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Key factors of the success of knowledge-based companies relied on academic incubator centers

H. Aramesh [1,*], M. Dehghani [2]

[1] Department of Management, University of Sistan and Baluchestan, Zahedan, Iran

[2] Department of Management, Velayat University, Iranshahr, Iran

ARTICLE INFO	ABSTRACT
	Today, most countries in the world are gearing up by innovation, seeking to increase productivity and improve their economic situation, and one of the important centers for innovative activities is the incubator centered companies. The majority of companies based in incubator centers are startups companies. Considering that the failure rate of new firms in the early years of formation is greater, research should be conducted on the success factors of these companies. Therefore, the present study aims to identify the key factors for the success of knowledge-based companies Relied on academic incubator centers and it was carried out with the Meta synthesis method. Meta synthesis requires that the researcher carry out a thorough and in-depth review, combining the findings of relevant qualitative research. Using the Meta synthesis method, evaluated over 38 articles in the field of knowledge-based companies. Content mining was used to extract the dimensions and codes, and the significance and priority of each was determined by the use of the quantitative Shannon entropy method. 13 codes, 4 general concepts and 2 categories were identified by reviewing 38 articles. Shannon's entropy was determined based on the results of the quantitative analysis. To evaluate the quality, the results are presented to one of the experts to be examined by the Kappa index Using SPSS software; a significant number of 0.000 and an index value of 0.706 were calculated. So it can be claimed that the extraction of the codes had a good reliability. The most important factor for the success of the companies located in the incubator centers of Sistan and Baluchistan University is the marketing and sales capabilities that have the highest coefficient and have the highest rankings in total. Based on the findings, it was found that the factors of marketing and sales capabilities, the presence of specialized staff and information technology related infrastructure (software, hardware, network, and brain ware), respectively, have the most impact on the success of knowledge-based companies Relied on university incubator centers.

INTRODUCTION

Given the competitive conditions of today and the role of incubator centers and science and technology parks in the country's economic development, the growth and success of companies based in these centers should be considered, which is one of the ways to increase the efficiency of companies, reduce prices and increase the quality of their products. In this regard, managers and owners of companies use different methods such as production planning, scheduling, application of appropriate machines, and compilation of corporate compatibility patterns,

*Corresponding Author:
Email: ham_aramesh@eco.usb.ac.ir
Tel.: +985431136785
Fax: +985431136781

localization and promotion of labor productivity in order to increase the efficiency of companies (Ahmad alinejad *et al.,* 2018). In the process of strategic internationalization of new knowledge based firms in the context of developing, testing in target area that have stronger network connections to global markets has a positive effect on the relationship between firm's international activity and the achievement of a sustainable international competitive advantage (Marjovi and Zarei, 2018). Startups are always faced with series of problems, especially when competing with experienced rivals. Various support mechanisms have been developed to boost these companies in a competitive environment. These supportive systems provide companies with a wide range of benefits, such as tax breaks, training, and exemptions from enforceable laws. Among these tools, Incubator centers seem to be one of the most advantageous processes for encouraging, consulting, and networking new startups (Carletto *et al.,* 2017). Business incubators are centers that after admitting research corporations or startups, over a period of many years, with the provision of services such as management training, law and marketing, and the provision of increased managerial and competitive capacity in institutions small and medium sized enterprises, in the shadow of regular and predetermined programs, are promoting entrepreneurship (Triodos, 2014). Although traditional incubator centers and science and technology parks are currently active in the country, there are some weaknesses such as the lack of post-growth services in them, the existence of spatial constraints, time constraints, and bureaucracies in them, the growth and diversity of technological ideas in information and communication technology business and lack of support due to limited resources and physical space, the lack of rapid and equitable access of entrepreneurs to resources from all over the country has led to failure in the expected accomplishments in the field of launching and developing new businesses (Mohamadian *et al.,* 2015). Due to the importance and development of the services and activities of the incubator centers for the society and, as a consequence, the role of companies based in the incubator centers in advancing the country's economic goals, and since there has not been a comprehensive study on companies based in incubator centers, therefore, in this research key

success factors of these companies are being investigated. On the other hand, it is important to examine the success and failure factors of the companies, because banks, investors, by selecting these factors in potential companies, choose the best company to make income and more profit for investment (Vikram Megaravalli and Sampagnaro, 2019). Today, technology transfer has become one of the important functions of modern universities. Most universities in the world have come to the conclusion that in order to survive and maintain their competitive position, they have to reconsider their traditional functions and seek new functionalities. Governments and communities have also realized that their welfare depends on how to apply science and technology consistently with their national needs. The new functions of universities and governments are the attention to science and technology parks, incubator centers, emerging companies, research and development, and the important goals of these institutions are helping to grow and survive small and start-ups companies. Support for startups can greatly increase the likelihood of their success and survival (Ghorchian and Ghasemizadeh, 2009).The development of science and technology, that is the general process of strengthening capabilities, creating science and technology, and raising their level in society, in addition to economic growth, has a strong and effective relationship with the cultural and social foundations, including the impact on employment status, health and people life (Yahyazadehfar *et al.,* 2017). By reviewing the researches in the field of study, there have been numerous factors that have been considered as factors affecting the success of companies, which are referred to as examples of this research: Vikram Megaravalli and Sampagnaro, (2019), in a research studied the growth of family firms using the balance sheet and the reason for the growth of these companies. The results of this research show that the most important factors of growth of family firms are debt ratio, liquidity, cash flow and labor capital. Ahmad Alinejad *et al.,* (2018), in their research to determine the main factors behind the success of logistic companies in Iran, by studying the related backgrounds and interviewing the experts stated that the most important factors for the success of these companies were the management and leadership, internationalization and competence of the employees. Sadeghi (2018), in a research on

the success factors of small and medium companies with high technology in Iran, with the fuzzy multi-criteria decision making approach identified policies and regulations, technology factors and the characteristics of these companies entrepreneurs as the most important success factors. Peng and Liu (2018) in examining the role of the government in the growth of entrepreneurial companies concluded that government support was important to increase research and development of entrepreneurial companies and the survival of these companies. Augusto and Rodrigues (2018), in a research entitled Organizational Factors and the Impact of Customers on the Performance of Insurance Companies, considered that organizational factors and customer motivation are related to the performance and success of insurance companies. The results of this research show that customers are highly influenced by organizational factors, which in turn affects the performance of insurance companies. Soleimani *et al.,* (2016), investigated driving and barriers factors of the establishment of companies located at Incubator Center of Humanities collage in Ferdowsi University of Mashhad. The results of this research showed that the most important factors were identified as individual characteristics of entrepreneurs, human resources capacities, organizational support of university, academic discipline, innovative idea, incubator center capabilities, internal dynamics, purposefulness of team, group work experience and legal support. Also, the unknown nature of human sciences, the weakness of university support, the lack of understanding of humanities technologies, lack of self-esteem in students, lack of team participation, lack of adequate financial resources, lack of interdisciplinary look at humanities, unsuccessful market presence and weak legal protections introduced as the most important barriers to launch the Incubator Center companies of Humanities collage of Ferdowsi University (Hosseingholizadeh, 2016). Ramezanpur Nargsi *et al.,* (2015), conducted a research on key factors affecting the development of technological entrepreneurship in knowledge-based companies based in science and technology parks in Iran. The results showed that elements such as government, university, capital, infrastructure, market, customers, advisors and technology entrepreneurs are the most important factors influencing the development of technological

entrepreneurship. Amini *et al.,* (2016), in an article entitled investigating the effective factors on the advancement of knowledge based companies using analytical hierarchy, case study of Tehran Park, examined eight important factors including technology, social, market conditions, political, managerial, economic, and environmental factors. The findings showed that all the studied factors, namely technology, management, market, economics, laws, politics, social and environmental factors, influenced the development of knowledge based companies for both target groups (corporate executives and experts from the Ministry of Health). Indicators of technology, economics and laws are three main and influential factors in the view of managers of knowledge based companies, respectively. Environmental, social and policy criteria are the least important. In their research, MirGhafouri *et al.,* (2013), examined the factors influencing the innovation promotion of incubator centers based on fuzzy topologies. The results of this study showed that acquisition of new knowledge and information and access to new and advanced technologies are one of the most important factors influencing innovation promotion in Yazd Science and Technology Park. The results of a study titled "Key Success Factors for Companies Affiliated with the Center for the Growth of the University of Sistan and Baluchestan" indicate that internal and external dimensions affect the success of these companies. (Aramesh and Keshavarz, 2018). The current study has been carried out in the incubator centers of Sistan and Baluchistan University (Iran), in (2018).

MATERIALS AND METHODS

In this research, the Meta synthesis method has been used to study past research and their interpretation. In addition to Meta synthesis, the meta-analysis was used to integrate several studies to create comprehensive and interpretive findings. Compared to the meta-analysis approach, which relies on quantitative data on subject literature and statistical approaches, Meta synthesis focused on qualitative studies, translates qualitative studies into one another and deepens the researcher's understanding. As the topics related to incubator centers in developing countries, including Iran, are roughly new, and most studies on the success factors of incubator centers are qualitative, the Meta

synthesis method is a good way to identify the factors affecting the success of companies based in incubator centers. In this study, the Seven-step method of Sandelowski and Barroso (2003), have been used and summary of these steps are shown in Fig. 1.

Step one: Setting up research questions

In Table 1, research questions are presented with parameters.

Step Two: Systematic review of texts

In this research, the researcher searched for various journals databases in the 2013-2018 period with keywords related to the subject. As a result, 143 articles were found by searching for different databases, journals, and search engines using the key words.

Step Three: Search and select the right articles

To select appropriate articles based on the algorithm shown in Fig. 2, various parameters such as title, abstract, content and quality of research method have been evaluated.

Step Four: Extract information

Articles are categorized according to the reference for each article, including the author's name and surname, along with the year of the publication of the article and the components of the coordination stated in each article. At the end of this step, the researcher identified the codes, the final identification process of the codes conducted in two steps:

Stage One: According to the research goal, the codes that were used in a limited number of researches were not used in the research process, also in terms of semantic and verbal differences between some codes, codes were merged, and subscribed to the same title.

Stage Two: Interviews with Experts on Incubator centers and Professors in Entrepreneurship

Table 1: Research questions

Parameters	Research Questions
What	What factors affect the success of incubator centered companies?
Who (survey community)	What significance and weight each of these factors have in the success of companies based in
When (time limit)	incubator centers?
How (method procedure)	What is the implementation framework for the success factors of incubator centered companies?

Setting up research questions

Systematic review of texts

Search and select the right articles

Extract articles information

Analyze and integrate findings

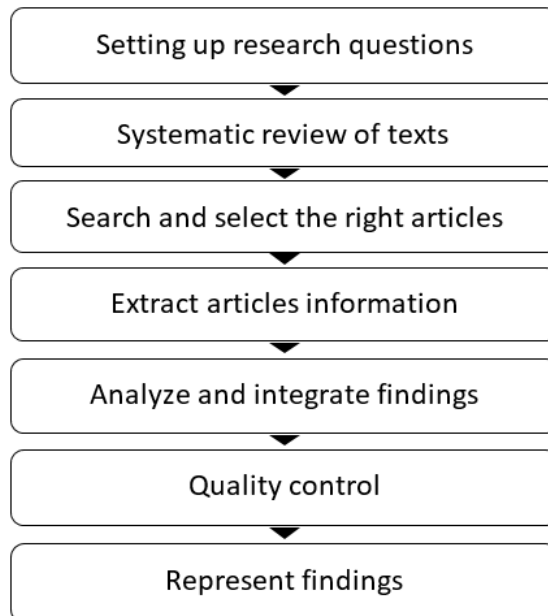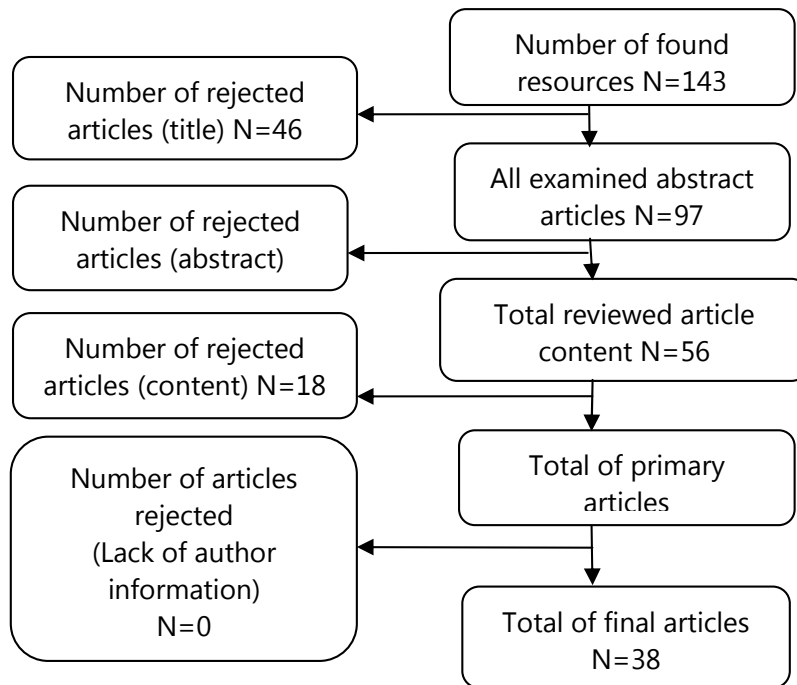Quality control

Represent findings

Fig. 1: Meta Synthesis steps

Fig. 2: Search results and selection of appropriate articles

Table 2: Categorization of Findings

row	Category	concepts	code
1	Organization internal factors	Human resources	Existence of a strong management team, presence of specialist staff, presence of experienced consultant teams
		Organizational policy	Marketing and sales abilities, collaboration between companies based in incubator centers, customer orientation, research and development
2	Organization external factors	Supportive factors	Supporting policies of government, university support from Companies based in incubator centers, industry support from companies based in incubator centers
		Infrastructure	Infrastructure related to information technology (software, hardware, network and brainware), physical infrastructure, patents and intellectual property

Following these two steps to identify extraction codes finally identified 13 codes.

Step Five: Analyze and integrate qualitative findings

Meta synthesis goal is to create an integrated and new interpretation of the findings. This methodology is used to clarify the concepts of patterns, the results in refining existing knowledge and the emergence of operational models and accepted theories. During the analysis, a search on topics or themes that have been sustained among the existing studies in Meta synthesis has been carried out. Sandelowski and Barroso (2003) called this a "subject matter review." Thus, the researcher first considers all the factors extracted from the studies as a code and then classifies them in the same sense, taking into account the concept of each of these codes. In this way, research concepts (themes) are formed.

In Table 2, Categorization of Findings is presented.

Step Six: Control extraction codes

In the sixth step, in order to evaluate the quality, the results are presented to one of the experts to be examined by the Kappa index. When two raters rank respondents, Cohen's Kappa index is used to assess the agreement between these two ranking respondents. The Kappa value varies from zero to one. The closer the measure to one, the greater is the

Table 3: Status of the Kappa Index

Status of agreement	Numeric value of Kappa Index
Weak	Less than 0
Insignificant	0-0.2
Moderate	0.21-0.4
Suitable	0.41-0.6
Valid	0.8-0.61
Excellent	0.81-1

agreement between the ranking respondents, but when the kappa value is closer to zero, there is less agreement between the two ranking respondents (Mohaghar *et al.,* 2014). Table 3, shows the status of the Kappa index. Using SPSS software, a significant number of 0.000 and an index value of 0.706 were calculated, which is shown in Table 4. Given the small

number of 0.05, the assumption of the independence of extraction codes is rejected. So it can be claimed that the extraction of the codes had a good reliability.

Content analysis

Content analysis is a stage in the information process through which content of the communication is transformed and converted into a collapsed and comparable data collection using a set of classified and systematic rules. Shannon's Entropy Method conducts a very strong data processing in the content analysis. Entropy in information theory is an indicator for measuring uncertainty expressed through a probability distribution. There are several methods for determining the weight of the indicators. One of the best practices is Shannon entropy (Azar *et al.,* 2009). In the Shannon entropy, first the message

Table 4: Number of the agreement size

	Size	Standard deviation	Significant number
Amount of agreement Kappa	0.706	0.071	0.000
number of valid cases	12		

Table 5: Ranking and significance coefficient of the success codes of the companies based in the incubator center

Table 5: Ranking and significance coefficient of the success codes of the companies based in the incubator center

| Concept	Code	Frequency	$\sum_{i=1}^{m}[p_{ij}\ln p_{ij}]$	Uncertainty	significance coefficient	rank	total rank concepts
Human resources	Strong team management	33	3.4965	0.7094	0.0946	2	4
	Existence of specialist staff	37	3.6109	0.7326	0.0977	1	2
	Experienced consultant teams	10	2.3025	0.4671	0.0622	3	9
Organizational Policies	Marketing and sales abilities	38	3.6375	0.7380	0.0984	1	1
	Cooperation between companies based in incubator centers	9	2.1972	0.4458	0.0594	4	10
	Customer Orientation	28	3.3322	0.6761	0.0901	2	5
	Research and development	16	2.7725	0.5625	0.0750	3	7
Supporting factors	supporting government policies	33	3.4965	0.7094	0.0946	1	4
	University support from companies based in incubator centers	17	2.8332	0.5748	0.0766	2	6
	Industry support from companies based in incubator centers	3	1.0986	0.2229	0.0297	3	11
Infrastructure	Infrastructure related to Information Technology (Software, Hardware, Network and Brainware)	36	3.5835	0.7270	0.0969	1	3
	Physical infrastructure	11	2.3978	0.4865	0.0648	2	8
	Patent and Intellectual Property	9	2.1972	0.4458	0.0594	3	10
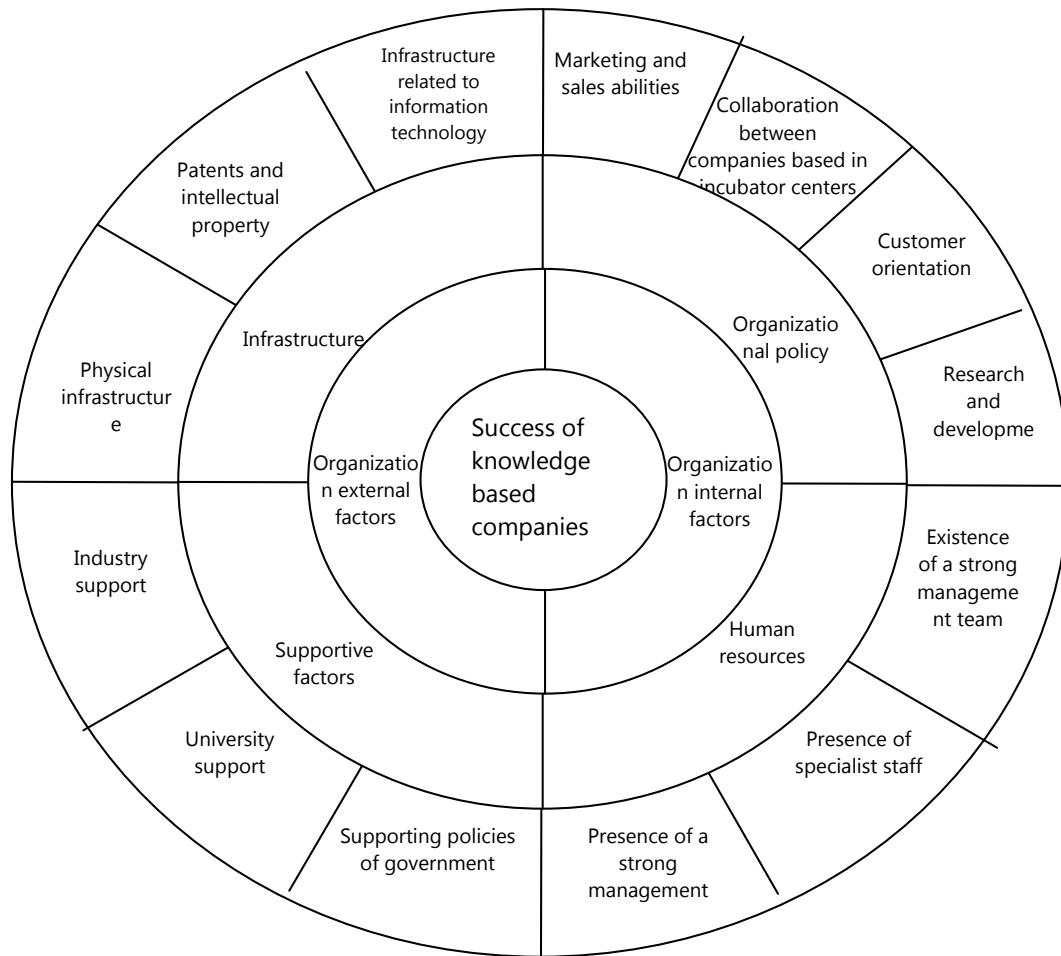
Fig. 3: The Inference Model of Qualitative Findings

is counted in terms of frequency in proportion to the number of respondents, and then, using the information load of each category, the significance of each one is computed. In this research, the Shannon entropy method is calculated for its strength and simplicity. According to this, the amount of support for previous research is statistically illustrated by the findings of this study. Eq. 1 and 2 are used to calculate the uncertainty information load and significance coefficient.

$$E_j = -k \sum_{i=1}^{m} \left[p_{ij} \ln p_{ij} \right], (j = 1, 2 \dots, n), k = \frac{1}{\ln m} \quad (1)$$

Where: E_j is uncertainty information load, W_j is significance coefficient.

$$W_j = \frac{E_j}{\sum_{j=1}^{n} E_j} \quad (2)$$

To calculate the weight of each of the concepts, the total weight of the codes of that concept was calculated and ranked according to the weights obtained in Table 5.

Based on the obtained coefficients, it was determined that marketing and sales capabilities code have the most significance coefficient and have the highest rankings in total; that is, in the field of incubator centers, these issues are more studied and considered and repeated more than other codes. The presence of specialist staff and

IT-related infrastructure (software, hardware, network and brain ware) are ranked second and third. Therefore, it can be said that paying attention to these indicators in implementing the success model of companies based in incubator centers is very important.

Fig. 3 shows the Inference Model of Qualitative Findings.

Step 7: Represent findings

This stage presents finding of the Meta synthesis method of the previous steps. 38 articles selected by the researchers were reviewed within one month and the required information was obtained based on the main objective of this study, which identified key factors of success and failure of the companies based at the incubator center of the University of Sistan and Baluchistan. The combination of findings after the consideration of academic experts and university experts in 2 dimensions is composed of 4 components and 13 indicators, which form the main elements of the success model of the companies based at the incubator center of the University of Sistan and Baluchistan.

RESULTS AND DISCUSSIONS

According to the findings of this study, for the success of the companies based in the incubator centers of the University of Sistan and Baluchistan, attention should be paid to the different dimensions of organization internal factors and organization external factors. In the context of organization internal dimension, the prevailing atmosphere of the companies located in the incubator centers is the facilities and equipment available to them. In this dimension, an organizational policy was identified based on a study of previous research and extracted human resources components codes. The human resources component consists of the existence of a strong management team, the presence of specialist staff, and the existence of expert consultant teams. The organizational policy component is marketing and sales capabilities, collaboration between companies centered in incubators, customer orientation, research and development. The purpose of the outsourcing dimension is that which the knowledge based company does not have role in determining them.

In this dimension, based on the study of previous researches and extracted codes identified the components of supportive mechanisms and infrastructures. The components of supportive mechanisms include government support policies, university support, and industry support from companies based in incubator centers. The infrastructure component includes information and technology related infrastructure (software, hardware, and network and brain ware), patents and intellectual property, physical infrastructure.

CONCLUSION

According to the Small Business Administration of America, small businesses account for over 99 percent of the workforce and 60 to 80 percent of newly created businesses. Small and startups companies cannot survive in competition with medium and large companies. If they do not compete, then in an unfavorable economic climate, these companies will fail after a short time. World statistics show that out of every five start-ups, four companies fail in the early years while incubator centers increase the survival rate of emerging companies by up to 80% (motameni *et al.,* 2014). The present study aims to identify the key factors for the success of knowledge-based companies Relied on academic incubator centers and it was carried out with the Meta synthesis method. Meta synthesis requires that the researcher carry out a thorough and in-depth review, combining the findings of relevant qualitative research. 13 codes, 4 general concepts and 2 categories were identified by reviewing 38 articles. Shannon's entropy was determined based on the results of the quantitative analysis. The most important factor for the success of the companies located in the incubator centers of Sistan and Baluchistan University is the marketing and sales capabilities that have the highest coefficient and have the highest rankings in total, that is, these issues has become more studied and considered in the field of incubator centers and were repeated more than other codes, because marketing identify and promote market requirements, advertising of products and services of companies conduct to increase awareness and to build brand, and eventually pricing on the product and services to sell them conduct with the highest profits in the long run and the company's

survival increases. The lowest weight in Shannon's analysis is dedicated to supporting industry from companies based in incubator centers that are less mentioned in the literature in the subject area.

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CONFLICT OF INTREST

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy has been completely observed by the author.

REFERENCES

Ahmad Alinejad, E.; Saman Pishvaee, M.; Bonyadi Naeini, A., (2018). Key success factors for logistics provider enterprises: an empirical investigation in Iran, Kybernetes, 3(47): 426-440. (**15 pages**).

Amini, A.; Bani Asadi, M.; Khatami, M.; Vahidi, H., (2016). Survey of factors affecting the development of knowledge-based companies, using the Analytic Hierarchy, case study technology park of Tehran. J. Technol. Dev., (48): 22-28 (**7 pages**). (In Persian)

Aramesh, H.; Keshavarz, S., (2018). Study the key Factors of Success of the Companies Based in the Growth Center of Sistan and Baluchestan University. Pub. Manage. Res., 11(42): 155-177. (**23 pages**). (In Persian)

Augusto, F.; Rodrigues, R., (2018). Organizational factors and customers' motivation effect on insurance companies' performance, J. Bus. Res., 68(7): 1622–1629. (**8 pages**).

Azar, A.; Mirfakhredini, S.H.; Anvari Rostami, A.A., (2009). A comparative study of data analysis in six sigma, with the help of statistical tools and multi-factor decision-making techniques. J. Hum. Sci. Modares, 12(4): 1-36. (**36 pages**). (In Persian)

Carletto, C.; Corral, P.; Guelfi, A., (2017). Agricultura commercialization and nutrition revisited: Empirical evidence from three African countries. Food Policy, (67): 106-118. (**13 pages**).

Ghorchian, N.Gh.; Ghasemizadeh, A.R., (2009). Investigating the effective factors on improving the effectiveness of technology centers and providing a suitable model. J. Educ. Leadersh. Manage., 2(4): 101-124. (**24 pages**). (In Persian)

Hosseingholizadeh, R., (2016). The Driving and Restraining Forces Affecting New Venture Creation in Humanities Incubator Center of Ferdowsi University of Mashhad. J. Entrepreneurship Dev., 9(1): 79-97. (**19 pages**). (In Persian)

Marjovi, A.; Zarei, B., (2018). Strategic Internationalization of Knowledge Based New Ventures in Iran: a Longitudinal Case Study Aiming at Creation of Actionable Knowledge. J. Sci., Technol. Policy, 10(2): 29-46. (**18 pages**). (In Persian)

Mirghafouri, S.H.A.; Sayadi Touranlo, H.; Kariminiya, M., (2013). Ranking of Effective Factors on Promoting Innovation Companies in Incubators, Using Fuzzy Topsis Technique; Case Study: Yazd Science and Technology Park. J. Sci.Technol. Parks Incubators, (36): 19-28. (**10 pages**). (In Persian)

Mohaghar, A.; Jafarnejad, A.; Modares Yazdi, M.; Sadeghi Moghadam, M., (2014).The Comprehensive Modeling of Informational Coordination in Supply Chain of Automotive Industry by Meta-synthesis Method. J. Info, Technol, Manage., 5(4): 161-194. (**34 pages**). (In Persian)

Mohamadian, A.; manian, A.; khodadad beromy, M., (2015). A systematic review of research and future research directions of the virtual business incubators. IT Manage. Stud, 3(12): 123-150. (**28 pages**). (In Persian)

Motameni, A.R.; Hoseinabadi, M.; Hemati, A., (2014). Evaluation of the Success Rate of Technology Units Located in Science and Technology Parks and Incubators. J. Technol. Dev., 8 (4): 32-40. (**9 pages**). (In Persian)

Peng, H.; Yang, L., (2018). How government subsidies promote the groth of entrepreneurial companies in clean energy industry: An empirical study in China, J. Cleaner Prod., (188): 508-520. (**13 pages**).

Ramezanpour Nargesi, Gh.; Ramezanpour Nargesi, S.; Ghafari, A., (2016). Key elements affecting the development of technological entrepreneurship in knowledge based companies based in science and technology parks in Iran. J. Entrepr. Dev., 8(4): 749-766. (**18 pages**). (In Persian)

Sadeghi, A., (2018). Success factors of high-tech SMEs in Iran: A fuzzy MCDM approach. J. High Technology Manage. Res., 29(1): 71-87. (**17 pages**).

Sandelowski, M.; Barroso, J., (2003). Toward a Meta Synthesis of Qualitative Findings on Motherhood in HIV-Positive Women. Res. Nus. Health, 26(2): 153-170. (**18 pages**).

Triodos Facet., (2014). Reaching Entrepreneurs through Alternate Models: Lessons from Virtual Incubation Pilots. Washington, DC: Word Bank.

Vikram Megaravalli, A.; Sampagnaro, G., (2019). Predicting the growth of high-growth SMEs: evidence from family business firms, J. Fam. Bus. manage., 9(1): 98-109. (**12 pages**).

Yahyazadehfar, M.; Shababi, H.; Rasekhi, S.; Shirkhodaie, M., (2017). The Interpretive-Structural Model for Prioritize the Relationship among Effective Factors on Science Development, Technology Development and Economic Growth in Iran. J. Sci. Technol. Policy. 9(3): 77-90. (**14 pages**). (In Persian)