

The identification and prioritization of the technological collaboration challenges among small knowledge-based firms and large companies; Case study of innovation system in Iran

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Abstract

The small knowledge-based firms are the main sources for technology development in different countries, especially in developing ones. The close relations among small knowledge-based firms and large companies are necessary for their sustainable improvement and technological development. So the identification of challenges for increasing the collaboration among the small knowledge-based firms and large companies are important. In the research, the challenges have been investigated from two sides; the side of small knowledge-based companies and the side of large companies. The research method was Binomial test. At the first, the 9 challenges were identified by literature reviews, the real evidences and beliefs of the several experts. Thereafter the importance of 9 identified challenges prioritized by expert beliefs. 28 experts participated in completing the questionnaires. The lack of risk acceptance for financing the product development of small knowledge-based firms, the low capability of small knowledge-based firms in making linkages to large companies and identification the technological needs of large companies are the most important challenges in increasing the collaboration.

Keywords: large companies, small knowledge-based firms, collaboration

Introduction

Jamieson et al. (2012) believes that "Large companies can be highly important to stimulating SME growth. Guaranteed revenue streams enable SMEs to develop growth strategies. Being an accredited supplier can lead to more exposure and work, and large organisations assist in up skilling SMEs and improving their work processes. Large organisations also train future entrepreneurs who in turn set up their own SMEs, driving innovation in the economy".

Lawton Smith et al. (1991) maintained that collaboration can be beneficial for both sides. The small firms can provide the possibility of exploiting new technology, new and sustainable markets, and additional funds. Also they can improve their management skills(Sawers, 2008). The other side, the large firms have various benefits from collaborating with small firms. For example, Sawers(2008) point out "small firms have people with the right combination of specialized skills to develop new products and enable large firms to monitor the development of new technology and equipment".

However there are different challenges for the sustainable collaboration among small knowledge-based firms and large companies which it is necessary to be identified by researchers. It is the first step for increasing the collaboration. So in

the research based on literature reviews, the real evidences and beliefs of the experts, we tried to identify the main challenges. The main objective of the research is identifying and prioritizing the importance of challenges for the sustainable collaboration among small knowledge-based firms and large companies.

The paper proceeds as follows. The following section elaborates the literature studies. The subsequent section describes the research methodology. The next section describes the research findings. Finally, the conclusion section discusses the implications of the study and highlights various limitations.

Literature review

Technological development is one of the main objectives of governments. Almost half of the respondent SMEs networked with larger companies, to access market, and win new business. This was particularly necessary for SMEs competing in sectors dominated by large businesses (Jamieson et al., 2012) such as oil and automobile industries.

Technological collaborations between small knowledge-based firms and large companies are important and different researches have been researched on the collaboration topic in recent years from internal and external aspects. The newer concepts such as innovation system concentrate on this collaboration as an important element for technology and innovation development. Marxt and Link(2002) investigated 106 companies in England and 400 Swedish ones and the rate of success in these collaborations were 40% to 60%. Some researches have focused on organizational and technological dimensions as the main factors for having successful collaborations (Naghizadeh, 2017).

The different context and technology can be effective on identification and prioritization of the main collaboration challenges between large companies and small knowledge-based firms. The case of the research is Innovation system in Iran (Naghizadeh, 2016). The correct recognition of challenges is important for effective exploitation from models of making collaboration between large companies and small knowledge-based firms such as innovation accelerators (Kohler, 2016), corporate CVC's (Dushnitsky et al., 2006) and corporate incubators (Tabatabaeean et al., 2011). So based on literature review, the real evidences in Iran and expert opinions, the 9 challenges identified by researchers and in the table 1 presents these 9 challenges in Iran.

Table 1: main challenges of collaboration between large companies and small knowledge-based firms in Iran

Main challenges
First challenge: the large companies have not identified their technological needs.
Second challenge: the technological needs of large companies have not been clarified by scientific and applicable methods.
Third challenge: the recognition of large companies from small knowledge-based firms are incomplete.
Fourth challenge: the large companies don't accept the risk of financing the product of small knowledge-based firms.

Fifth challenge: the large companies don't want to tolerate the risk of extensive buys from small knowledge-based firms.
Sixth challenge: the small knowledge-based firms can't make linkages with large companies to start negotiation and stable collaboration with them.
Seventh challenge: the small knowledge-based firms don't know the real technological needs of large companies.
Eighth challenge: the small knowledge-based firms don't have enough money and credit to provide their financial needs by themselves or banks.
Ninth challenge: the risks of small knowledge-based firms for selling their products are high.

Research methodology

At the first, the challenges were identified by literature reviews, investigation of the real evidences and beliefs of the several experts. Thereafter the importance of 9 identified challenges prioritized by expert beliefs. 28 experts participated in completing the questionnaires. The method for identifying and prioritizing of the collaboration challenges among large companies and small knowledge-based firms was Binomial test. After choosing the main challenges, expert's views about prioritizing the challenges were gathered by email. The questionnaire had 9 questions with 5 point Likert scale. Totally, 28 experts filled out questionnaires. To test the reliability of the questionnaire, Cronbach's alpha of questionnaire was done by SPSS software. Binomial test was used to analyze experts' views. Verified items with 95% reliability or higher were selected as significant factors. Also the experts explain more about the details of challenges by interviews or written texts. Binomial test is a non-parametric statistical method that makes it easier to judge a variable in a group when items are classified into two groups. Figure 1 depicts research steps.

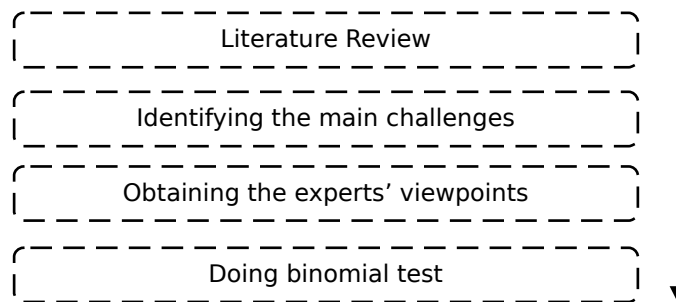


Figure 1: The Research Steps

Results

Table 1: main challenges of collaboration among large companies and small knowledge-based firms in Iran

After identification of the main challenges of collaboration among large companies and small knowledge-based firms in Iran, the challenges were prioritized by Binomial test. Table 2 shows the results of Binomial test.

Table 2. Results of Binomial test

Binomial Test

	Category	N	Observed Prop.	Test Prop.	Exact Sig. (1-tailed)
VAR0000 1	Group 1 <= 2.99	3	.2	.6	.004 ^a
	Group 2 > 2.99	11	.8		
	Total	14	1.0		
VAR0000 2	Group 1 <= 2.99	2	.1	.6	.001 ^a
	Group 2 > 2.99	12	.9		
	Total	14	1.0		
VAR0000 3	Group 1 <= 2.99	0	.0	.6	.000 ^a
	Group 2 > 2.99	14	1.0		
	Total	14	1.0		
VAR0000 4	Group 1 <= 2.99	0	.0	.6	.000 ^a
	Group 2 > 2.99	14	1.0		
	Total	14	1.0		
VAR0000 5	Group 1 <= 2.99	1	.1	.6	.000 ^a
	Group 2 > 2.99	13	.9		
	Total	14	1.0		
VAR0000 6	Group 1 <= 2.99	0	.0	.6	.000 ^a
	Group 2 > 2.99	14	1.0		
	Total	14	1.0		
VAR0000 7	Group 1 <= 2.99	2	.1	.6	.001 ^a
	Group 2 > 2.99	12	.9		
	Total	14	1.0		
VAR0000 8	Group 1 <= 2.99	1	.1	.6	.000 ^a
	Group 2 > 2.99	13	.9		
	Total	14	1.0		
VAR0000 9	Group 1 <= 2.99	0	.0	.6	.000 ^a
	Group 2 > 2.99	14	1.0		
	Total	14	1.0		

a. Alternative hypothesis states that the proportion of cases in the first group < .6.

Based on binomial test, the fourth challenge is the most important. The low tendency of large companies to accept the risk of finance for product development in knowledge based firms is the most important challenge. Most of the large companies in Iran are risk averse and they can't trust to small knowledge-based firms. The 6 and 7 challenges are in the second and third of the most important challenges. The challenges 6 and 7 shows the importance of making relation ways between small knowledge-based firms and large companies. The incomplete data from small knowledge-based firms has the other important challenge. The challenges number 8,9,2,1 are other important challenges. The challenges 8 & 9 are related to the financial resources of small knowledge based firms. And challenges 2 and 1 are related to identification and clarification of technological needs in large companies. The challenge 5 is the last important challenge. Table 3 shows the important explanation of each challenges and their priorities.

Table 3: main challenges and their priorities

Main challenges	Important explanation	Priorty
First challenge: the large companies have not identified their technological needs.	The large companies don't have an observatory structure for monitoring their technological needs. So they are passive about their needs.	8
Second challenge: the technological needs of large companies have not been clarified by scientific and applicable methods.	The clarification of technological needs are necessary for starting a negotiation. The technology RFP's or SPEC's are the main tools for technological needs clarification. Most of large companies don't have these RFP's. Also most of Iranian large companies don't have the adequate knowledge to provide these RFP's of SPEC's.	7
Third challenge: the recognition of large companies from small knowledge-based firms are incomplete.	Most of large companies don't have enough information about small knowledge-based firms. So they can't find capable small firms to solve their technological problems.	4
Fourth challenge: the large companies don't accept the risk of financing the product of small knowledge-based firms.	This challenge especially is important in Iran. The large companies in Iran prefer to pay their funds in low risk situations.	1
Fifth challenge: the large companies don't want to tolerate the risk of extensive buys from small knowledge-based firms.	The large companies don't trust to small firms for solving their problems. Also there is cultural problems in large companies to work with small ones.	9
Sixth challenge: the small knowledge-based firms can't make linkages with large companies to start	The small firms can't find the ways to have serious negotiations with large companies to solve their technological problems.	2

negotiation and stable collaboration with them.		
Seventh challenge: the small knowledge-based firms don't know the real technological needs of large companies.	The small knowledge-based firms can't have close relations with large companies. So they can't know the real technological needs of large companies.	3
Eighth challenge: the small knowledge-based firms don't have enough money and credit to provide their financial needs by themselves or banks.	The small knowledge-based firms don't have enough financial resources for their projects and also they don't have enough credit in banks. So they are not capable to finance their project with large companies.	5
Ninth challenge: the risks of small knowledge-based firms for selling their products are high.	The small knowledge-based firms are cautious for NPD because their risks for selling their products are high.	6

Conclusion

There are different challenges for collaboration between small knowledge-based firms and large companies. Some of them are inter organization and others are related to the outside of companies. The findings of the research have been concentrated on the identification and prioritization of the collaboration challenges among small knowledge-based firms and large companies. The 9 challenges were identified (by literature reviews, the real evidences and beliefs of the experts) and prioritized by Binomial test methods. The lack of risk acceptance for financing the product development of small knowledge-based firms from large companies and the low capability of small knowledge-based firms in making linkages with large companies are the most important challenges in increasing the collaboration.

This research focused on the challenges in Iran and surely different contexts have different challenges. So investigation the challenges in other developing countries can make a comprehensive view from the collaboration challenges among small knowledge-based firms and large companies for technology development in developing countries.

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