\,{}^{\propto}/_{2} \times \delta^{2} \times \mathrm{N}}{e^{2}(\mathrm{N}-1) + Z^{2}\,{}^{\propto}/_{2} \times \delta^{2}} \quad (1)$$

n=Appropriate sample size, N=The number of statistical population,δ= standard deviation (According to the Likert scale of 5 questions, its value was 0.67), d= the amount of allowed error, = The reliability coefficient equal to 1.96.

$$n = \frac{(1.96)^{2} \times (0.67)^{2} \times 221}{(0.05)^{2} \times 220 + (1.96)^{2} \times (0.67)^{2}} \cong \frac{373.4}{2.6} \cong 143 \quad (2)$$

The research tool was the researcher made questionnaire distributed among company managers. Questionnaires were distributed among managers or experts of different units of each company during 2019-2020 and then collected. To conduct this research, in the theoretical base of library studies, review of documents and internet search, note-taking were used, and in the field studies section, a semi-structured questionnaire and interview were used to answer the research questions. Content validity was used to determine the validity of the questionnaire. In this way, the questionnaire has been provided to a number of professors and management experts. As a result, some cases have been suggested for correction, and finally, after applying the corrections, the final questionnaire was used. In the present study the reliability of the questionnaire was obtained based on Cronbach's alpha method for the whole questionnaire using SPSS software and its coefficient was0.809 (coefficient value is more than 0.7 and the reliability of the questionnaire is evaluated as good), which was finally administered on the main statistical sample group.

The methodology used in this research was descriptive-survey and access to information through field method. In the descriptive section, data collection aimed to answer questions about the current situation. Although in the survey method, a questionnaire is mainly used, in this research, other tools such as interview, observation, content analysis, etc. were used. The characteristic of a survey method is that it is a structured or adaptive set of data, which is called an attribute matrix. At the beginning of the theoretical field studies, documentary research through field and theoretical studies, and documentary research through library studies including all production and industrial rules and regulations related to innovation capability assessment were performed.

To identify the dimensions of innovation capability in Urmia food industry, exploratory factor analysis, for clustering of Urmia food industry K-means algorithm and SPSS software,and for cluster ranking with MADMtechnique and EXPERT CHOICE software were used.

Research Findings

In the present study content validity was used in order to test the validity of research which was confirmed by 10 experts in the domain of management and food industries. For evaluating the research reliability Cronbach's alpha was used. The results are shown in table (1).

Table 1.
Reliability of Questions Concerning the Innovation Capability Variable

Variable	Number of questions	Cronbach's alpha
Innovation capability	20	0.809

In conducting factor analysis, first it must be ensured whether the number of considered data is appropriate for the factor analysis or not? In this regard KMOi index and Bartlett's Test are used. According to table 2, because the value of data adequacy test statistics is equal to 0.906, therefore the number of questions in the questionnaire is in accordance with the number of respondents. Also, the value of the meaningfulness level of Bartlett's Test is less than 5 that means factor analysis for identification of factor structure model is appropriate. Hence, the assumption that the correlation matrix is one (unit) is rejected.

Table 2.
Sample Goodness of Fit Test

KMO- data Adequacy Test		0.906
Bartlett's Test	Chi-square estimates	1602.742
	Freedom Degree	190
	Meaningfulness Level	0.000

Table 3 includes the commonality coefficients and shows the appropriateness of questions in the process of factor analysis. Commonalities table shows initial commonality and extracted commonality respectively. The values of extracted commonality are omitted if they are less than 0.5. In the present study the value of extracted commonality for all questions was more than 0.5.

Table 3.
Commonalities Coefficient

	Effective components in Innovation capability	Extracted commonality coefficient	Initial commonality coefficient
Human Factor			
1	Business environment survey	0.727	1
2	Accuracy, attention and intelligence of the company concerning similar products	0.584	1
3	Capacity for creation of new ideas	0.528	1
4	Implementation of new ideas	0.552	1
5	Technical knowledge of human resource	0.635	1
6	Experience of expert manpower	0.701	1
Structural Factor			
7	Company's strategies and goals	0.789	1
8	Management and leadership style	0.624	1
9	Management sustainability	0.756	1
10	Access to company's sources	0.765	1
11	Flexibility and change in all levels of company	0.580	1
12	Variety in product presentation and work methods	0.500	1
13	Risk taking	0.650	1
14	Effective communication network	0.595	1
15	Cooperation and interaction among members	0.564	1
16	Organizational learning	0.596	1
17	Information circulation, absorption and accumulation of specialized knowledge	0.577	1
Operability Factor			
18	Technological capacity	0.659	1
19	Attention to development and research	0.668	1
20	Capacity for supporting ideas	0.682	1

Table 4 shows the total variance explained in the way that clarifies what percentage of meant variance area is explained and covered by the existing variables. It also shows the validity of questions. In the present study collective variance is equal to 61.664 – more than 50%- which means the research has succeeded to place research variables appropriately in the study questions. Therefore, it can be said that 20 factors are appropriately clustered in 3 categories and 61.664% of innovation capability is explained by them.

Table 4.

Explained variance of innovation capability factors

Effective Factors	Special Values	Percentage of Explained Variance	Collective Percentage of Explained Variance
Factor 1	6.693	33.464	33.464
Factor 2	3.093	15.464	48.929
Factor 3	2.547	12.736	61.664

Table 5 shows the rotated factor matrix. The results of the table indicate the relationship of each of the components with factors that have been categorized appropriately. The components under evaluation are categorized in three factor classes which include human, structural and operability factors encompassing innovation capabilities in active food industry companies in Urmia metropolis.

Table 5.
Rotated factor matrix

answers	**Factors**		
	1	**2**	**3**
1	0.715	0.178	0.429
2	0.700	0.302	0.047
3	0.685	0.348	0.025
4	0.652	0.154	0.197
5	0.633	0.247	0.153
6	0.604	0.011	0.443
7	0.158	0.752	0.224
8	0.593	0.722	0.375
9	0.232	0.718	0.178
10	0.094	0.695	0.857
11	0.498	0.660	0.270
12	0.486	0.642	0.473
13	0.520	0.608	0.086
14	0.573	0.580	0.333
15	0.499	0.542	0.201
16	0.410	0.524	0.250
17	0.384	0.513	0.214
18	0.397	0.331	0.615
19	0.380	0.378	0.608
20	0.309	0.348	0.560

Clustering Food Industry Manufacturing Companies in Urmia Metropolis and Ranking the Clusters

This section includes 6 steps: examining the recorded data, constructing model variables, data normalization, clustering manufacturing companies, calculating the weights of study variables, and ranking due clusters.

Step 1: in this step some records with no components are omitted. It means for all companies the related data to the all questions of the questionnaire must be clarified. If it is not the case, the corresponding record is replaced by the average (mean) of the numbers 1 to 5, and number 3, otherwise the related data of the company is omitted from calculations.

Step 2: making model variables include human, structural and operability capabilities. To this end the average of the questions 1 to 6 as human factors index, the average of questions 7 to 17 as structural factors index, and the average of questions 18 to 20 as operability factor are calculated and considered. The higher the values obtained by the study variables for a company, the more desirable that company is.

Descriptive statistics of human, structural and operability variables including number, minimum and maximum value, mean and standard deviation are given in the table below:

Table 6.
Descriptive statistics of research variables

Variable	Number	Lowest Value	Highest Value	Mean	Variance
Human Factors	143	1.830	5.000	3.592	0.725
Structural Factors	143	1.550	5.000	3.734	0.697
Operability Factors	143	2.330	5.000	4.019	0.697

Step 3: this step includes normalization of data. Given that at the end of the analytic hierarchy process method, the normalized weights of each of the study variables are obtained, the data related to the variables must be normal. For data normalization Max-Min method was used for each company. As such, if Hi is the value of human factor variable for i company, Si the value of structural factor for i company, and Oi the value of operability factor for i company, the normalized variables are obtained by the following equilibriums:

$$H_i^N = \frac{H_i - H_{Min}}{H_{Max} - H_{Min}}$$

$$S_i^N = \frac{S_i - S_{Min}}{S_{Max} - S_{Min}}$$

$$O_i^N = \frac{O_i - O_{Min}}{O_{Max} - O_{Min}}$$

For example for i companythat its human factor variable equals to 2.67 the normalized value is 0.26.

$$\mathrm{H_i^N} = \frac{2.67 - 1.83}{5 - 1.83} = \frac{0.84}{3.17} = 0.26$$

Step 4: in this step at first the average values of each of the normalized variable in the previous step is calculated. Descriptive statistics of normalized variables include number, lowest value, highest value, mean and standard deviation shown in the table below:

Table 7.
Descriptive statistics of normalized variables

Variable	Number	Lowest Value	Highest Value	Mean	Variance
Normalized Human Factors	143	0.000	1.000	0.556	0.229
Normalized Structural Factors	143	0.000	1.000	0.633	0.202
Normalized Operability Factors	143	0.000	1.000	0.633	0.261

Then according to the value of each normalized variable, each of the companies under investigation is put in their due cluster. As such, each of the normalized variables of the manufacturing company can take two modes. First mode: more than normal mean equal to 1 and second mode: less than normal mean equal to zero. For instance, the normalized value of human factor for i company is 0.26 which is less than the normal mean of the human factor variable (0.556). Therefore, the company adopts zero mode.

Because the normalized values of human, structural and operability factors can be more or less than their corresponding mean value (0.556 for human factor, 0.633 for structural factor, and 0.633 for operability factor) based on clustering through K-MEANS method and by SPSS25 software eight clusters are obtained.

Table 8.
The Number of Clusters

The Number of Available Companies in the Cluster	Type of the Cluster	Cluster's Number
5	H↓S↓O↑	1
51	H↓S↓O↓	2
45	H↑S↑O↑	3
6	H↓S↑O↑	4
6	H↑S↓O↑	5
5	H↓S↑O↓	6
14	H↑S↑O↓	7
11	H↑S↓O↓	8

It must be said that H↓S↓O↑ cluster includes those companies that for them the normalized value of human, structural, and operability factors are less than normal means of (0.556), (0.633), and (0.633) respectively.

Step 5: this step includes calculation of the weights of the study variables based on the opinions of experts and the use of pairwise comparisons. To extract the results of pairwise comparisons for variables of human, structural, and operability factors expert choice software version 11 was used. By setting the comparison matrix, each of the study variables were judged two by two (in pairs) by 10 experts having literacy in the study subject matter, those whose points of view were analyzed by the software and the geometric mean was determined. In AHP method related pairwise comparisons and incompatibility rate is determined. If the incompatibility rate is less than 0.1 then the pairwise comparison is acceptable.

Given the scoring of comparison among 3 main indexes of human (H), structural (S), and operability (O) factors, which takes a number between 1 to 9, according to the output of expert choice software, related matrix of pairwise comparisons of main indexes (incompatibility rate 0.02) is as follow:

Table 9.
Matrix of Pairwise Comparisons of Research Variables

Variable Name	Human Factors (H)	Operability Factors (O)	Structural Factors (S)
Human Factors(H)	1.000	1.399	1.578
Operability Factors(O)	0.715	1.000	1.783
Structural Factors(S)	0.634	0.561	1.000

The diagram and table below show the ranking and weighted values of the indexes:

Diagram 2: Ranking and weighted values of the indexes

Table 10.
Ranking and Weighted Value of the Indexes

Index Name	**Weighted Value**	**Rank**
Human Factors (H)	0.421	1
Structural Factors (S)	0.229	3
Operability Factors (O)	0.350	2

Therefore, human factor with weighted value of 0.421, operability factor with weighted value of 0.350 and structural factor with weighted value of 0.229 stand at first, second and third ranks respectively.

Step 6: this step includes calculating the integrated rate for the manufacturing

companies of each cluster and ranking the clusters based on the same integrated rate. The integrated rate for the manufacturing companies of each cluster was obtained by the following equilibrium:

$$C_I^j = W_H C_H^j + W_S C_S^j + W_O C_O^j$$

In the above mentioned equilibrium ،C_H^j ، C_S^j و C_O^j are the mean normalized values of human (H), structural (S), and operability (O) factors in companies in each cluster and Ws are obtained weights based on the expert opinions in the pairwise comparisons' table. The integrated rate and final ranking of each cluster related to manufacturing companies are shown in the table below:

Table 11.
Final Ranking of Clusters

	Cluster		Human Factors (0.421)	Structural Factors (0.229)	Operability (0.350)	C_I^j	Rank
H↓S↓O↑	**1**	C^j	0.4221	0.5154	0.8000	0.5757	6
		WC^j	0.1777	0.1180	0.2800		
H↓S↓O↓	**2**	C^j	0.3381	0.4451	0.3734	0.3750	8
		WC^j	0.1423	0.1019	0.1307		
H↑S↑O↑	**3**	C^j	0.7779	0.8352	0.8977	0.8330	1
		WC^j	0.3275	0.1913	0.3142		
H↓S↑O↑	**4**	C^j	0.4826	0.7101	0.7909	0.6426	4
		WC^j	0.2032	0.1626	0.2768		
H↑S↓O↑	**5**	C^j	0.6062	0.5836	0.7915	0.6659	3
		WC^j	0.2552	0.1336	0.2770		
H↓S↑O↓	**6**	C^j	0.4530	0.6841	0.5753	0.5487	7
		WC^j	0.1907	0.1566	0.2013		
H↑S↑O↓	**7**	C^j	0.6843	0.7290	0.6255	0.6739	2
		WC^j	0.2881	0.1669	0.2189		
H↑S↓O↓	**8**	C^j	0.6131	0.5692	0.5352	0.5758	5
		WC^j	0.2581	0.1303	0.1873		

Conclusion

Examining capabilities concerning innovation issue is among the recent issues of interest. The present study aimed to examine and determine the dimensions of innovation capability along with clustering and ranking them in companies active in food industry in Urmia metropolis. Other studies mostly put emphasis on and examined the concept of innovation while in the present study in addition to focus on dimensions of capabilities in innovation, a systematic view was adopted to regulate, cluster and rank the components under question in food industry.

In this regard given the study variables and literature, researcher made questionnaire confirm by the experts were distributed among the study sample. After identifying the innovation capability of companies' managers, the result of a rotated factor matrix in exploratory factor analysis showed the appropriate explanation of the relationship between each component and concerning factors. Also, it indicated that the components were categorized appropriately. In the present study the collective variance equaled to 61.664 indicating that the researcher could place the questions appropriately in the form of considered variables –because the value is more than 50%. In determining the three dimensions of innovation capability for human, structural, and operability factors six, eleven and three indexes were used respectively. Therefore, it can be said that 20 items were appropriately classified in three categories and 61.664% of innovation

capability were predicted by the same three factors.

The output of the first stage is actually the input of the next stage. In the second section in order to cluster the variables 6 steps were taken. After taking the first two steps, manufacturing companies were put in their due clusters based on the values of each normalized variable. Since the normalized values of human, structural and operability factors for each company can be more or less than their corresponding mean (0.556, 0.633, 0.633 for human, structural and operability factors respectively) 8 clusters were obtained. In calculating the weights of study variables human, operability and structural factors with 0.421, 0.350 and 0.229 were ranked first, second and third respectively.

In a study in line with the current research, Ehsani & Mehrmanesh (2020), according to the results of the verifiable analysis in their research model, determined that the performance of the organization depends on the dimensions of "Innovation Capability", "Technology Capability" and "Competitive Advantage" in the supply chain, and has a positive and significant effect. The importance of dimensions of innovation capability to gain competitive advantage is emphasized in the study conducted by Hoseinzadeh shahri & Shahini (2018) just like the present study. Hagigi and et al. (2015) in line with the results of the present study found out that human, structural and operability factors are three important capabilities forming the innovation capability in organization and showed the direct relationship between the innovation capability and these factors. Akbarzadeh et al (2014) showed that the innovation capability (product, process, organizational) influences directly the entrepreneurship and competitive advantage. Namaki (2012) who benefited from exploratory factor analysis, just like the present study, found out that market orientation has not direct effect on innovative performance, but it has a direct meaningful effect on market performance.

Shafiei & Karbasikheir (2017) compared some selected domestic and foreign companies. Using text mining technique and clustering, they put companies in 5 separated clusters. However, they used SAW technique for ranking and showed that domestic and foreign companies focus on customers from different points of view.

Research suggestions and limitations

Proposed solutions to managers of food industries in Urmia metropolis:

In this regard it is suggested that company managers in food industries in Urmia metropolis:

1. **Concerning the human capabilities dimension;** in addition to introduction of new services to their clients and market, and pioneering in the same ground, train their employees to be innovative and provide them with new financial sources. Also, the same companies in comparison to other companies, concerning new products and services, strive for being among the short list of ranked companies and try to offer new services in various forms. Also while acting cautiously pay attention to risk taking actions. Today, those companies could achieve their goals successfully that while continuously identifying the needs of their customers, adopt appropriate and optimal approaches to develop new products and finally act to meet the needs of customers in a creative, innovative and cost-effective manner.

2. **Concerning the structural dimension;** they must always be in the search of new management systems (like new recruiting and marketing systems) and make use of them. Managers in these companies must always keep it in mind that integrated and comprehensive components of service management (process, productivity and quality, product elements, place and time, people, physical evidence, promotional and

training advertising, price and other service costs) are the vital factors in their decision making.

In addition to the issue of human resource recruitment, evaluation process is one of the most important issues in any given manufacturing, industrial and other related systems which is required for survival guarantee and information about performance quality. Waste disposal is another factor that causes a significant reduction in workload during production. Therefore, to improve the performance and gain greater effectiveness, evaluation process is offered. The managers in such companies must monitor the production process actively in order to improve production quality, reduce start-up times, increase production flexibility, and reduce incidents due to unreliable supply and poor quality in machine performance. Also, in order to set and apply new evaluation methods correctly at first the features of an appropriate performance evaluation system must be considered by company managers.

3. **Concerning the operability dimension;** management system makes the company risk taking and allow the expert force to implement new ideas by using the capacity to support ideas; make some changes in the process of service delivery; utilize new technologies sooner than other companies; and also, in providing services, seek new service delivery methods and become pioneering.

Clustering and networking innovative activities for conscious and purposeful improvement in companies, changing managers' approaches from being stuck in present towards a creativity and innovation, and also establishing the necessary mechanisms for training employees in order to enhance individual, group and organizational innovations are among the strategies for improving the current circumstances of companies active in food and beverage industries in Urmia metropolis. The extracted indexes on innovation capability have been used in industries with production nature, so for future research, it is suggested that indexes with service nature be extracted and evaluated in the relevant industries (university, hospital, bank, etc.).

The present study was not an exceptional research and had its own limitations:

- Companies cannot independently improve their innovation capabilities because their performance depends on supply chain performance.
- In the section on clustering, ranking and analysis due to the increase of relation.equations, only the relations.equations of the main factors have been examined and the others of sub-criteria have not been examined.
- Managers' limited time and the possibility of little access to senior managers of manufacturing companies due to their presence in frequent meetings.
- Not seriously pursuing up-to-date topics of innovation in the manufacturing industries and believing that such topics are costly.

It is suggested that according to the changing attitude of organizations towards writing organizational goals over the years, it is possible to use other methods, irregular and scattered documents or unstructured data in terms of product type and process etc. in future research. Classified or ranked in regular categories with different nature.

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