



## **SMALL-MEDIUM ENTERPRISES IN IRAN: PRIORITIZE FACTORS AFFECTING SUCCESS USING ANP METHOD**

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### **Abstract**

The purpose of this article is to prioritize the measures of success influencing small to medium size enterprises (SMEs) in Iran using multiple criteria framework. Analytical Network Process (ANP) has been used to develop the framework, because of the dependency among measures and the antecedents. And another reason to use ANP is that it provides relatively more reliable results compared to the other similar methods. To achieve this goal the judgments of experts have been collected through interviews and questionnaires, without interacting and not knowing each other's judgments. As SMEs are historically considered to be the engine of economic growth, the results would prepare the ground for entrepreneurs, managers and strategists to better understand the related factors and direct their efforts toward implementing them based upon their relative importance.

Keywords: SMEs; ANP; Measures of success

## **INTRODUCTION**

SMEs play a pivotal role in the national economies of countries all around the world. Industry is moving away from large vertically integrated firms. Flexible value chains are replacing them. SMEs are recognized as key, not peripheral component of the value chain, as previously thought (Rivera, J.M.C, 2007). On the other hand results shown that, success of the SMEs have direct influence on the development of both developed and developing countries (Demirbag, M., Tatoglu, E., Tekinkus, M. and Zaim, S, 2006). According to Forsman, SMEs are the catalysts for the future economy. Current literature suggests that SMEs may differ from larger companies by a number of key characteristics, such as, resource and knowledge limitation, lack of money reliance on a small number of customers and need for multi-skilled employees (Forsman, 2008).

SMEs are the main parts of the economical industry, thus the survival and grows of these enterprises are vital and needs more caution. As Gartner stated, there are many discussions about factors that influence success of the companies (Gartner et al, 1999). And therefore Prioritizing factors affecting SMEs' success can guide policy makers and business owners in SME policy formulation, while in our country there is lake of such definite research on these issues, in other words in Iran just few or limited works have been done in this case.

In this research with respect to the literature and using experts' opinion thorough Delphi method, some of the influence factors have been collected and with Analytical Network Process, the measures have been prioritized. Subsequently we tried to use a model that could be useful and practical in Iran. The model has been chosen from a research, worked in Turkey. And we got nearly the same result as they did.

Analytical Hierarchy Process (AHP) is one of the widely used approaches to prioritize factors (Saaty, T.L., Peniwati, K., 2008). However, a limitation of AHP is the assumption on independence among various factors and as we know success factors considered in this research are not independent. For Example, regulation and policies in Country affects intensity of competition in industry which affects facility location, financial support, international market entry.... And all of these are among the factors affecting firms' success. In Addition, measures of success are interdependent as well. (Such as quality affects sales and sales affects survival of the firm). Because of this interdependency, the factors, seems to be less important individually might turn out to be more important when evaluated collectively. And that's why we selected Analytical Network Process (ANP) as a methodology.

We Identified 5 measures of company success and 34 factors (antecedents) affecting it mostly from literature search modified and expanded by our experts, with the help of the study worked in Turkey by Birsen Karpak and Ilker Topcu, 2010. Antecedents were divided into five clusters: Country and Business Environment, Firm Internal Environment, Firm Expertise, Owner Related Factors (Entrepreneurs) and Institutional Support. The five measures of success were identified as sales (revenue), product cost superiority, Product quality, cash flow (balance) and survivability (long term viability).

In this Research, We will first briefly introduce SMEs in Iran, and then we review the measures of success and the antecedent. In the section of Methodology we survey the ANP method and its relation to SMEs' factors. And on individual and aggregated result, the results display and at the end we would have conclusions.

## **SME IN IRAN**

SMEs in Iran have been operating in an unstable and unfavorable macroeconomic environment form many years, since the new president comes with the slogan of SME and

SMEs' growth –SMEs are the main part of the economic development- the policies to somehow have been changed, But for sure it wasn't enough.

The definitions of an SME vary from country to country. In Iran the definition of Small enterprises is the companies employing fewer than 50 people. And we couldn't find any official definition for Medium size enterprise, but we can call 50-249 employees, Medium-sized firm (using the definition of European Union).

According to Information Center of the Small Enterprises in Iran, 105467 licenses of establishments and 57902 licenses to exploit have been issued until the ends of 2009, and the number of employed person were 1,813,202. And the investments on the SMEs are more than 727\$ billion.

### **MEASURES OF SUCCESS AND THE ANTECEDENTS**

Storey in 2000 reminds that for many business owners, grows of their business is not an objective, they are targeting at survival (Storey, D. & K. Keasey & R. Watson & P. Wynarczyk, 1987), However we know that one of the main characteristic of the entrepreneurial firms is to develop their companies. Morrison et al, (2003) summarize that a key distinguishing feature of a pro-growth small business is a balanced alignment of the owner-managers' intention, the business abilities and the opportunity environment. Murphy et al. (1996) reviewed 51 published number articles and concluded that a majority of performance measures were related to one of eight performance dimensions: efficiency, growth, profit, size, liquidity, success/failure, market share and leverage (Murphy, G.B., Traller, J.W., Hill, R.C., 1996). Cooper and Gascon (1992) contend that return on equity which is the most cited efficiency dimension in Murphy et al. (1996), can be difficult to obtain and can be heavily influenced by decisions about the owner-manager's compensation. Although, the advantages linked to small firms are their flexibility, organic organization, centralized decision-making and the fact that they are close to the customers (Storey, 2000); (Julien, 1993).

Murphy et al. found out that not many of the studies included measures of more than one dimension and recommend that studies include multiple dimensions of performance whenever possible. And then In 2010 Birsén Karpak et al., in their study on measure operational performance gathered 5 factors, and called them factors of success, Instead of profit they included cost of the product and sales since identifying influence of antecedents on these measures are easier. For size they selected sales which were the most frequent measure in this dimension. For liquidity they included cash flow, again the most frequently cited measure for liquidity. And because their factors were comprehensive enough in this research we used them as success factors of the performance (Birsén Karpak , Ilker Topcu, 2010).

In this research, Antecedents were divided into five cluster: Country and Business environment, firm internal Environment, Firm Expertise, Owner Related Factors (Entrepreneurs) and Institutional Support. The five measures of success were identified as sales (revenue), product cost superiority, Product quality, cash flow (balance) and survivability (long term viability).

Simson et al, defines the macro-envirement as containing factors external to the company that present situational variables which may facilitate or inhabit entrepreneurship at start-up and during the SME lifecycle (Simpson, M., Tuck, N. & Bellamy, S., 2004). This is supported by dahlqvist et al, who expounds that these external factors present opportunities, threats and information affecting all entrepreneurs within that environment, regardless of their background, education or business concept. Guzman and Santos (2001) lists external factors

to include socio-demographics, markets (local, international, emerging and technological, infrastructure and other physical factors of that particular environment (Guzman, J. & Santos, F.J. , 2001). Mazzarol, Volery, Doss and Thein and Viviers et al (2004:4) point out that these macro environmental factors are not controllable and the success of the SME often depends on management's ability to deal with them (Mazzarol, T., Volery, T., Doss, N. & Thein, V., 1999); (Ligthelm, A.A. & Cant, M.C. , 2002).

In this research these environmental factors placed on the cluster of Country and business environment:

### **1. Credit available in the country**

The availability of appropriate economic resources is important for business development (Tustin, 2003; Goodall, 2000a; Czinkota and Ronkainen, 2003). This enables SMEs to secure the necessary expertise and raw materials to put entrepreneurial ideas into practice, to be competitive, to survive during unfavourable conditions and grow (Robertson, 2003). The lack of capital and limited access to finance is a factor inhibiting entrepreneurship and influencing growth negatively, as it impedes the progress that comes from timely application of resources (Nasser, M.E., du Preez, J. & Herrmann, K., 2003); (Pretorius, M. & Shaw, G., 2004); (Rwigema, H. & Venter, R., 2004); (Davila, A., Foster, G. & Gupta, M., 2003); (Ligthelm, A.A. & Cant, M.C. , 2002).

### **2. Regulation and Policies**

Reviewing regulation at all levels of government is vital in Iran for public administrations, organizations, enterprises and citizens. By simplifying and, where possible, removing regulations Iran can become a more productive and better environment in which to live and do business. The European Commission is encouraging all Member States to follow its initiative to cut red tape. The Commission has developed and implements a range of policy measures specifically to assist SMEs in Europe. These policies are aimed at creating the conditions in which small firms can be created and can thrive.

### **3. Stage of industry**

Stage of Industry affects SME success. If industry is at the growth stage good performance of the firms is far easier than for a mature industry.

### **4. GNP per capita**

GNP per capita also affects SME success. It is especially very important for consumer products. GNP affects the development of SMEs and SME creates stability and growth per capita income vice versa.

### **5. Intensity of competition in industry**

Enterprise density is defined as the number of firms in a given population at a given time and refers to the percentage of existing and possible entrepreneurs (Panco, R. Korn, H.J., 1999). For example, In South Africa the enterprise density is low at 2%, meaning there is room for expanding active enterprises, and this low density acts as a disincentive to firms to exit (Pretorius, M., van Vuuren, J.J. & Nieman, G.H., 2005).

## **6. Big company strategies toward SMEs**

Sometimes, SMEs may have one or more big companies as their major customers. In some cases, the survival of the SME is tied to the continued existence of such big companies. In addition, big companies are usually able to use their size to influence the prices of the products or services supplied by the SMEs.

## **7. Availability of qualified personnel in industry**

Access to labor markets is key factor of production crucial entrepreneurship (Shane, S. & Vankataraman, S., 2000) (Thornhill, S. & Amit, R., 2003), as it allows for appropriate expertise that enables ventures to explore identified opportunities (Nasser, M.E., du Preez, J. & Herrmann, K., 2003) (Markman, G. & Baron, R., 2003).

Next Cluster that we want to discuss here is the Firm internal environment. The personal environment (internal or firm-based factors) has an impact on entrepreneurship and business success (Guzman, J. & Santos, F.J. , 2001) (Fielden, S.L., Davidson, M.J. & Makin, P.J., 2000). The personal environment include all firm-specific factors that are influenced by specific firm action, including the availability of resources, personal skills and abilities for pursuing entrepreneurial function and the effective use of resources inside the firm (Panco, R. Korn, H.J., 1999); (Nieman, 2006)). Deficiencies in the internal environment are the major cause of SMEs' failures, with over 65% of failure causes said to be firm-based (Dockel and Ligthelm, 2005) (Ligthelm, A.A. & Cant, M.C. , 2002).

The systems approach to the study of business organisations stresses the interaction between a firm's internal and external environments. Key aspects of the internal context of business include the organization's structure and functions and the way they are configured in pursuit of specified organizational objectives. If the enterprise is to remain successful, constant attention needs to be paid to balancing the different influences on the organization and to the requirement to adapt to new external circumstances. This responsibility lies essentially with the organization's management, which has the task of blending people, technologies, structures and environments (Ian Worthington and Chris Britton, 2006).

These factors include, Access to overall low cost factors of production, Availability of capital of the firm, Firm's access to credit, Flexibility to adapt new industry and market trends, Ability to define strategic direction for the firms, Facility [factory] location, Information and telecommunication tech. usage, Scale and scope of customer portfolio, Accessibility to (big) supply chain, Ability to enter international markets.

Next cluster is firm expertise that includes Product technology, Process technology, Leading edge facilities, Management, Marketing, Finance & accounting, Customer service, HR management.

The other cluster is owner related factors that encompass Networkability, Philosophy, Family partners approach, 2nd generation perception.

And the last one is institutional support cluster that contain, Financial, Consultancy, Education, International market entry (Birsan Karpak , Ilker Topcu, 2010).

## **METHODOLOGY**

### **Background of methodology**

The ANP is a generalization of the Analytic Hierarchy Process, popularly known as AHP. AHP is a theory of prioritization that derives relative scales of absolute numbers known as

'priorities' from judgments expressed numerically on an absolute fundamental scale (Saaty, Theory and Applications of the Analytic Network Process, 2005). The AHP/ANP framework has three basic features which are useful in multi-criteria decision-making problems: (1) modeling the system's complexity, (2) measuring on a ratio scale and (3) synthesizing. The local priorities in ANP are established in the same manner as they are in AHP using pairwise comparisons and judgments. However, the super matrix approach which became popularly known as the ANP approach is becoming an attractive tool to understand more of the complex decision problem as it overcomes the limitation of the AHP's linear hierarchy structure. (Saaty, Decision Making with Dependence and Feedback: The Analytic Network Process, first ed, 1996).

The super matrix was introduced to serve as a unifying framework for the study of priorities in hierarchy and in systems with feedback (Saaty, The Analytic Hierarchy Process, 1980). Consider a system that can be decomposed into  $m$  clusters  $C_1, C_2, \dots, C_m$  and let the elements in  $C_k$  having  $n_k$  elements be denoted as  $e_{k1}; e_{k2}; \dots; e_{kn_k}$ . Then, a super matrix representation of this system can be viewed as a partitioned matrix that describes the interaction between the elements and clusters of a system. In this so-called super matrix, the block matrix contains a column of priority weights which represent the impact of all elements in the  $i$ th cluster on each of the elements in the  $j$ th cluster. Some of its entries may be zero corresponding to those elements which have no path of direct interaction (or influence) to other elements.

The directions of the arc (or arrow) and loop signify dependence such that the arc and loop pointing into a cluster indicate that its elements influence the elements in the cluster from which the arc is emanating. This structural model incorporates the following types of dependence in a multilevel hierarchy: (1) hierarchic functional dependence as described by the downward arc from the upper level to the lower level clusters, (2) feedback dependence as described by the upward arc from the lower level to the upper-level cluster, (3) inner-dependence or self-feedback as indicated by loop at each cluster, (4) interdependence among clusters in a level as indicated by the (horizontal) arc between clusters belonging to the same level and (5) feedback control loop as indicated by the arc pointing to the goal cluster. The feedback control loop can be viewed as a structural dependence indicating that all the elements defined in the decision structure are relevant and influenced by the goal element, making the systems strongly connected.

The input to the super matrix of a hierarchical network would depend on the presence and type of dependence among factors. The entries to the block matrices ( $S_{ij}$ ) in the initial super matrix are the estimated priorities that provide the relative strength of dominance of an element over another element in the cluster with respect to a common element from which the arc emanates. There are several algorithms to measure such priorities as described in Srdjevic (2005) (Srdjevic, 2005). The AHP eigenvector method is one of the popular methods used to quantify the relative dominance of the elements from pairwise comparison matrices. Saaty (1980) proposed the following eigenvalue formulation to obtain the desired ratio-scale priority vector (or weights)  $w$  of  $n$  elements:

$$Aw = \lambda_{\max} w, \quad e^T w = 1$$

Overall (ratio-scale) priorities can be derived based on the synthesizing concept of the super matrix. In raising the super matrix into a large power, the transmission of influence along all possible paths defined in the decision structure is captured in the process. (Saaty, 2001). The convergence of the initial priorities to a steady state or equilibrium value in the so-called

limit super matrix provides a set of meaningful synthesized priorities from the underlying decision structure. Since the PRMEHN model defines a strongly connected digraph, its super matrix representation is a primitive irreducible matrix. Thus, the limit super matrix  $L$  exists when the initial super matrix is standardized by its principal eigenvalue as shown by the following equation:

$$\lim_{p \rightarrow \infty} \left( \frac{S}{\lambda_{\max}} \right)^p = \lim_{p \rightarrow \infty} (\bar{S})^p = L$$

Every column of this limit matrix is a unique positive column eigenvector associated with the principal eigenvalue  $\lambda_{\max}$  (see Nikaido (1968) for the mathematical proof). This principal column eigenvector corresponds to the stable priorities from the limit super matrix and can be used to measure the overall relative dominance of one element over another in a hierarchical network structure (Michael Angelo, B. Promentilla, T. Furuichi, K. Ishii, and N. Tanikawa, 2007).

### **ANP Steps**

As we explained before, Analytic Network process, is a decision making tool used in complex problems. It involves all kinds of Relationship, dependency and feedback in the model and draws a systematical figure of the decision making problem. ANP is the more general form of Analytic Hierarchy Process, which generates feasible solutions to hierarchical kind of decision problems.

In this research, using pairwise comparisons, all kinds of subcomponents are being evaluated through ANP. There is a 1-9 scale which is also developed by Thomas Saaty and the pairwise comparisons are measured through this scale (Saaty, Theory and Applications of the Analytic Network Process, 2005).

Our method is consists of five main steps:

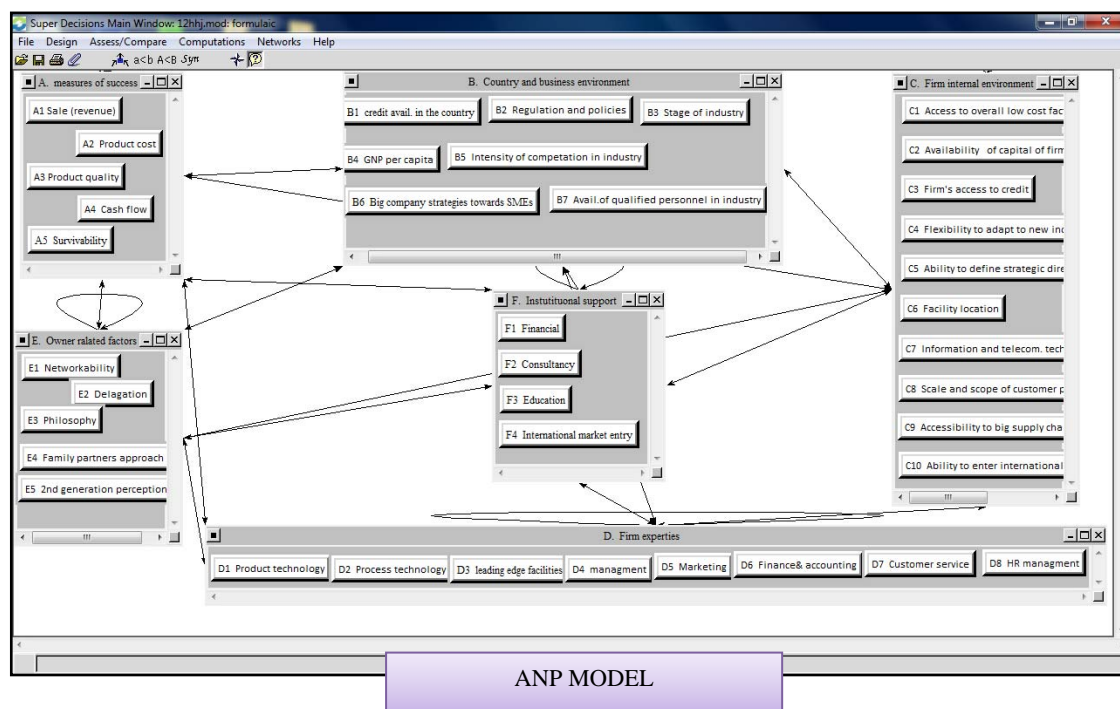
1. Performing pairwise comparisons on the elements of the model.
2. Generating weighted super matrix by putting the relative importance weights (eigenvectors), calculated from pairwise comparison matrices, within the super matrix.
3. Performing pairwise comparisons on the clusters.
4. Generating the weighted super matrix by weighting the blocks of the weighted super matrix, by the corresponding priorities of the clusters so that it can be column stochastic.
5. Generating the super matrix by raising the weighted super matrix to the power  $2k+1$ , where  $k$  denotes an arbitrary large number, until the weights converge and stays constant (Saaty, Theory and Applications of the Analytic Network Process, 2005).

Figure A: Influence matrix

	Measures of Success					Country & Bus. Environ.							Firm Internal Environment										Firm Expertise								Owner R. Factors					Inst. Support			
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	D1	D2	D3	D4	D5	D6	D7	D8	E1	E2	E3	E4	E5	F1	F2	F3	F4
Measures of Succ	A1	+																																					
	A2	+																																					
	A3	+	+																																				
	A4	+	+	+																																			
	A5	+	+	+	+																																		
Country & Bus. Environ.	B1	+	+	+	+																																		
	B2	+	+	+	+																																		
	B3	+	+	+	+																																		
	B4	+	+	+	+																																		
	B5	+	+	+	+																																		
	B6	+	+	+	+																																		
	B7	+	+	+	+																																		
Firm Internal Environ.	C1	+	+	+	+																																		
	C2	+	+	+	+																																		
	C3	+	+	+	+																																		
	C4	+	+	+	+																																		
	C5	+	+	+	+																																		
	C6	+	+	+	+																																		
	C7	+	+	+	+																																		
	C8	+	+	+	+																																		
	C9	+	+	+	+																																		
	C10	+	+	+	+																																		
Firm Expertise	D1	+	+	+	+																																		
	D2	+	+	+	+																																		
	D3	+	+	+	+																																		
	D4	+	+	+	+																																		
	D5	+	+	+	+																																		
	D6	+	+	+	+																																		
	D7	+	+	+	+																																		
	D8	+	+	+	+																																		
Owner R. Fact.	E1	+	+	+	+																																		
	E2	+	+	+	+																																		
	E3	+	+	+	+																																		
	E4	+	+	+	+																																		
	E5	+	+	+	+																																		
Inst. Sup.	F1	+	+	+	+																																		
	F2	+	+	+	+																																		
	F3	+	+	+	+																																		
	F4	+	+	+	+																																		

## APPLICATION OF ANP INTO SMES

In model construction stage all elements affecting the SMEs success –Measures of success and factors affecting success-, where determined from the Study worked by karpak et al, 2010 and tested in Iran. We do not have alternatives in our frame work, measures of success are proxy for alternatives.





In order to represent the link among elements explicitly, an influence matrix can be constructed (Birsen, Karpak., Ilker Topcu, 2010). Each element of the system is represented at one row and on respective column of the influence matrix. If the row element affects the column element the corresponding entry of the matrix is checked, otherwise the entry is empty, i.e. No relation. If at least two row elements of any cluster affect a column element, question for pairwise comparison of row elements with respect to that column element are asked. If there is only one row element affecting a column element (i.e. column B4 is only affected by row A1), there is no need to – and.

No change to- ask a pairwise comparison question. In the unweighted super matrix, the corresponding entry (Row A1- Column B4) would have a priority value of 1.

The influence matrix is given in figure A. there is inner dependence in every cluster. For example in measures of success cluster since quality affects sales and cost; and cost affects sales there is an inner dependence among measures of success. In ANP as we talked before model inner dependence is depicted with a loop in a cluster. There is outer dependence in every cluster too. For example credit availability in the country affects firm access to credit. This illustrates outer dependence between country and business environment cluster and firm internal environment cluster. There is feedback between firm internal environment and firm expertise cluster since one of the component of the Firm Internal Environment cluster, availability capital of the firm antecedent, affects leading edge facilities element of Firm Expertise cluster, and leading edge facilities factor affects accessibility to big supply chain. In ANP model feedback is depicted with an arrow in both directions between the clusters.

A questionnaire of about 26 pages and 253 questions in 31 parts was developed to assess degree of influence of two factors with respect to a controlling factor.

All the experts were academicians whose main research areas are SMEs and teaching this course in their universities and they all involved in Iran's business situation especially in Small business situation.

The inconsistencies among the experts' answers in most parts were beyond 0.1 even though there were up to 10 factors in firms' internal environment. However Saaty suggest that each clusters could contain less that 9 factors because the human mind can't analyze more than that. for the first time During filling the questionnaire one of the authors was presence to answer the question of the experts. We asked all the experts to give suggestion about the questionnaire and the influential factors, that if it needs any addition or omission. It took more than 1 month to complete.

## **INDIVIDUAL AND AGGREGATED RESULTS**

After gathering the questionnaires from the experts and set down in the software (SuperDecisions) the results emerged. We lay down the answer from each expert's judgment individually and did the prioritizing for each one separately and an Aggregate judgment was derived from the geometric mean of individual judgments. Then we used Microsoft Excel to sort them from largest to smallest (see table A for a portion of the first five factors according to each expert individually and combined values). According to the limit matrix priorities (See Table B: A portion of the limit matrix) , regulation and policies (11.68%) turned out to be the most influential factor affecting SMEs' success (the same as Birsen et al, 2010) followed by facility location (9.63%), the stage of industry (6.26%), availability of the qualified person in industry (5.80%), and intensity of competition (5.48%). As it clearly shows, four of the first five factors are in the country and business environment cluster. It shows the importance of this cluster and demands more attention on the side of government, and the other factor is in the cluster of the firm internal environment. Sales and quality of the product were the

most important measure of success. Among owner related factors the first factor was personal philosophy and approach of doing business (philosophy of the entrepreneur) and the second one was ability to have access to resources and capabilities through personal and professional networking. In institutional support cluster, first factor was consultancy and the second one was education, and in the last cluster the most important factor was management and the next one was Process technology.

Our results in this research are nearly the same as the study had been done in Turkey by Birsen et al, 2010. Regulation and policies is the first important factor. The more important reason that we can refer to might be the bureaucracies in both countries. And according to Heritage the overall freedom to start, operate, and close a business remains limited by Iran's regulatory environment (Kim R. Holmes, 2010) and it declares that the Turkey's regulatory environment has improved somewhat in recent years, but it seems that Turkey still have difficulties with bureaucracies. On the other hand, we can recommend the government to ease the conditions of starting a new business. And start making policies that improve the procedures of starting new business. The other thing that we got from this research was that the most important factor for SMEs' success is the external environment. As Viviers et al, pointed out that these macro environmental factors are not controllable and the success of the SME often depends on management's ability to deal with them, we want to declare that if Iran wants to have his economy's growth, the government should make stable environment for business and we can specially point out in regulation and policies making for the SMEs that is under the control of the government in Iran.

Table A

First five factors	Expert 1	Expert 2	Expert 3	Expert 4	Aggregated
1.Regulation and policies	11.87%	10.88%	12.75%	11.30%	11.68%
2.Facility location	9.59%	9.22%	10.38%	9.36%	9.63%
3.Stage of industry	6.47%	7.27%	6.25%	5.95%	6.26%
4.Availability of the qualified personnel	5.49%	6.10%	6.23%	5.42%	5.80%
5.Intensity of competition	4.13%	5.64%	6.63%	5.83%	5.48%

## CONCLUSION AND FUTURE STUDIES

The entrepreneur's personality, his/her managerial skill, and technical know-how are often cited as the most influential factor to the performance of an SME (Man, T.W.Y.,Lau,T.,Chan,K.F., 2002). However, our study and the study in Turkey show that regulations and policies are the most influential factor in SMEs success. And as we assumed before the interdependencies among the factors when be evaluated concurrently might show that the factors that are less important individually might turn out to be more important (Birsen Karpak , Ilker Topcu, 2010).

Through our knowledge, this is the first study prioritizing success factors for small medium manufacturing enterprises in Iran. All we said in this study were about the importance of factors that influence SMEs' success. Then the concentrations on this study could be very important for entrepreneurs, managers and strategist to better understand these factors and direct their efforts toward implementing them. Because our method was reliable and clear enough it could help the growth of the SMEs and slowly and constantly helps our country to go forward. Prioritizing these elements could be considered as guidance for us to set our programs and preferences through definite assumptions.

Furthermore, this research could be the pass for the future study and helps the researchers to use ANP in their studies. ANP is a powerful methodology but you need to identify experts from whom the judgments are to be extracted. ANP is not very complex as a methodology; eliciting judgments from experts, however, could be quite time consuming. We have been very careful in designing the framework for obtaining expert judgment. Karpak et al, (2010) assumed that degree of influence of two factors with respect to controlling factor may differ from country to country, but we have shown that these elements in Iran and Turkey are nearly the same. We assume that this model with this influence matrix could get the same results for different cultures and different countries.

Table B: A portion of the limit matrix

		A. measures of success					B. Country and business environment			
		A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
A. measures of success	A1 Sale (revenue)	0.087032	0.087032	0.087032	0.087032	0.087032	0.087032	0.087032	0.087032	0.087032
	A2 Product cost	0.008944	0.008944	0.008944	0.008944	0.008944	0.008944	0.008944	0.008944	0.008944
	A3 Product quality	0.017122	0.017122	0.017122	0.017122	0.017122	0.017122	0.017122	0.017122	0.017122
	A4 Cash flow	0.002255	0.002255	0.002255	0.002255	0.002255	0.002255	0.002255	0.002255	0.002255
	A5 Survivability	0.003865	0.003865	0.003865	0.003865	0.003865	0.003865	0.003865	0.003865	0.003865
B. Country and business environment	B1 credit avails. in	0.023421	0.023421	0.023421	0.023421	0.023421	0.023421	0.023421	0.023421	0.023421
	B2 Regulation and	0.119836	0.119836	0.119836	0.119836	0.119836	0.119836	0.119836	0.119836	0.119836
	B3 Stage of industry	0.056733	0.056733	0.056733	0.056733	0.056733	0.056733	0.056733	0.056733	0.056733
	B4 GNP per capita	0.057622	0.057622	0.057622	0.057622	0.057622	0.057622	0.057622	0.057622	0.057622
	B5 Intensity of	0.082889	0.082889	0.082889	0.082889	0.082889	0.082889	0.082889	0.082889	0.082889
	B6 Big company	0.011825	0.011825	0.011825	0.011825	0.011825	0.011825	0.011825	0.011825	0.011825
	B7 Avail. Of qualified	0.048828	0.048828	0.048828	0.048828	0.048828	0.048828	0.048828	0.048828	0.048828
C. Firm internal environment	C1 Access to overall low cost factors of	0.014970	0.014970	0.014970	0.014970	0.014970	0.014970	0.014970	0.014970	0.014970
	C2 Availability of	0.009847	0.009847	0.009847	0.009847	0.009847	0.009847	0.009847	0.009847	0.009847
	C3 Firm's access to credit	0.005823	0.005823	0.005823	0.005823	0.005823	0.005823	0.005823	0.005823	0.005823
	C4 Flexibility to	0.002502	0.002502	0.002502	0.002502	0.002502	0.002502	0.002502	0.002502	0.002502
	C5 Ability to define	0.030719	0.030719	0.030719	0.030719	0.030719	0.030719	0.030719	0.030719	0.030719
	C6 Facility location	0.099393	0.099393	0.099393	0.099393	0.099393	0.099393	0.099393	0.099393	0.099393
	C7 Information and	0.004893	0.004893	0.004893	0.004893	0.004893	0.004893	0.004893	0.004893	0.004893
	C8 Scale and scope of	0.016148	0.016148	0.016148	0.016148	0.016148	0.016148	0.016148	0.016148	0.016148
	C9 Accessibility to	0.008952	0.008952	0.008952	0.008952	0.008952	0.008952	0.008952	0.008952	0.008952
	C10 Ability to enter	0.011986	0.011986	0.011986	0.011986	0.011986	0.011986	0.011986	0.011986	0.011986
D. Firm expertise	D1 Product technology	0.015980	0.015980	0.015980	0.015980	0.015980	0.015980	0.015980	0.015980	0.015980
	D2 Process technology	0.017851	0.017851	0.017851	0.017851	0.017851	0.017851	0.017851	0.017851	0.017851
	D3 leading edge	0.005637	0.005637	0.005637	0.005637	0.005637	0.005637	0.005637	0.005637	0.005637
	D4 management	0.022873	0.022873	0.022873	0.022873	0.022873	0.022873	0.022873	0.022873	0.022873
	D5 Marketing	0.006221	0.006221	0.006221	0.006221	0.006221	0.006221	0.006221	0.006221	0.006221
	D6 Finance& accounting	0.012684	0.012684	0.012684	0.012684	0.012684	0.012684	0.012684	0.012684	0.012684
	D7 Customer service	0.003016	0.003016	0.003016	0.003016	0.003016	0.003016	0.003016	0.003016	0.003016
	D8 HR management	0.000107	0.000107	0.000107	0.000107	0.000107	0.000107	0.000107	0.000107	0.000107
E. Owner related factors	E1 Networkability	0.016870	0.016870	0.016870	0.016870	0.016870	0.016870	0.016870	0.016870	0.016870
	E2 Delagation	0.008040	0.008040	0.008040	0.008040	0.008040	0.008040	0.008040	0.008040	0.008040
	E3 Philosophy	0.034543	0.034543	0.034543	0.034543	0.034543	0.034543	0.034543	0.034543	0.034543
	E4 Family partners	0.014396	0.014396	0.014396	0.014396	0.014396	0.014396	0.014396	0.014396	0.014396
F. Institutional support	E5 2nd generation	0.014592	0.014592	0.014592	0.014592	0.014592	0.014592	0.014592	0.014592	0.014592
	F1 Financial	0.034781	0.034781	0.034781	0.034781	0.034781	0.034781	0.034781	0.034781	0.034781
	F2 Consultancy	0.034479	0.034479	0.034479	0.034479	0.034479	0.034479	0.034479	0.034479	0.034479
	F3 Education	0.019262	0.019262	0.019262	0.019262	0.019262	0.019262	0.019262	0.019262	0.019262
	F4 International market entry	0.013063	0.013063	0.013063	0.013063	0.013063	0.013063	0.013063	0.013063	0.013063

## Appendix A

See Table C.

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Table C: Results according to each expert individually and combined values

No.	Expert 1		Expert 2		Expert3		Expert 4		Geomean	
	Criteria	Limiting	Criteria	Limiting	Criteria	Limiting	Criteria	Limiting	Criteria	Limiting
1	B2	0.118619	B2	0.108792	B2	0.127471	B2	0.112971	B2	0.116757
2	C6	0.095869	C6	0.092177	C6	0.103775	C6	0.09361	C6	0.096256
3	A1	0.082455	A1	0.072707	A1	0.067376	A1	0.06466	A1	0.071488
4	B3	0.064621	B3	0.06374	B5	0.066349	B3	0.059454	B3	0.062558
5	B4	0.06305	B7	0.061032	B3	0.062542	B5	0.05826	B7	0.057974
6	B7	0.054818	B5	0.056368	B7	0.062275	B7	0.054216	B5	0.054772
7	E3	0.046107	B4	0.052415	E3	0.050535	B4	0.043948	B4	0.049048
8	B5	0.041303	E3	0.047415	C8	0.040369	E3	0.041121	E3	0.046167
9	F2	0.039537	F2	0.039566	F2	0.040205	F2	0.041079	F2	0.040092
10	C8	0.038147	C8	0.039107	B4	0.039848	C5	0.037878	C8	0.038574
11	C5	0.033922	C5	0.033899	C5	0.033307	C8	0.036764	C5	0.034705
12	F1	0.027806	F1	0.030429	F1	0.027561	F1	0.028842	F1	0.028638
13	E1	0.02485	B1	0.026023	D4	0.025438	E4	0.027147	D4	0.024968
14	D4	0.023311	D4	0.025015	E1	0.024954	E1	0.02673	E1	0.02379
15	F3	0.021292	E5	0.024326	F3	0.022174	D4	0.026198	F3	0.020671
16	B1	0.018955	A3	0.019573	D2	0.020214	B6	0.020881	B1	0.01998
17	E4	0.018799	E1	0.019326	B1	0.016707	F3	0.02046	E4	0.017609
18	E5	0.017894	F3	0.018901	A3	0.016423	A3	0.019608	A3	0.017585
19	A3	0.01517	D1	0.018301	E4	0.015422	B1	0.019339	E5	0.017221
20	D2	0.013401	C1	0.016189	C10	0.015381	D2	0.018958	D2	0.015917
21	C10	0.012759	C10	0.015932	D1	0.012509	E5	0.016446	C10	0.013745
22	C2	0.012388	D2	0.0125	E5	0.012285	C1	0.014638	C1	0.012895
23	D1	0.01225	E4	0.012217	C1	0.010448	C9	0.013317	D1	0.012408
24	C1	0.011167	F4	0.009911	D8	0.010111	C10	0.011417	C2	0.009908
25	D8	0.009242	C9	0.00971	C9	0.009054	D5	0.011071	C9	0.009391
26	F4	0.008964	C2	0.00966	C2	0.008615	C2	0.009346	D8	0.009262
27	A2	0.008924	D8	0.009524	C3	0.008423	F4	0.009162	F4	0.008909
28	E2	0.008658	B6	0.008551	C4	0.008249	D1	0.008452	B6	0.008479
29	C4	0.007348	E2	0.007323	E2	0.007865	D8	0.008267	E2	0.007798
30	C3	0.007047	D5	0.006322	F4	0.007741	E2	0.007414	D5	0.007192
31	D3	0.006713	C3	0.005818	D5	0.007538	C3	0.006987	C3	0.007009
32	C9	0.006644	A2	0.005509	B6	0.004725	D3	0.006839	A2	0.004658
33	B6	0.006125	D3	0.004159	D6	0.003018	C7	0.006401	C4	0.004508
34	D5	0.005072	C7	0.003756	A2	0.002802	A4	0.004694	D3	0.004174
35	C7	0.004744	C4	0.003303	A4	0.002733	D6	0.00463	C7	0.003873
36	D6	0.003702	A5	0.003153	C7	0.001973	A2	0.003418	D6	0.003534
37	D7	0.003229	D6	0.003014	D3	0.001589	A5	0.002229	A4	0.002777
38	A4	0.002689	D7	0.002613	D7	0.001469	C4	0.002062	D7	0.001915
39	A5	0.002409	A4	0.001724	A5	0.000526	D7	0.001086	A5	0.001727