

INTERNATIONAL KNOWLEDGE TRANSFER
IN EUROPEAN RESEARCH AND DEVELOPMENT
PROGRAMMES: TURKISH CASE

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ABSTRACT

INTERNATIONAL KNOWLEDGE TRANSFER IN EUROPEAN RESEARCH AND DEVELOPMENT PROGRAMMES: TURKISH CASE

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International programmes, namely Framework Programmes 6, 7, and European Research Cooperation Agency (EUREKA), aim supporting national Small and Medium Scale Enterprises (SMEs) to subcontract their research needs to Research and Technological Development (RTD) performers. Main objective of this thesis is to measure level of success of knowledge transfer from RTD performers towards Turkish SMEs within the FP6, FP7 and EUREKA. The thesis proposes a model for knowledge transfer consisting of four stages: initiation, implementation, elaboration, and internalization. Extensive data is collected from sixty projects involved in these programmes via structured survey. The data is analyzed within the context of the proposed model via using the variables selected from the literature. Main findings show that the initiation stage is at a satisfactory level. The national SMEs continue learning from the international partners while they practice the knowledge they acquire, therefore, necessary support should be given to national SMEs to communicate as much as possible in order to receive as much knowledge as possible from their international partners, during implementation process. Level of absorptive capacity is indispensable for elaboration. Therefore, much effort is required to strengthen absorptive capacity of national SMEs. Internalization is the weakest stage. If internalization is not successfully achieved, it is hardly possible to sustain and systematize the knowledge. All stages are mutually exclusive. If the initiation is not based on real needs and expertise of the SMEs, implementation will fail. It will be difficult to elaborate on the knowledge; therefore, improvement of the knowledge will not be at expected level. Since the improvement will not be sustained, internalization of the knowledge will be less, which will undermine successful transfer.

Keywords: Knowledge transfer, research and technological development (RTD) performers, SMEs, FP, EUREKA

ÖZ

AVRUPA ARAŞTIRMA GELİŞTİRME PROGRAMLARINDA ULUSLARARASI BİLGİ TRANSFERİ: TÜRKİYE ÖRNEĞİ

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Çerçeve Programları ve Avrupa Araştırma ve İşbirliği Ajansı (EUREKA) uluslararası programları ulusal küçük ve orta ölçekli firmaların (KOBİ) araştırma ihtiyaçlarını Araştırma ve Teknolojik Gelişim (ATG) uygulayıcılarından sağlayabilmeleri amacıyla yönelik olarak desteklemektedir. Bu tez, ÇP6, ÇP7 ve EUREKA çerçevesinde ATG uygulayıcılarından ulusal KOBİ'lere yönelik gelişen bilgi transferini ölçmeyi hedeflemektedir. Tez bu ölçümü gerçekleştirmek için, inisiyatif gösterme, uygulama, geliştirme ve içselleştirme aşamalarından oluşan bir model önermektedir. Bu amaçla, bu programlarda yer alan altmış projeden veri toplanmış olup, elde edilen veriler literatürde yer alan değişkenler kullanılarak önerilen model çerçevesinde değerlendirilmiştir. Temel bulgular inisiyatif alma aşamasının yeterli bir düzeyde olduğunu göstermektedir. Ulusal KOBİ'ler, edindikleri bilgileri uygulama aşamalarında, uluslararası ortaklarından öğrenmeye devam etmektedir. Bu nedenle, uygulama aşamasında, KOBİ'lerin bilgi aktarımlarını en üst düzeye çıkarabilmeleri için, KOBİ'ler ortakları ile görüşme imkanlarının artırılması hususunda desteklenmeye devam edilmelidir. Edinilen bilgilerin özümseme kapasitesi geliştirme aşaması için vazgeçilmez bir etkidir. Bu nedenle, ulusal KOBİ'lerin özümseme kapasitelerinin artırılması için gerekli desteğin verilmesi gereklidir. Bulgular içselleştirmenin en zayıf aşama olduğunu göstermektedir. İçselleştirme etkin bir şekilde gerçekleşmez ise, bilginin sürdürülebilirliğinin sağlanması ve sistematik hale getirilmesi mümkün olmayacaktır. Tüm aşamalar birbiri ile bağlantılıdır. İnisiyatif alma aşaması KOBİ'lerin gerçek ihtiyaç ve uzmanlık alanlarına göre yapılmaz ise, uygulamada başarı oranı düşecektir. Buna bağlı olarak, edinilen bilginin geliştirilmesi mümkün olmayacağı için, bilgi istenen düzeyde gerçekleşmeyecektir. Gelişim sağlanamadığı için ise, bilginin içselleştirilmesi çok sınırlı olacaktır. Dolayısı ile, bilgi transferi başarılı düzeyde gerçekleştirilemeyecektir.

Anahtar Kelimeler: Bilgi transferi, araştırma ve teknolojik gelişim (ATG) uygulayıcıları, KOBİ'ler, ÇP, EUREKA

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CHAPTER 1

INTRODUCTION

Renewed Lisbon Strategy states that knowledge has been recognized as one of the priority areas. As industrial competence is being widespread internationally, firms find themselves in building cross-border cooperation. The requirements of the current business atmosphere, challenging progresses in information and communication technologies and expansion of global networks urged firms cooperate while competing at the same time (Loebecke et al., 1998). Bresman et al. (1999) supports this view via addressing the transition from capital to knowledge currently.

Finding an exact definition for knowledge transfer is not an easy task. There are various definitions in literature; however, all definitions unite in the approach that it is exchange of ideas, experiences, know-how, good practices of governments and products of markets amongst countries, academia and societies, to lead developments aiming to create new products and services. Successful knowledge transfer is crucial for turning scientific research into innovations that improve the quality of life and enhance industrial competitiveness. As a result, this new challenging atmosphere forced firms to adopt themselves to develop mechanisms to internalize new knowledge sooner and better due to the fact that they have to compete with rapidly changing market requirements. Cohen and Levinthal (1990) addressed effective transfer of knowledge as the key factor for a firm to be able to innovate. Transfer of knowledge increases competitive advantage of firms and helps firms to sustain their power in the market. Product development processes, strategic decision making and absorption capacity of a company play crucial role in adapting new knowledge gained through cooperative research.

Industries that value generation of knowledge and innovation in order to expand and qualify their economic facilities acquire creative characteristics. Industries with high capacity to absorb new knowledge are considered as the ones which play important role in the shape of the economy and that "the industries of the twenty-first century will depend increasingly on the generation of knowledge through creativity and innovation," (Landry and Bianchini 1995: 4). Creative industries as production-related organizations have the capability of developing an innovative idea but lack the research capability to realize their ideas. On the other hand, Research and Technological Development (RTD) performers: universities, research institutes/centers, big industrial companies or research performing Micro, Small and

Medium-Sized Enterprises (SMEs)¹, have the ability to generate new knowledge and apply that knowledge in their new initiatives. SMEs, by nature, have the necessary capacity to generate new ideas however; their skills on research techniques are limited. Therefore, cooperative research is the most useful means for the SMEs at the first instance. Therefore, the ideal aim is to bring together strengths of both parties in a cooperative research scheme. Cooperative researches are built upon needs of SMEs. There is no limitation in the research topics; they purely depend on the needs of SMEs. This kind of research facilitates knowledge transfer from RTD performers to SMEs. The main idea behind this type of research is the externalization of industry research and improving knowledge transfer to SMEs.

Research cooperation between national SMEs and international RTD performers is being developing as well. Some efforts are being spent to increase this cooperation within the context of the Sixth Framework Programme (FP6)², the Seventh Framework Programme (FP7)³ and EUREKA⁴. These programmes target SMEs which have technological capacity from low to medium levels and limited research skills. In addition, high-tech SMEs those tend to outsource researches are also included in the target group of these programmes. Efforts for evaluating the knowledge transfer were limited to evaluation of knowledge transfer in public-funded researches only based on some limited variables such as research agreements, patent applications, patent grants, licenses executed... It is widely accepted that measurement of knowledge transfer is very difficult by its nature. Moreover, the efforts were limited to measurement based on economic aspects of knowledge transfer because it is much more possible to base measurement of some quantitative variables such as given above. Measurement of the transfer based on social and cultural aspects and human resources capacity is not found feasible. Evaluation of the 'value' of the knowledge transferred in different forms between Turkish SMEs and international RTD performers have not been carried out yet. Therefore, this thesis will focus on examining both the economic and value of the knowledge transfers from RTD performers towards Turkish SMEs in cooperative research projects under the FP6, FP7 and EUREKA.

¹ "The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro", Extract of Article 2 of the Annex of Recommendation 2003/361/EC.

² Named as 6th Framework Programme for Research and Technological Development and lasted five years from 2002 to 2006, FP6 was established by the European Union in order to fund and encourage European research and technological development and contributed to the creation of the European Research Area by strengthening cooperation and co-ordination for research in Europe.

³ Named as 7th Framework Programme for Research and Technological Development and planned for seven years from 2007 till 2013, FP7 promotes researchers in and beyond Europe, to fund research, technological development and demonstration projects.

⁴ EUREKA is a pan-European programme which aimed to contribute to the development of market-based research facilities. EUREKA brings businesses of all sizes, research centers and universities together to create new products and services. EUREKA promotes both public and private investments in R&D with its well-established research and business networks.

Objectives of this thesis are to assess effectiveness and impact of knowledge transfer from RTD performers to industry, understand the extent and scope of transfer of knowledge, content and usefulness of knowledge transferred, determine which international programme is more beneficial for companies, find out whether the role of institutional management is sufficient, analyze the contribution of being a part of national Research and Development (R&D) projects and being a part of an international R&D projects to knowledge transfer, find out if absorption capacity and being in a right network is important in knowledge transfer process, find out what kind of capabilities that a firm should have for an effective knowledge transfer and finally provide public policies for an effective knowledge transfer from RTD performers to industry.

Transfer of knowledge in cooperative research is highly comprehensive area including many different inner dynamics, which would be analyzed in detail in order to come up with realistic analysis. Prior to evaluation of process, it is significantly important to review the literature on this area. Therefore, in Chapter 2, this thesis provides comprehensive review of the relevant national and international resources in order to make a theoretical and empirical background on knowledge transfer mechanisms. The review initially aims to identify the concept of knowledge in comparison to information and data and its linkage to knowledge transfer. Literature review covers comprehensively the knowledge transfer processes as well. In order to understand the knowledge transfer process explicitly, it is important to consider several variables that affect this process. Additionally, variables that several researchers depicted will be studied and the similar ones in terms of its context will be examined under one topic as variables that will form the basis of this thesis research methodology. In addition, empirical studies will be reviewed in detail under the concept of knowledge transfer. The literature provides detailed resources on variables that affect knowledge transfer; therefore, this thesis derives relevant variables and reflects to this research.

Based on the models in the literature, the thesis proposes a unique theoretical and conceptual model of knowledge transfer, which is developed via harmonization of the existing models. As mentioned above, the evaluation will be conducted within the light of the proposed model by using various relevant variables derived from the literature. These variables will help to collect realistic and required knowledge for the thesis on what forms of knowledge can be carried and transferred; through which channels or mechanisms knowledge transfer can take place; how transferred knowledge is turned into benefits, and by whom; what strategies are appropriate for different channels and how funding programmes can organize the knowledge transfer activities... In Chapter 3, the author gives brief information on SMEs and knowledge transfer in FP6, FP7 and EUREKA. Chapter 4 is earmarked for evaluation of knowledge transfer in FP6, FP7 and EUREKA. Research design is given in detail in this chapter. Methodology for the data collection for the thesis is

conducting a survey. Data is collected from some selected SMEs that are partners in FP6 and FP7 and EUREKA research projects. Data will be analyzed within the framework of the proposed model, and used variables and the outcome will be reported in this Chapter. The research will analyze whether the institutional management of international programmes contribute to motivation of SMEs or not, and if so, its impact on the transfer success; whether openness of firms, trust and communication frequency between national and international partners, being in a right network, geographic proximity of international partners, duration of projects, absorptive capacity, embeddedness, articulability and teachability of the knowledge have impact on success of knowledge transfer or not. Finally, in Chapter 5, based on the outcomes of data analysis, the author makes some recommendations for strengthening cooperative research partnerships between Turkish SMEs and international RTD performers. Hypothesis of the research are as follows:

CHAPTER 2

THEORETICAL and EMPIRICAL BACKGROUND on KNOWLEDGE TRANSFER MECHANISMS

2.1 KNOWLEDGE

If, someone asks himself how much he really knows, he cannot answer that question until he knows what counts as knowledge. There are so many varieties of knowledge and each of them has so many aspects that it is easy to neglect some of the phenomena and to produce a theory that only covers part of the field in this thesis. In order to answer some of the questions that come into one's mind, it should be necessary to classify knowledge during the study. How should they be classified? What are the important differences? Are there linkages between different aspects of knowledge?

Knowledge cannot be clearly categorized into certain categories, but the term knowledge that is used in the literature must be investigated and analyzed taking into consideration various components. As pointed out by Mokyr (2002), "The growth of human knowledge is one of the deepest and most elusive elements in history", the concept of knowledge has deep historical roots. Knowledge is a generic but historically shaped notion; it grows and evolves with time. In this respect, Lundvall and Johnson (1994) used taxonomy that fall into four categories: know-what, know-why, know-how and know-who. Kogut and Zander (1992) defined know-how as the internalized and sustained skills and experience enabling practitioner do something properly and efficiently and know-what refers to mostly codified forms of knowledge. Lundvall and Johnson (1994) defined know-why as empirical knowledge of principles and laws of motion in nature, in the human mind and in society and know-who as specific and selective social relations.

Two different perspectives can be adapted in the study of knowledge: it can be viewed as an object or a process (Sveiby, 1997; Zack, 1999b). These two different notions of knowledge can have different objectives and refer to different scientific backgrounds. In the first perspective, knowledge is considered as an entity that can be directly observed, stored and reused and transferred. This static notion of knowledge is probably at the origin of the studies aimed to define knowledge categories and taxonomies, which investigate the knowledge nature. In the second perspective, knowledge is defined as a dynamic entity which appears in a flow of interactions amongst the people taking part in a process of knowledge transfer.

On the other side, when speaking about an organizational structure, knowledge in a broad sense includes production technology, management expertise, marketing skills and other intangible assets. Additionally, it includes knowledge of goods and services' production and distribution methods. Davenport and Prusak (1998) defines knowledge as a dynamic mixture of experience, values, information and skills to harmonize new experience and information. Knowledge is always personal related, resides inside peoples' minds. Knowledge is continuous and it is perceived as a process of knowing that is continually emerging, indeterminate and closely linked with practice (Detlor, 2001). Knowing means not only to understand or believe, but also to use or apply that knowledge. In an organizational context, knowledge conversion processes depend on human-to-human or human-to-technology interactions. Knowledge use emphasizes personal interpretation and understanding. Moreover, it is context specific for expressing beliefs and commitments. Knowledge exists in a variety of forms such as tacit and codified. The knowledge appears in various locations such as individuals, culture, and work routines.

Leonard-Barton (1995) stressed that "Knowledge is increasingly being recognized as a vital organizational resource that gives market leverage and competitive advantage. In particular, knowledge has become a substance to be managed." Generally speaking, common understanding in the definitions of knowledge is that knowledge can be in two forms: codified and tacit.

Codified knowledge is objective and mostly systematic. It can be formulated in numbers, words, scientific symbols or any other tools that the knowledge is made in shapes that humans can tell. Therefore, it can be easily transferred in different forms such as software programmes and scientific processes (Nonaka and Takeuchi, 1995). Due to this fact, since knowledge appears as an object, it is mostly used for defining facts, technical information or specifications of a means (Koskinen, 2000).

Rather, **tacit knowledge** is subjective. It is embedded in every person's mind taking shape according to the unique perceptions of each person. Therefore, tacit knowledge has different meanings depending on the personal experiences. It cannot be expressed in numbers or sentences; it consists of subjective understandings (Koskinen, 2000). Tacit knowledge cannot be generalized or formulated, thus it is hard to transfer to another recipient in the exact form as it is in the resource. Tacit knowledge gains its meaning with the values, contextual expertise of subjects, therefore it is dependent on the context it is perceived. It is mostly found in particular contexts such as technology, industry, financial activities. Tacit knowledge includes know-how, crafts, insights and intuitions gained through experience and participation in a contextual exercise for a particular period of time. Tacit knowledge also has important cognitive dimensions, such as mental structures, beliefs, feelings and intuitions. Hence, this type of knowledge is created by using past experience in new contexts.

Knowledge tacitness refers to that aspect of knowledge that cannot be easily and readily communicated and/or shared (Polanyi, 1967; Nonaka, 1994). Tacit knowledge is rooted in an individual's action in a particular context and; therefore, cannot be easily codified. "While the explicit knowledge is easy to communicate and express as it resides in symbols, technical documentation, etc., the tacit aspect can only be described as personal non-verbal forms of knowledge embedded in routine and culture" (Polanyi, 1966).

There is a close relationship between data, information and knowledge which is commonly recognized in the literature. Data is mostly at the bottom of the transformation towards information and knowledge. These three terms are often used interchangeably. Although there is some confusion in the use of data, information and knowledge, most authors agree that knowledge is the last resort of the transformation where one confines the data and produces information via using the data in specific contexts. Therefore, it is significant to clarify the conceptual confusion about data, information and knowledge, which is required for better conceptualization of knowledge transfer.

Data are key requirements for knowledge and information. They are context free and can always be shared because the receiver cannot or does not interpret them and are defined as plenty of facts in forms of numbers, words, symbols or any other means of technical specifications. It is not necessarily meaningful; however, it provides inputs to information (Roberts, 2000). Hirschheim et al. (1995) defines data as "in-variances with potential meaning to someone who can interpret them. Communication via technically, biologically or socially are based on in-variances encoded in some medium and transmitted in many forms such as waves, electrical currents, etc. The encoded in-variances are received through our senses -vision, hearing, smell, touch, taste- from the environment". It is important to note that what is expressed as data may be represented as a word, sentence, number, sign, symbol or some other form of representation.

Generally speaking, **information** is defined as data which is constructed in a pattern with a purpose to illustrate particular contexts. It is derived from the data which is formulated in a meaningful pattern. Data can be obtained from various sources such as raw results of surveys; on the other hand information is obtained from the analysis of the data (Roberts, 2000). Information always encompasses an act of transfer or sharing among people and involves interpreting representations of our own or others knowledge and is context specific for use and application. Hirschheim et al. (1995) contends that "The in-variance acquires meaning through social conventions of individuals and communities. The in-variances received are transformed through a process of meaning attribution or interpretation into information, which then triggers a behavior". In parallel to Robert's (2000) view, Davenport and Prusak (1998) stated that information is an output of the process of using the data in a particular context demonstrating by means of scientific specifications. Utilization of data in a

particular context is mostly subjective. It depends on the peculiar characteristics of understandings of individuals. Therefore, information does not necessarily have the same meaning to everyone. It depends on the perception of the individuals dealing with that piece of data. However, this characteristic of the information should not be confused with definition of knowledge.

2.2 KNOWLEDGE TRANSFER

Current society is rapidly turning into knowledge society (Nonaka, 1994). Changing environment urges all actors in this society compete with others in order to keep up with the changing requirements. Therefore, each organization has to figure its competitive advantages immediately. In this regard, transfer of knowledge becomes a key for each organization to capture its competitive advantage (Pan and Scarborough, 1999). Knowledge is produced through a process of data and information, however generation of that knowledge itself is not sufficient for an organization to figure and invest in its comparative advantage. The organization should develop awareness on the use of that knowledge and should value transferring that piece of knowledge into its body. That is why; transfer of knowledge should be the focus of the constituents of this newly emerging environment.

Various researches have been directed towards the transfer of strategic knowledge among alliances and partners, the transfer of best practices among companies and technology transfer. Therefore, in the following discussion, the theoretical background of knowledge transfer process will be examined by providing new theoretical and conceptual models for successful knowledge transfer.

2.3 KNOWLEDGE TRANSFER PROCESS

As mentioned above, organizations should value and develop their skills for transfer of knowledge in order to successfully figure their competitive advantage and strengthen their sustainability in the newly emerging competitive environment. Cohen and Levinthal (1990) underlined that ability to transfer knowledge is the basic need of organizations in order to adapt changes and keep up with the new challenges of this new environment. Transfer of knowledge is the process of receipt of a particular knowledge from its source to the recipient. Source of knowledge can be in different forms, such as individuals, firms, organizations or other actors. The organizations should be conscious on the particular knowledge that they need for achieving competitiveness, and should aim the transfer that knowledge from the source to their body successfully (Cutler, 1989).

Further distinctions between types of knowledge can fruitfully be made, but more important for the purpose of this thesis is to define the model by introducing stages in the knowledge transfer process. As the process of knowledge transfer is not static but dynamic, knowledge

transfer in international R&D cooperation can be seen as compilation of various stages starting from generation of raw data, production of information, and transfer of knowledge successfully by the firms within the context of particular thematic areas. There is limited number of models defining the stages of the process of knowledge transfer in the literature. One of the well known models which show detailed stages of entire knowledge transfer process is developed by Gilbert and Cordey-Hayes (1996), where they mainly aimed to provide necessary tools to organizations to manage the knowledge transfer within the organization. Hansen (1999) proposed a model which consists of two stages: search and transfer. Szulanski (1996, 2000) developed another model which has four stages: Initiation, implementation, ramp-up and integration. Common understanding among these researches is that success of transfer of the knowledge mainly depends on how easily and successfully the knowledge is generated, transferred and interpreted and internalized by the organization (Hamel, Doz and Prahalad 1989). Nelson and Winter's (1982) concern is storage and develop models of imitation and emphasizing the differential abilities of markets and firms as social mechanisms.

Some researches focused on the forms of organizations. They analyzed what types of administrative structures of organizations contribute to success of transfer of knowledge. Birkinshaw and Morrison (1995) found that "Firms with organizational structures that supported combining activities and sharing resources across subsidiary boundaries are more innovative". On the other hand, Meyer and Rowan's (1977) were rather concerned on the transfer success based on the status of the recipient. They analyzed degree of knowledge transfer taking the ownership of the recipient, level of its commitment to the knowledge, and its satisfaction as main indicators of success of knowledge transfer. They used the term internalization to define the final and key stage of the knowledge transfer success. They mentioned that internalization as the last stage which is dynamic by essence where the firms use their capacity to evaluate the knowledge, integrate it into their own practices, utilize it in a proper manner and develop a routine for sustainable exploitation of that knowledge in their own business. Therefore, the levels of abilities of firms are very much critical for a successful internalization of the knowledge. In this thesis I originally propose a new theoretical model of successful knowledge transfer process. Four stages could be identified from and included in the transfer model: initiation, implementation, elaboration, and internalization (figure 1).

In the following, the theoretical foundations, description of each stage and requirements for completion of each stage will be discussed.

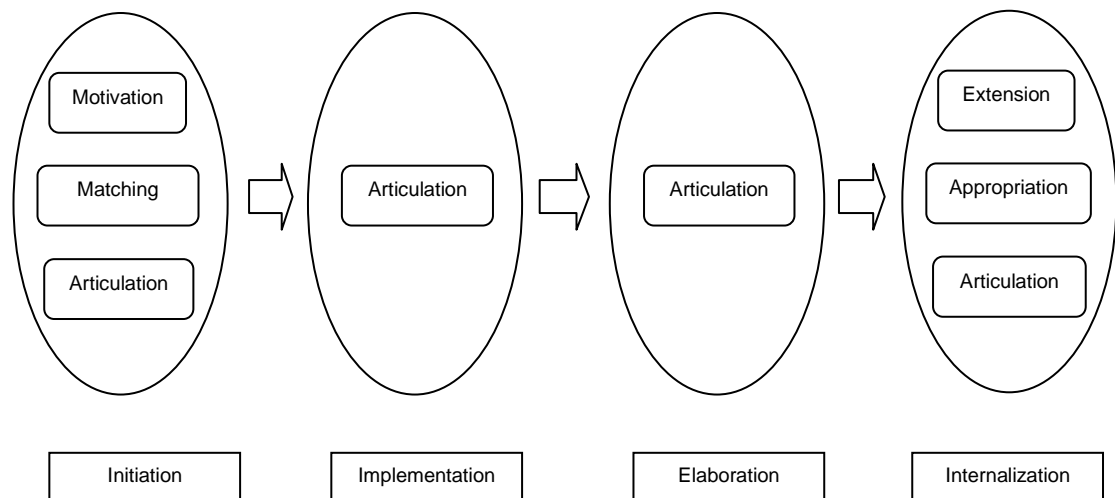


Figure 1 - Theoretical Model for Knowledge Transfer Process

2.3.1 Initiation

This stage is the initial stage of the entire knowledge transfer. It is the stage decision is taken to transfer particular piece of knowledge. In order to initiate a transfer, there is a need to identify the need for a transfer. The particular piece of knowledge should be identified which will respond to that need of the organization. The success of the following processes of knowledge transfer is highly depended on concise analysis of the realistic need and identification of the knowledge which will best fit into the need (Balm, 1992). Teece (1976) found that process of identification of the need and the best fit need knowledge often requires long terms of search and collection and evaluation of data. The decision to initiate the transfer process of the identified knowledge is the final action of this stage; which is also highly interrelated with the following stage of motivation.

2.3.1.1 Motivation

This stage begins with the identification of gap between the defined need and the identified knowledge that is required to respond to the need of the organization (Kwan and Cheung, 2006). It is important that the organizations are aware about their existing level of knowledge. This requires analysis of already existing knowledge in the organization. This will help to make the best decision for identifying the right knowledge to be transferred. It is also important to take into consideration the founders of the firms. They influence the firm by all means. Founders of organizations may have very useful information on the prior knowledge of the organization which could be useful during identification of the gap between the required and existing knowledge.

Knowledge is stored in individuals or organizations (Kwan and Cheung, 2006). Therefore, tendency of individuals or organizations to share the knowledge is very much crucial for

initiation of transfer process. This tendency has deep roots in desire to benefit the organization or community (Bock and Kim, 2002; Constant et al., 1994, Fraser et al., 2000; Jarvenpaa and Staples, 2000, 2001; Wasko and Faraj, 2000), and/or getting useful information and expected mutual sharing (Constant et al., 1994; Fraser et al., 2000; Wasko and Faraj, 2000). Sharing is a positive attitude of one which is required for societal development and future success of transfer process. In literature, organizational ownership is gained after certain duration of work experience and some learning exercises such as professional trainings, involvement in common objectives of organization and having a role to play in achievement of those joint objectives. Superior level of ownership of the organization motivates sharing of embedded knowledge (Constant et al., 1994).

Organizations can strengthen the positive attitude of sharing of knowledge from one employee to other one by some means. Organizations can link sharing culture with the core values and vision. Networking systems in the organizations which will force cooperative work can be main tool to strengthen the sharing culture which will result in the fact that one's success is depended on others' knowledge (McDermott and O'Dell, 2001). Award system should be formulated in a way that it will promote sharing attitude of the employees (McDermott and O'Dell, 2001; Swart and Kinnie, 2003; Szulanski, 1996, 2000). Both knowledge source and the recipient can initiate the sharing of the knowledge depending on their level of motivation and ability to identify and evaluate needs. This tendency is completed in a set of actions that are processed in matching stage.

2.3.1.2 Matching

The Matching stage is the compilation of actions where best fit partners are explored, identified, communicated and matched. Partners can be both the source of knowledge and the recipient, depending on their intention to partner with one another. Making the best match is dependent on many different factors. Initially, it is dependent on the characteristics of the needed knowledge identified by the recipient and the knowledge standing abstract from the recipient. In addition, characteristics of the context, level of motivation to sharing knowledge, attitudes of the potential partners, similarities and differences, comparative advantages of both sides (Tsai, 2002; Darr and Kurtzberg, 2000), experiences and perceptions of the source and the recipient may have significant impact on the process of matching (Szulanski, 1996). However, successful matching does not necessarily guarantee successful transfer of knowledge. The following stages are also as much important as the best fit matching. Commitment to sharing of knowledge should continue until the final stage of the knowledge transfer. This will allow fertile process of transfer. The initiation stage is finalized only when all necessary sources and recipients confirm partnership with high motivation and commitment to knowledge sharing. They proceed to the next stage which is Implementation.

2.3.1.3 Articulation

Articulation is total of actions which turns tacit knowledge into explicit knowledge. This can take place at all four stages in the theoretical model: Initiation, Implementation, Elaboration and Internalization (figure 1). Hedlund (1994) stated that “Articulation is essential in facilitating transfer of information, but also for its expansion and improvement, since it allows open scrutiny and critical testing”. Articulation is crucial in the growth of the organization. Without such articulation, it is difficult to involve new employees and to divide up and specialize work. In the literature, organizations constitute plenty of practices which are codified in scientific specifications which generate their competitive advantage via articulation of those practices. Each and every progressive action of organizations involves articulation of contextual skills which can be codified and transferred to the employees. Therefore, industrial development is a result of infinitely many articulation of the knowledge. The empirical results of Zander (1991) showed that codifiability does not necessarily lead to quicker competitor imitation. Thus, organizations should not restrict themselves for attempting to codify the tacit knowledge within them.

2.3.2 Implementation

The implementation stage begins after the decision is given to initiate the transfer with proper amount of motivation and a suitable matching. In an ideally successful implementation stage, continuously flow of knowledge between the source and the recipient is expected. Both parties should maintain their motivation to share the knowledge and necessary mechanisms for successful flow should be active. Continuous flow of knowledge establishes social relation between the source and recipient. This develops new inner dynamics which can strengthen the success of implementation process. The other way around is possible as well. In case one of the parties or both weaken their motivation or undermine their sharing attitude, the implementation stage can be weakened. It is a dynamic process. Each party experiences learning and sharing, gains new knowledge and raises competitive advantages, which returns to the process as increase in motivation increasing the quality of the process. Parties should take note of experienced problems and should develop actions in order to prevent to experience the same problems again during implementation (Buttolph, 1992; Rice and Rogers, 1980). Therefore, this is a dynamic stage and new inner dynamics can occur within the process and draw its new path. All this process is guaranteed with establishment of good communication methodologies which will lessen the anxiety of the introduction of new knowledge. Implementation stage ends when the recipient begins using the transferred knowledge in its own business properly. On the other hand, the implementation stage is still active until the performance of usage of the transferred knowledge reaches a satisfactory level.

2.3.3 Elaboration

The elaboration stage begins when the recipient continuous utilization of the transferred knowledge after the first use of it. Elaboration requires the transferred knowledge to be preserved in the actions of the recipient. It should not be confused that elaboration is not the utilization of the knowledge itself more than once but the consequences of applying in the business of the organization. The organization begins to learn from the consequences of application of the knowledge which starts elaboration. This stage is also dynamic where an intensive learning process is experienced. The organization should be cautious in order to identify any problem occurring during application of the knowledge. Methodologies for solving problems are critical part of the stage where it reinforces learning from the consequences. Organizations develop skills to respond quicker to the problems and strengthen their abilities to solve problems. In the literature, it is stated that the recipient mostly uses the new knowledge ineffectively in the first instance (Adler, 1990; Galbraith, 1990), but gradually improves performance, ramping up toward a satisfactory level. In order to achieve this, there is a need for ability to absorb the knowledge obtained from the source, apply and reuse it in a progressive manner, which is the absorptive capacity (Cohen and Levinthal, 1990).

2.3.4 Internalization

Internalization is the final stage of the knowledge transfer where the organizations begin achieving the results of applying the new transferred knowledge into the routines of the organization. The key action of this stage is assimilation of the results of applying the transferred knowledge. In this process, articulation of knowledge makes that knowledge tacit. The tacit knowledge is the one which enters into routines of the organization. Routinization of the transferred knowledge happens gradually (Berger and Luckman, 1966). The transferred knowledge is used in business of the organization many times in gradually progressing manner. Thus, a history of progress of the performance of application of a particular knowledge in an organization emerges. The best practice of this history is institutionalized and becomes routinized.

The internalization stage requires continuous motivation of exploring solutions and more effective methodologies to use the transferred knowledge until it reaches its best practice which can be institutionalized. Therefore, there is a need for awareness on the benefit of re-applying the knowledge in the business in its best performance. Knowledge is a familiar input at this stage because it is routinized after many times re-application. However, the employee should continue allocating extra effort to work with the institutionalized knowledge in a sustainable manner (Mowday et al., 1979) and develop competence in using the knowledge (Leonard-Barton, 1995). The level of satisfaction with the knowledge during this stage is

critical due to the fact that the employee will keep this motivation for continuous extra effort during the stage (Leonard-Barton and Deschamps, 1988). Only when the employee internalizes the knowledge, the knowledge can be totally understood, and adapted in the business of organization as an important part of it.

2.3.4.1 Extension

Extension is the transfer of the knowledge to all levels of the organization. The transfer is done from lower levels to higher levels. The form of the knowledge can be articulated or tacit form (Hedlund, 1994). Transfer can be in different ways depending on the structure of the organization. For instance, the knowledge can be shared with other units and lower levels in written format where the knowledge is used as an input for the future plans, strategies, or planned activities. The tacit knowledge is mostly transferred from higher to lower levels. The management level can develop different ways to teach the tacit knowledge to the employees, such as trainings, demonstration or working together in specific projects.

2.3.4.2 Appropriation

Appropriation is integration of the transferred knowledge in the business culture of the organization (Hedlund, 1994). Organizations aim to teach the transferred knowledge to its employees demonstrating it in a tacit manner such as products. This process requires interaction between the organization and its employees. Good interaction which can be obtained through joint works, projects, meetings... will strengthen better appropriation of the knowledge and reinforce integration in the corporate culture.

2.4 VARIABLES that AFFECT KNOWLEDGE TRANSFER

Transfer of the knowledge is affected positively or negatively from various variables. There are many researches in the literature on this matter. Specially, Szulanski (2000) analyzed some different dynamics that can have impact on the success of the knowledge transfer. Szulanski was concerned about the characteristics of the source and the recipient of the knowledge, the context that the transfer takes place, and the characteristics of the knowledge itself. The results showed that impacts of these variables change at different stages of the transfer. For instance, while the characteristics of the knowledge such as its reliability, complexity determines the speed of the initiation process, recipient's abilities to communicate, absorb and motivation to reuse and elaborate the knowledge determines the success of implementation processes (Szulanski, 2000).

As mentioned above, communication between the source and the recipient is crucial for better transfer of the knowledge. Some studies in the literature showed that social networks have an impact on the level of transfer of knowledge. For instance, a study conducted by

McEvily and Zaheer (1999) showed that organizations which are open to and active in social networks increased their capacity to incorporate the new knowledge in their business, due to the fact that they had more opportunities to have access to further knowledge that they may need in contrast with other organizations which resisted interaction in social networks.

In the literature, similarities of tasks of organizations are considered another important factor that affects transfer of knowledge. The more the tasks involve similar characteristics even though they are in different contexts; it is more likely the transfer of knowledge to be more successful (Darr and Kurtzberg, 2000).

Characteristics of technology or tools are also crucial factors that may affect transfer of knowledge. They are important because, mostly, knowledge stands as embedded in technology or tools. Galbraith (1990) found that when the technology used in an organization is not so complex, the transfer of knowledge occurred quicker and more effectively. Proximity of the source and the recipient is also another important factor. The research found that making engineering teams of the source organization move to the recipient for a period of time or co-production with the source increased efficiency of the transfer. In reverse, moving the personnel of the recipient organization to the source helped recipient organization access to the tacit knowledge at the source which is not yet made explicit in documents, plans, strategies or products.

In the literature, much emphasis was given to the attributes of the knowledge to be transferred (Kogut and Zander, 1995); others were concerned about characteristics of the context where the transfer takes place. Collaborative experience amongst the partners, motivation of the source and recipient for transfer of knowledge, organizational capabilities, identification of partners, and trust were examined by Simonin (1997, 1999). Hu (1995) analyzed transferability of competitive advantage of a firm at international arena. Dodgson (1996) explored importance of trust and technological linkages between the recipient and the source. Table 1 summarizes the main characteristics of some selected studies in the literature.

Table 1 - Independent and Dependent Variables Used in Previous Research

Authors	Sample	Research Topics	Independent Variables	Dependent
Bresman et al., 1999	Forty-two cases of international acquisitions involving knowledge transfer	Examination of the patterns of knowledge transfer over time	Communication, frequency of meetings, knowledge tacitness, time elapsed, size of unit	Knowledge transfer
Cummings and Teng, 2003	1000 different cases randomly selected from database of an R&D Magazine	Transfer at inter- and intra-firm levels	Knowledge, relational, recipient, activity contexts (transfer mechanisms)	Knowledge Internalization
Simonin, 1999	151 multinational firms selected by cross-sectional sampling	Investigation of the antecedents of knowledge ambiguity which are independent variables	Tacitness and complexity of the knowledge, experience, partner protectiveness, cultural and organizational distance, specificity of knowledge	Knowledge ambiguity
Szulanski, 1996	271 observations of 122 best-practice transfers in 8 companies	Systematic empirical investigation of internal stickiness	Casual (knowledge) ambiguity, unproven knowledge, motivation, recipient's absorptive and retentive capacity, unreliable source, barren organizational context	Difficulty experienced during the transfer process
Kogut and Zander, 1995	Based on the innovations on 100 major Swedish innovations	Effects of the codifiability and communication of manufacturing capability	knowledge tacitness, complexity, systems dependence, product observability	Speed of transfer

Research conducted by Bresman et al. (1999), which focused on knowledge transfer in international context, showed that frequency of meetings conducted during the transfer process had impact on the speed of transfer. In addition, type of knowledge and tacitness of knowledge were found as factors that affect the time of the transfer of the knowledge. Similarly, Simonin (1999) explored the transfer of know-how. The study examined the role of knowledge ambiguity in the transfer of marketing know-how in international strategic partnerships. Same as Bresman et al. (1999), the results showed that tacitness has a significant impact on the knowledge transfer process. Szulanski (1996) focused on the barriers that undermine transfer of knowledge, and found that limited absorptive capacity of the recipient affects knowledge transfer negatively. In addition, the characteristics of the knowledge and interaction between the source and the recipient affect the transfer process. Kogut and Zander (1995) focused on speed of the knowledge transfer.

In sum, those studies identified importance of various variables for knowledge transfer. Therefore, those studies enlightened further studies on knowledge transfer which are used in this thesis as well. In this thesis, the author categorized all the variables described in literature under four components which are developed based on their common characteristics (Table 1). These components are:

- **Knowledge-specific variables** that can be transferred between actors,
- **Partner-specific variables** between recipient and source involved in the knowledge transfer process,
- **Project-specific variables** used to describe the environment where the interaction takes place,
- **Transfer-specific variables** by which the transfer is carried out.

In order to demonstrate strength of the relationships between these theoretical components, the author also originally developed a conceptual model which can be seen in Figure 2. According to the figure, the knowledge-specific variables include teachability, knowledge embeddedness and knowledge articulability. Knowledge transfer also depends on the characteristics and choices of both the source and the recipient. These partner-specific variables include: openness, trust, motivation, absorptive capacity and firm size. Theoretical studies and research on international cooperation directed this study to a new component named project-specific variable. These project-specific variables include: communication frequency, networking, duration and project collaboration. The last component, transfer-specific variables play a crucial role in the transfer process in which the level of transferred knowledge determined. These variables are media, language and geographic proximity.

In sum, altogether fifteen variables are compiled under the four components in Figure 2. All those variables will be presented in detail in the following section and they will be analyzed in this thesis within the context of the hypotheses of the study presented in Chapter 4.

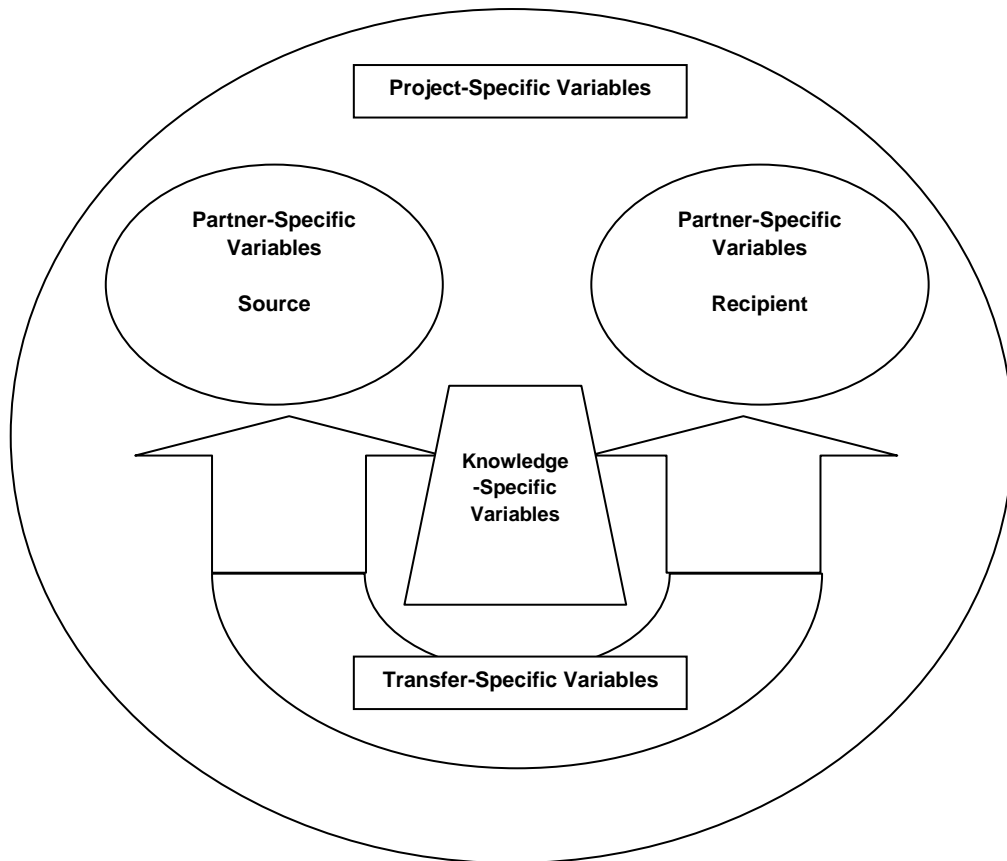


Figure 2 - Conceptual Model for Successful Knowledge Transfer Process

Table 2 - Variables under Four Categories

<i>Knowledge specific variables</i>	<i>Partner-specific variables</i>	<i>Project-specific variables</i>	<i>Transfer-specific variables</i>
<ul style="list-style-type: none"> ➤ Teachability ➤ Knowledge embeddedness ➤ Knowledge articulability 	<ul style="list-style-type: none"> ➤ Openness ➤ Trust ➤ Motivation ➤ Absorptive capacity ➤ Firm size 	<ul style="list-style-type: none"> ➤ Communication frequency ➤ Networking ➤ Duration ➤ Project collaboration 	<ul style="list-style-type: none"> ➤ Media ➤ Language ➤ Geographic proximity

2.4.1 Knowledge-Specific Variables

The first component of the conceptual model depicted in figure 2 as knowledge-specific variables are located in the fundamentals and characteristics of the knowledge to be transferred. The variables affect the success of the transfer process as the taxonomic dimensions of knowledge that impede its transfer (Kogut and Zander, 1993, 1995; Winter, 1987).

The main argument on this matter is that the success of the knowledge transfer necessitates that the source and the recipient should establish a common understanding on exactly where the knowledge is stored in the source and afterwards both parties are expected to activate the processes which will enable the targeted knowledge reachable (Dixon, 1994).

2.4.1.1 Teachability

Teachability is the measurement of the extent to which the employees can be trained on a particular skill and knowledge (Rogers, 1983; Winter, 1987). Kogut and Zander (1995) found that non-tacit knowledge increases the speed of the transfer. In addition, this variable covers the extent to which the tacit knowledge which cannot be formally articulated can be taught. Training can be in different ways. For instance, the engineers, technical experts can be send to the source of the knowledge to learn the know-how, or in reverse workers can work for a period of time in the recipient depending on the characteristics of the partnership.

2.4.1.2 Knowledge Embeddedness

Embeddedness is one of the main characteristics of knowledge, which is recognized in the literature. Knowledge can be embedded in different sources such as individuals, technology, software, businesses of organizations, etc. (Argote and Ingram (2000). When the knowledge is embedded in the source, the number and characteristics of the elements of the knowledge desired becomes the main concern for the knowledge transfer. The number of recipients and relations between the recipients and the source affect the transfer process of an embedded knowledge.

According to Polanyi (1967), the knowledge which is embedded in various sources specifically individual's minds, practices, or organizational businesses have tacit characteristics. Due to this fact, it may not always be easy to codify this tacit knowledge, which undermines its transfer to other recipients. Difficulty in transferring tacit knowledge makes it difficult to measure transfer of the tacit knowledge. Measurement of the knowledge transfer can be done by measuring changes occurred in the knowledge or in the changes occurred in the recipient. However, since the tacit knowledge cannot be manifested in written documents, it becomes difficult to measure the transfer due to the fact that measurements are mainly done by written documents.

Knowledge can be embedded in different structures in sources. For instance, it can be differently embedded in crafts skills of employees, corporate culture, institutional practices, technological tools, software or hardware (Argote and Ingram, 2000). However, some recent researches proved that even tacit knowledge can be transferred in the projects where technicians or engineers move to the source of the knowledge and access to the knowledge at its source (Almeida and Kogut, 1999). Some researches underlined that even though humans have the capacity to transfer tacit knowledge, a considerable amount of time and effort is required for transfer of tacit knowledge.

Knowledge can be embedded in products or tools. Considerable amount of researches focused on transfer of knowledge between the organizations and within the organizations. These researchers found that the knowledge embedded in product or technology can be more easily transferred to other organizations or other units in an organization compare to other forms of embedded knowledge (Kogut and Zander, 1995).

Szulanski (1996) mentioned that knowledge can be embedded in organizational routine practices. Kostova (1999) stated that since organizational routines have a meaning and value in itself, and they are mostly knowledge and experience based, transfer of this type of knowledge can only be possible with transfer of those meanings and values.

Knowledge can also be embedded in the source in a group or network of elements. Therefore, transfer of this type of knowledge requires transfer of that particular network of elements to the recipient. This can be possible by moving the group of employees to the recipient within the framework of established patterns which will enable transfer of the network of element that the knowledge is embedded in. Interaction amongst the members of the network has impact on the success of the transfer of knowledge (Stasser et al., 1995).

As complexity is one of the characteristics of knowledge, it includes different kinds of competencies. Whether the employee has a primary or university degree or not, knowledge appears to be complex when different and multiple kinds of competencies were embedded in knowledge (Rogers, 1983; Winter, 1987). It becomes difficult to give an exact definition for complexity. Simonin (1999) stated that complexity is one the most difficult dimensions to operationalize when several number of resources, technologies, employees, task, routines are related to embeddedness of particular knowledge. In order to complement the definition, complexity was measured in terms of technical complexity as the innovative dimension of technology which can be measured by number, novelty and technological complexity of new concepts. Craftsmen' skills and competencies embedded in an activity, task or product provide the complex side of the required knowledge. In parallel with this context, when human or technological systems become more complex, there will be a low level of knowledge transfer (Reed and DeFillippi, 1990).

For knowledge transfer in international research projects, it is crucial to deal with parallel activities in terms of R&D contexts. It is the degree of knowledge distance to which the source and recipient possess similar knowledge (Cummings and Teng, 2003). It is generally the case that the source and the recipient in international R&D projects have different R&D contexts. R&D input of the recipient often comes from the R&D output of the source. Besides, there may be no any other parallel R&D activities of the source and the recipient. Due to this fact, it is difficult for transfer of the knowledge embedded in the international partner to the national partners through R&D projects. In order to achieve a successful knowledge transfer, knowledge gap between two parties cannot be too great (Hamel, 1991). This situation may require several iterations for the knowledge to be transferred. In this sense, Nonaka and Takeuchi (1995) stated that the more the parallel activities and overlapping areas of expertise, the more successful the knowledge transfer. Hamel (1991, p.97) clarified that, "if the skill gap between partners is too great and if the recipient may be unable to identify the gap between its present competence level and that of its partner, learning becomes almost impossible" and thus the transfer of knowledge.

2.4.1.3 Knowledge Articulability

Knowledge articulability can also affect the success of knowledge transfer. In other terms, whether the knowledge can be in written formats, graphically represented, verbalized or not can have a significant effect on the facilitation of knowledge transfer (Bresman et al., 1999). It is the articulated knowledge that could be explained by software programmes, patents, blueprints, etc. verbally or in written formats. In case of patents and blueprints, articulated knowledge can be easily transferred from the source to the recipient. This was explained by Simon (1979) and Kogut and Zander (1992) that the transfer of articulated knowledge does not depend on a strong social link between them.

Researches in literature have shown that, it becomes easier to transfer articulable knowledge than less articulable knowledge. Transfer of knowledge is affected mostly by its two specific characteristics; tacitness and articulateness. As tacitness and articulateness have an important impact on the facilitation of the knowledge transfer (Zander, 1991), codifiable knowledge which can be described mainly as product-based knowledge could be transferred more readily than less articulable knowledge (Kogut and Zander, 1995).

2.4.2 Partner-Specific Variables

The source or the recipient can be considered as the partners of the knowledge transfer process. They can constitute a social system or network of individuals or groups in which information is processed and knowledge is developed.

Analyzing the knowledge transfer within a cooperative relationship, it can be important for the effectiveness of the knowledge exchange to provide some influential key factors. Simonin (1999) stressed the firm size as a key factor. Cohen and Levinthal (1990) and Lane and Lubatkin (1998) stressed absorptive capacity on the other side. In addition to these factors, three main specific characteristics of the source and the recipient involved in the knowledge transfer process were proposed by Wathne et al. (1996) and Simonin (1999): openness, trust and motivation.

Dealing with structure and culture of the source and the recipient in terms of organizational distance determine the degree of dissimilarity between the research partners (Simonin, 1999). National, organizational, professional and national cultural difference has also significant affect on the success of knowledge transfer. Choi and Lee (1997) stated that the greater the difference between the partners in terms of said factors, the greater the difficulty of transferring knowledge through international research cooperation.

2.4.2.1 Openness

Openness is equated with intention to share the knowledge. The source of the knowledge can sometimes resist sharing the knowledge with others. Some researchers found that since knowledge means power in some contexts, the sources can resist transferring knowledge (Simonin, 1999). Especially, within international R&D projects, it is very often that the partners resist transferring the knowledge to recipient partners in order to keep their competencies embedded in them. This is most likely especially when the knowledge is held by only a few experts in the source organization (Hamel 1991).

In the literature, some experts mentioned that openness requires willingness to transfer the knowledge (Badaracco, 1991; Hamel, 1991; Stata, 1989). Some others mentioned that it is equated with transparency of source partner towards recipient partners (Hamel, 1991). The degree of openness directly affects the degree of success of the transfer of knowledge.

Some researchers found that structure of the organizations have critical impact on transfer of knowledge. For instance, organizations with centralized structure where there is a hierarchical formal relation may negatively affect the transfer. On the other hand, flexible organizations may demonstrate better performance in knowledge transfer. Flexibility enables capacity to adapt changes more easily and readily. Flexible firms can demonstrate better performance in innovative and creative actions. They tend to have better capacity to implement new technology, respond to new requirements of the market, and their employees are less resistant to share knowledge in partnerships. In addition, relations with other units in an organization may have positive impact as well. Since innovations of other units may be part of knowledge transfer if there is a proper dialogue amongst the units (Zmud, 1982). Structure of an organization can become more suitable to knowledge transfer by some

interventions in terms of recruitment policies. For instance, human resources policies can promote knowledge sharing attitude, support for transfer of knowledge, some career policies to increase ownership and confidence of the employees, develop a common language amongst employees. These policies may help homogeneity in the organization and stronger belief in benefits of knowledge sharing (Swart and Kinnie, 2003).

Culture of an organization is considered as another important factor that has affect on knowledge transfer (Leonard-Barton, 1995). If the organizational culture supports sharing of knowledge, flow of information, collaboration, and values the benefit of sharing of knowledge, the employees will be more comfortable and confident when transferring the knowledge (Simonin, 1999). In addition, experience in knowledge sharing may lead to accumulation of experience which will pave way to further knowledge transfer by providing base and mechanisms for knowledge sharing. Culture of organizations will also affect the type of knowledge to be transferred. Some risk taking organizations may transfer new knowledge and may be more ready for new innovations. On the other hand, risk-avoiding organizations may tend to control the knowledge and seek familiar knowledge in different versions. Therefore, culture of the organization may in general affect the future comparative advantage of the organization.

Denison and Mishra (1995) stated that culture consists of four main elements: involvement, adaptability, consistency, and sense of mission. Involvement is the main requirement of sense of ownership, feeling responsibility of the overall mission of the organization, and commitment to being a part of future developments of the organization. Adaptability is defined as capacity of an organization to respond to changes in the market and environment and also its open attitude towards new ideas and interventions coming from outside the organization. Consistency lies within the employees. It refers to the level of employees to involve, agree and confirm the overall objectives, future plans and strategies and policies of the organization. Lastly, sense of mission is the understanding, taking part in development processes and demonstrating ownership on the objectives and meaning of the business of the organization by the employees.

Culture of an organization may promote learning attitude of the employees. This culture increases tendency to share the knowledge and raise awareness on the value of benefiting new knowledge through partnership. Darr and Kurtzberg (2000) found that similarity between the source organization and recipient organization may also have positive impact on the knowledge transfer. In case these two parties are located in same networks, contexts, culture or they are established in similar society or market, it may be easier to transfer the knowledge (Wasko and Faraj, 2000).

2.4.2.2 Trust

Trust is the sense of confidence of one partner towards other partner or partners. Mayer et al. (1995) mentioned that trust is the “willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party”. Trust is one of the inevitable requirements in partnerships. Trust decreases the level of critical attitude towards knowledge sharing and increases the confidence in being transparent towards other partners (Das and Teng, 1998; Luhmann, 1988). Trust strengthens partnerships due to the fact that organizations feel comfortable when they share their knowledge. Trust increases openness therefore decreases ambiguity and vagueness in the partnership (Lewis and Weigert, 1985).

There are some factors that may affect trust between partners. For instance, reliability of the source organization or the recipient organization may have positive impact on building up trust easier and quicker. If the organizations rely on the benefit of the knowledge and trust each other that they can transfer that knowledge in an effective manner, the transfer of that knowledge will be more successful (Szulanski, 1996, 2000).

Trust is important at both organizational level and also between the employees. If the employees have the opportunity to learn about each others’ tasks, their behavior, motivation and type of business, they will feel more confident in attitudes of each other. Therefore, they will build trust among each other, which will reinforce more effective cooperative works. Weick et al. (1995) states that cooperation is very much important for development of shared understanding and common values, and trust is the main component for establishment of effective collaborations. If trust is established between the source and the recipient, it is most likely that the recipient will have the opportunity to access the knowledge whether tacit or explicit quicker and more effectively.

Trust is even more crucial requirement for successful transfer of knowledge in international R&D projects. If the partners trust each other, they will be more motivated and willing to sharing the knowledge with each other. This will also contribute to transfer of the needed knowledge on the right time. This type of exchanges will make the partners more comfortable in terms of being transparent to each other and the knowledge transfer process will be more fruitful. The increase in transparency will increase the opportunities for the organizations to see how and when to transfer which particular knowledge. Trust will also increase the motivation of the partners to share necessary equipment or software that is needed for application of the knowledge and will be more confident in terms of sharing the outcomes of the application of the knowledge. Finally, trust may lead partners to be willing to

plan future partnerships in different contexts. Overall, trust will reinforce each stage of the transfer of knowledge starting from initiation till internalization of the knowledge.

In the literature, a direct relation between openness and trust is underlined. Trust has positive impact on openness of the partners (Wathne et al., 1996). Moreover, Simonin (1999) proved that there is an indirect relation between the duration of international R&D partnerships; establishment of trusts speeds up over months and partners tend to become more and more familiar with each other's characteristics and expectations.

2.4.2.3 Motivation

Motivation is a very important element in triggering the transfer of knowledge. It is the motivation behind the willingness of the source organization to share the knowledge and also the willingness of the recipient to spend effort for transferring the necessary knowledge. In the literature, it is widely accepted that if the recipient values the benefit of the knowledge transfer and sets it as a priority objective, motivation level of the recipient will increase which will affect positively the time and effort allocated for that transfer (Szulanski, 1996).

Lack of motivation may result in lack of willingness to share the critical knowledge with partners as a result of resistance to lose the power of holding the crucial knowledge within the source. Lack of motivation will also negatively affect the recipient to seek the needed knowledge, most efficient methods for transfer and efforts to internalize the knowledge. Therefore, lack of motivation will negatively affect overall success of the knowledge transfer.

2.4.2.4 Absorptive Capacity

Absorptive capacity was coined by Cohen and Levinthal (1990) as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (p. 128). Absorptive capacity is a critical characteristic of an organization which has direct impact in innovative capacity. Absorptive capacity has two main components. First one is that absorptive capacity involves past experiences, accumulated knowledge within the organization, embedded in the employees, organizational practices and business. However, there is a need for a new impulse for this already existing knowledge to be turned into an innovation. The organizations should have certain level of motivation to have skills to develop innovative ideas. Efforts to develop innovative ideas when combined with prior expertise and accumulated knowledge of the organization are the two main components of absorptive capacity (Cohen and Levinthal, 1990; Kim, 2001).

Absorptive capacity is seen at two levels: individual level and organizational level. Employees' capacity to absorb knowledge is a determinant of the overall organizational absorptive capacity. However, organizational absorptive capacity is a characteristic beyond

the compilation of the absorptive capacities of the employees Galbraith (1990). It also depends on the ability of an organization to identify the need and the best fit knowledge to respond to that particular need, develop necessary motivation and allocate required effort for developing proper methods to transfer the knowledge and establish mechanisms to internalize the transferred knowledge at organizational and individual levels.

Every organization may have different levels of learning abilities and absorptive capacity. In addition, the source and the recipient in a partnership may not have the same level of absorptive capacity and may have different levels of learning abilities (Cohen and Levinthal, 1990; Szulanski, 1996). This is most likely to be seen in international R&D projects which may affect the way and success of the transfer of knowledge.

As mentioned above, one of the two main components of absorptive capacity is the prior experience of the source and the recipient organizations. In the literature, prior experience is considered as critical factor for determining the absorptive capacity of an organization (Kogut and Zander, 1995). Cohen and Levinthal (1990) mentioned that prior experience may affect method of storing the knowledge in the source and have different attitudes in re-using that knowledge in business practices. Therefore, prior experiences have significant affect on storage, sharing, usage and internalization of the new knowledge. Each organization may demonstrate unique characteristics in those steps based on their prior business habits. The ability to identify the needed knowledge and search for the appropriate knowledge and all the processes until successful transfer of knowledge of the recipient organization also is affected by the prior experiences of that organization (Wathne et al., 1996).

In addition, having different levels of absorptive capacities may lead new learning opportunities for both source and recipient organizations. However, in case one of the parties – either the source or the recipient – has very different levels of absorptive capacities, this may mean that one of the parties have not yet developed necessary skills or accumulated necessary experiences in that contextual area. Therefore, lack of the necessary competence at one of the parties may undermine success of the knowledge transfer.

2.4.2.5 Firm size

Firm size is mostly measured with the number of employees in an organization. Firm size is considered as an important factor in the literature which has significant affect on knowledge transfer. It is associated with capacity to absorb knowledge, flexibility to transfer the knowledge with appropriate methods, ability to develop good communication methods and speed in responding the new ideas in the organization (Simonin, 1999). For instance, Acs and Audretsch (1990) mentioned that smaller organizations are mostly more flexible in order respond to environmental changes and they are more able to deploy specific expertise at the

proper areas which strengthens success of knowledge transfer. In this regard, SMEs have less formal characteristics when compared to large organizations, and they mostly are more open to new innovative ideas.

The SMEs have innovative capacity; therefore they may be more effective in applying new technological ideas. However, they may lack the necessary resources and research skills for structuring new ideas into effective methods for effective results. In the literature, it is recommended that collaboration of large companies with SMEs may create a unique partnership which may enable each party benefit from different aspect for their competitive advantage (Acs and Audretsch, 1990).

2.4.3 Project-Specific Variables

It is important to access the specific project activities, information on dedicated subjects, experiences and ideas of several people in order to reach tacit knowledge. Through this way, it becomes easier to illustrate and perceive the knowledge within a project by developing interaction between the actors taking role in the project, prior experience on R&D project cooperation, communication frequency, networking and duration (Simonin, 1999).

2.4.3.1 Communication Frequency

Communication between the source and the recipient is mentioned as key factor for a successful knowledge transfer. Frequency of communication is seen as key factor for understanding the relation between the partners. Bresman et al. (1999) mentioned that as frequency of communication increases between the source and the recipient, the success of knowledge transfer increases. As mentioned before, knowledge transfer stages in which tacit knowledge is involved, requires even more frequent communication between the parties (Szulanski, 1996). Cohen and Levinthal (1990), while exploring “absorptive capacity” found out that communication frequency is an important factor which increases the capacity.

Communication between the source and the recipient can be enabled in regular meetings, visits, joint activities. These activities give opportunity to the parties elaborate on the project components and develop better understanding of each other’s characteristics. The greater the number of these activities, the more successful the knowledge transfer is (de Meyer, 1991).

In the literature, face-to-face meetings are underlined as the most effective communication method for both parties. It gives opportunity to share critical knowledge, identify the needs better and develop a common understanding on the expectations, businesses and outcomes of the project. Face-to-face meetings are important in terms of immediate reaction to the problems and realistic knowledge sharing. Misinterpretations can be corrected during

meetings and necessary feedback can be received in a shorter period. Face-to-face meetings also help both parties to get to know more about each other's culture as well. Body language, tone of voice, and attitudes beyond body language help understand each other better (Meherabian, 1971). Since tacit knowledge is mostly depended on subjective perceptions of individuals, face-to-face meetings help understand the tacit knowledge more clearly and correctly, which finally makes its transfer easier.

In the literature, it is mentioned that the main tool for interaction is face-to-face meetings in international R&D projects. It allows opportunity for immediate feedback, and is the best method for transfer of tacit knowledge. Therefore, if a project involves a tacit knowledge, this method should be considered as the main means. However, some researchers found out that the source and recipient are not most of the time involved in the process of development of projects, therefore, they lose the benefit of face-to-face meeting at the initial stage of the project, which undermines efficiency of the following stages (Koskinen, 2000).

For tacit knowledge, by nature, human interaction is significantly required for transfer (Nonaka and Takeuchi, 1995). During knowledge transfer process, subjective perceptions of the source and the recipients should be reflected. This will decrease the number of vague and unclear points during implementation process. Subjective perceptions should be reflected into the project details by face-to-face communication.

2.4.3.2 Networking

Transfer of knowledge, by nature, requires much number of flows of information and reciprocal interaction. Any platform that eases these flows and interactions has positive impact on transfer of knowledge. In this regard, organizations can benefit networks in terms of strengthening frequency of interaction and speed up flows of knowledge. Uzzi (1996) found out that transfer of tacit knowledge is better between the source and the recipient which are in the same networks in compare to organizations outside the existing networks. Further, strong relations between the source and the recipient may cost high in financial and duration terms. However, this may be needed for transfer of tacit knowledge (Hansen, 2002).

Organizations can develop some mechanisms such as specialized teams, task forces assigned for enabling relations with partners to increase formal interaction channels and control the transferred and distributed knowledge (Gupta and Govindarajan 2000). In addition, diminishing some layers in the decision making body can also help jointly discussions and decision making which may increase internal communication (Knights et al., 1993). The organizations should select the best network which is more appropriate to their needs and where they can find more suitable partners in. Thus, SMEs should seek the networks which can provide them new ideas and opportunities of new knowledge and ideas for innovation and spend the same effort for identifying the right partner in the right network.

2.4.3.3 Project Collaboration

As mentioned in previous sections, transfer of tacit knowledge is relatively a difficult task. One of the main factors that make it easier is collaboration between the source and the recipient. Sharing experiences through some communication channels between the organizations is important to make both parties develop ways for sharing experiences, skills, attitudes. Especially, experiences in prior collaborations may reflect well in the new projects. These collaboration activities contribute easier and better transfer of tacit knowledge.

In international R&D projects, previous experiences play a crucial role. Prior experiences help organizations better understand the mechanisms for identification of source, development of better mechanisms for transferring data and information, correct interpretation and more effectively communicate. Therefore, familiarity with these mechanisms contribute to establishment of stronger collaborations and thus better absorption of the knowledge in projects Simonin (1997).

2.4.3.4 Duration

It is the time elapsed that the partners of the R&D project can have chance to interact with each other. Projects start during the implementation stage, continue in the elaboration and internalization stages but can finish at a time during the internalization stage of the conceptual model. According to the duration of the project source and recipient can be able to meet, discuss, and innovate for achieving satisfactory results of the project. Not only project duration but also the time elapsed after finalizing the project is crucial for the transfer. During the implementation of the project, knowledge, partners, project and transfer specific variables can affect the transfer process. In the beginning, all efforts are formalized to find out the necessary time for execution of the project. It can appear that enough time is figured out in the beginning. Finalizing project initiates a different duration that can also be considered.

2.4.4 Transfer-Specific Variables

Much of the research has shown that it is difficult to gain access to tacit knowledge (Blacker, 1995). For instance, even though organizational routines can be carriers of tacit knowledge, it is not easy to transplant routines or know-how from one work environment to another (Giddens, 1993). New practices evolve continuously and are in tension with old practices. Tacit knowledge, know-how and skilled behavior are implicit, but they are not easily codified and made accessible to others and ultimately managed by organizations. International R&D projects provide platforms for knowledge sharing, which contributes to creation of new ideas.

2.4.4.1 Media

Transferring the knowledge requires many different means, which can be generally named as media. The data and information are coded in different forms such as reports, strategy documents, and minutes of meetings. The data and information are formed in written version in these documents. This codification constitutes the first element of media (Boisot, 1987). The second element is the every means for transferring this coded knowledge to necessary recipients. These means are different types of channels. They may differ in terms of their capacity to transmit the knowledge. Knowledge flow in the projects is done through these channels.

Characteristics of media can differ from project to project. The types of codified documents and established channels constitute the characteristics of media. The effectiveness of the media depends on its ability to transfer the knowledge to the target. It can be enriched by including elements which will enable transfer of knowledge more efficiently in qualitative and quantitative terms. Its capacity may include ability to resolve vagueness, ambiguities in the transfer of knowledge, decreased misinterpretations and faster flows. Media may include mechanisms where the representatives of the source and recipient may participate and reflect their opinions, feedbacks and critics to the transfer (Daft and Lengel, 1984, 1986).

The most commonly used technique for media is usage of information and communication technologies (ICTs). However, it should be noted that usage of ICTs are more suitable for codified and standardized knowledge but not that suitable for tacit knowledge to be transferred. As international R&D projects mostly involve both codified and tacit knowledge, usage of ICTs can be useful to some extent only when it is used for the transfer of identified knowledge.

Some researches in the literature were concerned about the physical distance between the partners in international projects. The greater the distance, the less successful the knowledge transfer is (Allen, 1977). Boutellier et al. (1998), in his research on international projects, found out that the intensive usage of ICTs in international projects is likely to increase the probability of communication between the partners.

On the other hand, a negative aspect of usage of ICTs intensively in international projects is that feelings, willingness, senses can be lost during communication, due to lack of face-to-face interaction Boutellier et al. (1998). Even though face-to-face interaction is found traditional for some researchers, it is still valid for enabling stronger relations which is highly required for collaborative work. However, if the duration of the project is long enough to make face-to-face interaction costly and difficult, it is rational to replace it with usage of ICTs.

2.4.4.2 Language

Communication channels have important affect on efficiency of transmission of data into knowledge. During codification of the knowledge, it is very likely that some pieces or parts of information can be lost. In order to regain the lost knowledge, there is a need for replacing of the lost knowledge with some codes that has the same meaning. Especially, if the knowledge is tacit, this loss is even more likely to occur. Therefore, it may require activation of multi channels of communication which will compensate the loss of information, or a prior exchange of experiences between the source and the recipient which will lessen misunderstandings or transmission of vague knowledge (Boisot, 1983).

In international R&D projects, language becomes as an important factor. The technical employees, project managers or team members cannot easily understand each other due to the fact that the expressions and terminology used in that particular thematic area can be different at the source and the recipient. This may undermine interaction between the partners and even may decline their motivation. Lack of ability to speak the partner's native language can be very significant obstacle because it will prevent sharing of codified knowledge from the source.

2.4.4.3 Geographic Proximity

Geographic proximity between the source and the recipient is a factor which raised significant attention in literature. Geographical distance plays crucial role in communication between the partners. It becomes a difficult barrier for the efforts to increase face-to-face interaction between partners. Some researches recommended that organizations can better work with local academia due to the fact that they can frequently meet and develop personal contacts which speed up the communication (Krugman, 1991; Mansfield, 1995). Industry-academia cooperation in R&D projects is crucial to use and apply scientific knowledge in industry. Not only national but also international projects provide this kind of cooperation to increase the interaction between academia and industry. Two partners from the same geographical area in an international project can meet, discuss on the project and exchange researchers whenever they want. Technological developments in communication decreased negative impact of geographical distance due to the fact that it enables communication via using information technologies (Lind and Zmud, 1995). On the other hand, usage of ICT in international projects can limit researchers exchange knowledge to some extent. Mobility of the project specific materials that are used during project can cause substantial problems for the implementation of the project. In order to contribute to these studies with more comprehensive research and to add new aspects to the related literature, this thesis will control this variable to see its effect on the knowledge transfer process.

In sum, all these variables are identified as factors affecting the knowledge transfer process separately. However, they are not mutually exclusive variables. Though limited studies in literature showing interaction among all those variables, some studies show that interaction between some of those variables exist. For instance, language exists as a problem in small size firms due to the fact that the larger amount of employees consist of technicians whom are mostly low level educated personnel. Therefore, this thesis will extend the possible analysis by using the results derived from interaction between or among some of those variables in Chapter 4.

2.5 CONCLUDING REMARKS

There are so many varieties of knowledge and each of them has so many aspects. Knowledge cannot be clearly categorized into different mutually exclusive classes or categories. There are varieties of definitions of knowledge, which are studied in detail in the Chapter.

Knowledge has its roots dated back to the history of human beings. It is generic however it is dynamic by nature. Therefore, it is shaped throughout the history. While some thinkers defined knowledge as an objective which can be considered as an object that can be observed, stored, reused and transferred, others consider it as more dynamic flow of interacting changes. Knowledge exists in a variety of forms such as tacit and explicit. Explicit knowledge is formal and systematic which can be easily communicated and shared. Tacit knowledge is on the other hand subjective, practical, and experience-based that cannot be expressed in words, sentences, and numbers.

Knowledge is transferred through some stages. There are several models proposed in the literature based on different aspects of transfer knowledge. Some thinkers aimed tracking the knowledge transfer within an organization and proposed two stages model: research and transfer. Some others focused on storage and develop knowledge and some others focused on analysis of imitation and replication of knowledge.

Success of transfer of knowledge was another concern for some thinkers. They defined success as the extent to which the transferred knowledge is sufficiently and properly transferred to the recipient, which creates ownership and commitment in the recipient for internalization of that knowledge. Therefore, they claimed there is a need for internalization of the knowledge within the individuals. They believed that the knowledge can be successfully transferred only if it is internalized by to acquiring, evaluating, assimilating, integrating, diffusing, deploying, and exploiting the knowledge.

This thesis proposes a model for knowledge transfer based on the models given in literature, which is adapted according to the peculiarities of the cases in Turkey. The proposed model consists of four stages: initiation, implementation, elaboration, and internalization.

Initiation is the stage which constitutes of all necessary actions which lead to decision given to start the transfer. It involves the events for attempting to initiate a knowledge transfer, attempting to search for suitable transfer partners whom we can described as the source or the recipient and articulation of a knowledge which aims to transfer tacit knowledge into a codified knowledge.

Implementation is the stage where the resources flow between the source and the recipient many times during application of the knowledge. This is the stage of communication and interaction between partners in order to encourage opportunities for transferring knowledge effectively.

Elaboration is the third stage which starts right after the recipient starts using the transferred knowledge after the first use of the transferred knowledge in the recipient organization. It is the stage where the recipient increases its performance via intensively identifying and resolving unexpected problems.

Internalization is the last stage which begins after the consequences of the application of the transferred knowledge is well acquired and satisfactory results are achieved by the recipient organization. Internalization of the knowledge, it can be understood and adapted for effective re-creation.

Knowledge transfer can only be measured based on some variables. There are various studies which aimed to test different variables within the context of knowledge transfer. These variables, fifteen variables in total, can be categorized under knowledge specific, partner specific, project specific and transfer specific variables which is shown in the Table 2 above.

These variables are defined in detail in literature review and most relevant ones are adapted according to the objective and the target group of this thesis which are motivation, openness, trust, networking, geographic proximity, communication frequency, duration, absorptive capacity, knowledge embeddedness, knowledge articulability and teachability.

The main objective of this thesis is to measure the transfer of knowledge from RTD performers to national SMEs which are involved in FP and EUREKA projects. Next chapter will study these international projects in details.

CHAPTER 3

SMEs and KNOWLEDGE TRANSFER in FRAMEWORK PROGRAMMES and EUREKA

Knowledge transfer which is dealt with innovation and related activities affects the innovative capacity of European industry and the mechanisms. Knowledge transfer can be behaved as one of the European countries' governments' main concerns to divert the technological expertise of university academics into the development of new industries and lead local businesses in developing new products and diversifying their markets in preparation for surviving the next crisis.

SMEs are at the core in the European economy. They have the capacity of showing a quick response for their competitive position in the market and job creation. Dynamic community is based on their various sector-specific behaviors and adaptation of market changes in a short time because of being the source of entrepreneurial skills, innovation and employment. Although large companies attract main intention and seem to be the director of the market, they do not easily adapt the technological changes quickly. Besides, SMEs are the main suppliers of those large companies and they have the power to manage the market in general. Large companies do not deal with national markets but also with international markets. They need to sub-contract some of their activities to SMEs. Together with the increased competition, there is an increase of large company's need for SMEs.

Large companies are mainly based on mass production. On the other hand, SMEs have the capacity of changing the product according to market needs. This is because their production is more flexible. This is why successful SMEs are recognized for their innovative products, ideas and their applications in the market. To remain competitive, SMEs should always be innovative. This can be achieved by means of developing new technologies, creative products within their facilities or gaining access to them. Additionally, most of the SMEs want to be an international actor according to their needs in the market and try to search opportunities for new markets and business activities.

Together with The Lisbon Strategy, European Commission aims to make the European Union (EU) "the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs, greater social cohesion and respect for the environment by 2010"⁵ and behaves SMEs as the most crucial starting point for emerging economic sectors.

⁵ Lisbon European Council Conclusions, 2000.

On the contrary, SMEs often develop an innovative idea but lack the research capability in order to realize them. There should be a transfer of this capability from organizations that acquire research to SMEs in order to realize their ideas. It is the knowledge of transfer through which SMEs gain skills, knowledge, technologies, and various production methods. It is the cooperative research where there is a knowledge transfer from RTD performers through SMEs. This is the way for gaining technological capacity for innovation. By only this way SMEs do not lose their position as a supplier for large companies and get the opportunity of finding new markets for their innovative products.

In this respect, European Commission (EC) provides a specific programme for SMEs under FP6 called CRAFT and FP7 called research for SMEs in order to facilitate knowledge transfer and complement their core research capability via cooperative research projects. Cooperative research under the “CRAFT” and “Research for SMEs” specific programmes are schemes where several SMEs, according to the participation of rules of the programmes, need some part of their scientific and technological research to be sub-contracted to RTD performers. In this sense, SMEs have specific problems and need to outsource some part of their research activities. Cooperative research is a bottom-up scheme. It covers any scientific or technological topic or field in supporting the research needs of SMEs. The schemes facilitate trans-national R&D cooperation between SMEs and Europe’s research community.

In the literature, it is suggested that if the number of partners increases beyond an optimum point called the tipping point, the partnership will fail to function well. At the tipping point, an increased number of partners decrease the effectiveness of the partnership because communication becomes too complex and inefficient. The involvement of large numbers of public and private sector partners causes the communications to become unwieldy as the links between partners become too complicated. In practical terms, innovation capacity reaches a maximum at the edge of chaos. However, beyond that point, the capacity deteriorates. To attain an optimum functionality in a research project, partnerships should not include too many partners. Each partner must add value and selectivity is important. They are the research programmes that should limit the number of partners. Framework programmes (FPs) and EUREKA programme are those to provide a sufficient number of partnerships in research projects.

EU conducts and coordinates its research activities via Framework Programmes. EU coordinates research activities which has a common benefit to the all or some of the members in European level by bringing participants from industry and academia from their members⁶ and associate countries⁷. It funds international or regional coordination projects

⁶ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

directly. All these activities are conducted within a dynamic and elastic mechanism so that firms, universities, research laboratories and even government institutions can apply for projects and can be funded by EU directly. The evaluation of projects and also even FPs is done by EU and participating member states and project partners. By this way, the coordination of the research and development in European level can be organized in FPs.

In addition to funding research projects via FPs, with its Ljubljana Strategy⁸, EUREKA (European Research and Coordination Agency) has set out a common vision as EUREKA should move forward, with a particular view to developing complementarities between the different European level research programmes (FPs, EUREKA and others) and national programmes promoting innovation and competitiveness, creating larger European entities and integrated projects in strategic industrial sectors. It can be easily stated that innovation related activities includes knowledge transfer across national borders under the concept of European Union research and technology programmes.

3.1 FRAMEWORK PROGRAMMES (FPs): RESEARCH for SMEs

At the beginning of the 1980s, there was concerns that the European economy was falling behind the USA and Japan in emerging high-tech areas like information and communications technologies (ICTs). In order to face the decreasing market share, the first action the European Union (EU) took was the establishment of a programme promoting collaborative research in ICT. It was ESPRIT 1 that was established in 1984 in collaboration with 12 large European ICT firms⁹. The aim is to strengthen the scientific and technological basis and information technology (IT) capabilities of European industry and eventually improve its competitiveness in global markets. Official basis for the implementation of science and technology policy in the EU was only created in 1987. It was the time that the first framework programmes were established. ESPRIT 1 served as a model and motivation for a general framework included several programmes in other technological areas. Shared cost contract research and technological development (RTD) projects can be considered as the main mechanism because they acquire the major proportion of EU funding. Projects are coordinated and implemented through the FPs which controls the budget allocation in the various technology areas. Thus, FPs become the main instrument of the European technology policy, aiming at enhancing European competitiveness by promoting transnational research cooperation and encouraging the transfer of knowledge.

⁷ Albania, Bosnia & Herzegovina, Croatia, Iceland, Israel, Liechtenstein, Montenegro, Norway, Serbia, Switzerland, the Former Yugoslav Republic of Macedonia, Turkey.

⁸ Presented under the Slovenian Chairmanship at the Ministerial Conference in June 2008.

⁹ Bull (France), CGE (France), Thomson (France), AEG (Germany), Nixdorf (Germany), Siemens (Germany), Olivetti (Italy), STET (Italy), Philips (Netherlands), GEC (United Kingdom), ICL (United Kingdom) and Plessey (United Kingdom).

Research for SMEs: That is one of the funding mechanisms in FPs is directly related to SMEs and being created to the benefits of SMEs. It is crucial to note that in FPs Research for SMEs projects (R4S), the ideas come from the SMEs and they need to sub-contract the research to RTD performers. This is because of the insufficient capacity of doing dedicated research. R4S projects support innovative SMEs in solving technological problems and acquiring technological know-how. SMEs want to increase their overall business and innovation capabilities and R4S projects must fit into them. It is the acquisition of the necessary technological knowledge by sub-contracting research to RTD performers. At the end of the projects, it should be expected from research projects for the SMEs involved in to have clear and obvious exploitation potential and financial and economic benefits.

SMEs themselves have the opportunity to directly invest in the RTD projects under R4S and to outsource most of the research and demonstration activities to RTD performers. This is the main aim of R4S projects. SME participants are the direct beneficiaries of this kind of projects. During and after the project, the primary goal is to improve existing processes or services, products, systems and receive and internalize the technological know-how they need to develop.

There is a “customer-seller” relationship between the SMEs and the RTD performers in R4S projects. SMEs buy technological knowledge from RTD performers that they need to develop their activities and RTD performers sell their expertise, work and skills. SMEs provide their own resources for the initial specifications in order to direct RTD performers for the development of the product for their benefit. The real investment by the SMEs which is funded 100% in R4S projects includes the price for the outsourced research that they pay for the knowledge improved during the implementation of the project and the intellectual property rights for the innovative results.

It is also important in R4S projects that the results of the project must fit into the overall business strategy. Projects enable solving long-term technological problems and assisting SMEs in accessing and being a part of international networks. They also enable SMEs to develop their medium to long-term business plans and activities. This is why R4S projects have a bottom-up scheme that addresses any research topic across the entire field of science and technology.

3.2 The EUROPEAN RESEARCH COORDINATION AGENCY (EUREKA)

Conference of Ministers of 17 countries and Members of the Commission of the European Communities was held in July 1985 and it was the date that EUREKA was established. There are 39 member countries constituting EUREKA today. It is the EUREKA label that

provides opportunity to the EUREKA project participants for increasing their visibility European-wide and entire world as well.

It was the United States' Strategic Defense Initiative that created technological and industrial challenge by all means. A response from Europe whose leading country was France to that initiative resulted in the initiation of EUREKA in 1985. This provides a growing awareness among European countries that inter-governmental collaboration is needed in order to protect and expand national technologies. Having this idea being kept in mind, successful cooperative programmes were initiated in the early 1980s. One of the most critical one was ESPRIT 1. It promotes regional collaboration in information and telecommunications technologies. European governments tried to promote and guide international industrial cooperation under this target. Although the initial French proposal required no formal treaty and there is a top-down approach for research project that the R&D research topics were determined by the governments, EUREKA was established with a bottom-up approach for research project that firms chose research topics and objectives of collaboration in the following years.

It is the EUREKA to have an ultimate goal of enhancing the competitiveness of Europe. Projects are generated and funded if the results are close market oriented. From a structural point of view, EUREKA is inter-governmental and there is no any real common pool for funding. On the other hand, it is EUREKA's member countries responsibilities to invest and fund their national firms via arranging international industrial partnerships. Main rule to initiate a EUREKA project is to have two or more firms from at least two EUREKA member countries. If this is the case, initiation of this international project could be declared to the EUREKA secretariat which has a duty of coordinating the decisions of the member countries. National governments are then informed with this initiation and the projects are evaluated nationally under the specific national rules. If approved, national governments provide national funds to their national partners in the EUREKA project. Questions of intellectual property rights remained under the responsibilities of the partners according to their expectations from the project in the market. These procedures and rules provide national industry to determine the nature and the extent of knowledge transfer.

There are significant dissimilarities between these FPs and EUREKA in terms of objectives, mechanism and characteristics. Difference between these two international R&D cooperation programmes is depicted in Table 3.

Table 3 - Difference between Framework Programmes and EUREKA

	FRAMEWORK PROGRAMMES	EUREKA
Objectives	<ul style="list-style-type: none"> ➤ to strengthen the science and technology ➤ to enable industry to become more competitive at the international level ➤ to cover all scientific and technological areas 	<ul style="list-style-type: none"> ➤ to increase the productivity and competitiveness national economies in the world market ➤ to enable closer cooperation among enterprises and research institutes in its member countries ➤ to enable the exploitation of technologies
Mechanism	<ul style="list-style-type: none"> ➤ the European Parliament and the Council has the general decision for its implementation ➤ the content and the objectives of the R&D policy are defined over its implementation ➤ specific thematically focused sub-programmes implement the research activities that are described in the framework programme ➤ projects are selected via thematically focused call for proposals ➤ firms receive up to 75% funding and universities 100% 	<ul style="list-style-type: none"> ➤ In the Ministerial Conference, the EUREKA status of the projects are decided each year ➤ A project includes two or more firms from at least two EUREKA member countries ➤ there is a EUREKA secretariat located in Brussels that coordinates the decisions of the countries and the programme as a whole ➤ funding of EUREKA is organized at the national level ➤ participants receive up to a funding limit that each country has specified according to their national funding rules
Features	<ul style="list-style-type: none"> ➤ 5 participants from industry and research institutions ➤ from three countries ➤ receives about one million € EU funding ➤ takes about 3 years 	<ul style="list-style-type: none"> ➤ 2 to 5 participants from industry and research institutions ➤ from two or more countries ➤ costs less than five million € national funding ➤ takes about 3 years

Figure 3 shows the representation of knowledge transfer mechanism in R&D programmes in Turkey. This mechanism clearly states that the knowledge transfer occurs at national and international level. There are three groups in terms of these programmes' types. There are three types of programmes that should be dealing with; national R&D, FP and EUREKA programmes. National R&D programmes can be managed by different institutions in order to provide grants to SMEs for their R&D activities. EUREKA is managed by TÜBİTAK and funding is provided nationally. The aim is to enhance the international R&D co operations. In Turkey, FP is managed by TÜBİTAK and both the funding and evaluation of the projects is performed by European Commission.

In general all the programmes provide co operations between Turkish SMEs and RTD performers nationally or internationally. National R&D programmes provides knowledge transfer nationally. This is because national programmes provide opportunity for SMEs to sub-contract some of their R&D activities to national universities and RTD performers. In EUREKA, Turkish SMEs can have the opportunity to sub-contract again some of their R&D activities to national RTD performers. Besides, they can be able to cooperate with international RTD performers in order to complement their research activities within the project. This provides working both with national and international RTD performers in the same project. In FP, the situation is similar to national R&D projects but this time on international level. Research for SMEs sub-programme in FP provides SMEs to sub-contract most of their R&D activities to international universities and RTD performers. Under the concept of "customer-seller" relationship, Turkish SMEs can be able to buy technological knowledge from RTD performers that they need to develop their activities. This thesis deals with knowledge transfer only in EUREKA and FP programmes. Success of knowledge transfer in national R&D programmes should be act as a new research area.

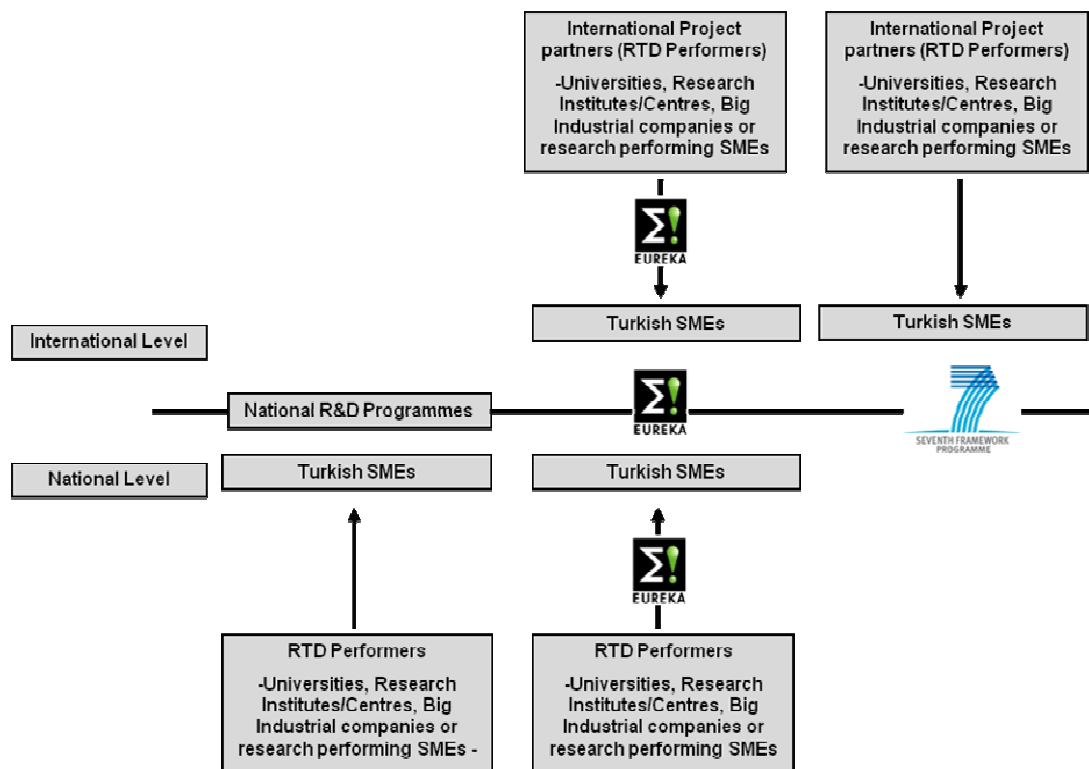


Figure 3 - Knowledge Transfer Mechanism in R&D Programmes in Turkey

3.3 CONCLUDING REMARKS

In response to concerns about European technology falling behind in the global sector, the European governments initiated new programmes to divert the technological expertise of universities into the development of new industries. These programmes targeted the SMEs since they are considered as the most crucial segment of the industry. Due to the fact that the SMEs can develop an innovative idea but they lack the research capability, these specific programmes for SMEs under FP6 called CRAFT and FP7 called research for SMEs aimed to facilitate knowledge transfer and complement their core research capability via cooperative research projects. These researches cover any scientific or technological topic or field in supporting the research needs of SMEs. These programmes provide a sufficient number of partnerships in research projects in order to keep number of partnership at an optimum level which will enable effective communication. Participants from industry and academia meet each other in these programmes.

FPs' aim is to strengthen the scientific and technological basis and IT capabilities of European industry and eventually improve its competitiveness in global markets. It promotes transnational cooperation in research and encourages the dissemination of information. The

SMEs lack capacity to do dedicated research, therefore, R4S provides SMEs to subcontract researches to RTD performers.

EUREKA aims increase the productivity and competitiveness of European industries and national economies in the world market and to enable closer cooperation among enterprises and research institutes in its member countries in the field of advanced technologies. The national SMEs are expected to define their needs and arranging industrial partnerships accordingly. Through EUREKA, the European countries aim increases the capacity of the economy in various sectors via strengthening SMEs.

This thesis will examine the success of knowledge transfer from RTD performers towards SMEs in cooperative research projects. As having the opportunity as partnership in projects since 2002 in FPs and since 1985 in EUREKA, Turkey's capacity in knowledge transfer in these specific programmes will be analyzed.

This thesis focuses on a survey applied to selected SMEs which is a partner in FP7 research for SMEs project. In this study, level of cooperation and absorptive capacity of the Turkish SME will be examined in order to come up with a conclusion on the effectiveness of knowledge transfer from RTD performers to SMEs in these specific programmes.

In the next chapter, the results of the study are examined and consequently current status of SMEs will be explained with future recommendations for future cooperation opportunities and policy implications for strengthening the knowledge transfer between the Turkish SMEs and international RTD performers.

CHAPTER 4

EVALUATION OF KNOWLEDGE TRANSFER in FRAMEWORK PROGRAMMES AND EUREKA

As mentioned in the beginning, this thesis aims to evaluate the effectiveness of the knowledge transfer between Turkish SMEs and international RTD performers within the context of FP6, FP7 and EUREKA research programmes. The thesis aims to make a concrete analysis of Turkish SMEs based on the scientific data collected from end beneficiaries which are Turkish SMEs that are partners in FP6, FP7 and EUREKA. The evaluation design is intended to be based on qualitative and quantitative data collected from main beneficiaries. In the next section, the research question, selected methodology, selection of sample and data analysis methods will be explained in detail.

4.1 DESIGN of EVALUATION and RESEARCH QUESTION

The main aim of this thesis is to answer the following research question: Is knowledge transfer in FPs and EUREKA from RTD performers towards Turkish SMEs successful?

With the aim of finding an answer to the research question above, main objectives behind this question are:

- To examine the success of knowledge transfer from RTD performers to SMEs
- To understand the extent and scope of transfer of knowledge, content and usefulness of knowledge transferred
- To determine which international programme is more beneficial for companies
- To find out whether the role of programme management is sufficient
- To analyze the contribution of being a part of national R&D projects and being a part of an international R&D projects to knowledge transfer
- To find out if absorption capacity is important in knowledge transfer process
- To find out what kind of capabilities that a firm should have for an effective knowledge transfer
- To provide governmental policies for an effective knowledge transfer from RTD performers to SMEs

In order to come up with sufficient answer to the main research question, 11 hypotheses are created. In order to test each hypothesis, they were linked to the questions in the survey¹⁰. Each hypothesis is also linked with the variables to show the relation between variables and the hypotheses. All the data collected will be analyzed within the context of the stages of the proposed model constituting of four previously discussed stages: initiation, implementation, elaboration and internalization. All hypotheses, related stages and variables are shown in Table 4.

Table 4 - Relationship between Hypotheses, Stages and Variables

HYPHOTHESES	STAGE	VARIABLE
HYPOTHESIS 1: Institutional management of international programme's contribution for motivation of SMEs increases, the transfer success increases.	1- Initiation	Motivation
HYPOTHESIS 2: The more SMEs are open, the more transfer success can be sustained.	1- Initiation	Openness
HYPOTHESIS 3: As national SMEs trust international partners, transfer of knowledge is more successful.	1- Initiation	Trust
HYPOTHESIS 4: Being in a right network increases the transfer success.	1- Initiation	Networking
HYPOTHESIS 5: Geographical proximity increases, the transfer success increases.	2- Implementation	Geographic Proximity
HYPOTHESIS 6: If communication frequency increases, the success of transfer of knowledge increases.	2- Implementation	Communication Frequency
HYPOTHESIS 7: If duration of the projects increases, the success of transfer of knowledge increases.	2- Implementation	Duration

¹⁰ See Appendix for survey.

Table 4 (continued)

HYPOTHESIS 8: If absorptive capacity increases, the success of transfer of knowledge increases.	3- Elaboration	Absorptive Capacity
HYPOTHESIS 9: Transfer success increases as knowledge embeddedness decreases.	4- Internalization	Knowledge embeddedness
HYPOTHESIS 10: Transfer success increases as knowledge articulability increases.	4- Internalization	Knowledge Articulability
HYPOTHESIS 11: Transfer success increases as teachability of the knowledge increases.	4- Internalization	Teachability

4.2 SELECTION of SAMPLE

The target group is Turkish SMEs which are partners in FP6, FP7 and EUREKA cooperative research projects. Due to the fact that the thesis aims to evaluate the knowledge transfer, the target group is limited with the SMEs whose conditions are suitable to evaluate the completed processes in terms of their completeness of the projects. Additionally, as framework programmes have different sub-programmes, only the SMEs which are partners in SME specific cooperative research projects are involved in the sample. However, since there are no sub-programmes in EUREKA, this criterion is not valid for SMEs in EUREKA. Projects in both framework programmes and EUREKA are involved in various thematic areas such as agriculture, automotive, bio-technology, manufacturing... Due to the fact that the intention of the author is to have a general overview of knowledge transfer in those programmes, no specific focus on particular thematic area is considered for this research. Some projects involve not only Turkish SMEs but also some large industries. However, they are excluded from the sample. As the number of SMEs in FP and EUREKA is not so many, limitation the number of SMEs for their location is not considered as selection criteria.

Since FP6 programme was initiated in 2002 and finalized in end 2006, all the SMEs who were partners under cooperative research component in this programme are included in the sample. FP7 programme was initiated in 2007 and will continue until 2013. In this regard, only the SMEs which concluded their projects starting from 2007 till the start date of the survey (March 2010) were included in the sample. In addition, some of SMEs which have initiated their projects and have progressed to some extent where their data could be useful

for the research are included as well. EUREKA programme was initiated in 1985 and is still ongoing to a non-defined future date. SMEs which have concluded their projects in this programme were included in the sample as well. Again, SMEs which have initiated their projects and have progressed to some extent where their data could be useful for the research are included as well. A grand total of 113 SMEs constitute the sample for this research. Table 5 shows the number of questionnaires sent and the response rates. The samples are selected not based on the firms but on the projects. Therefore, those response rates shows the questionnaires responded based on different projects. Therefore, some SMEs responded for several projects that they are coordinating. In order to prevent bias of provision of similar answers to questionnaires, the project managers of each project were asked to fill in the forms but not the managers of the SMEs. This method also enabled receipt of reliable and sound data due to the fact that the project managers have the through information on the projects compare to any other personnel in the SMEs (Bresman, et al, 1999).

Table 5 - The number of questionnaires sent and the response rates

	FPs		EUREKA	TOTAL
	FP6	FP7		
Sent	20	21	72	113
Responded	9	11	40	60
Response Rate	45,00%	52,38%	55,56%	53,10%

Some demographic data were collected through the questionnaire. Table 6 shows the profile of respondent projects.

Table 6 - Profile of respondent projects

Provinces	# of Projects			# of Personnel						
	FP	EUREKA	Total	<10	10-20	21-50	51-100	101-150	151-250	Total
Ankara	7	10	17	9	7	0	1	0	0	17
Hatay	1	0	1	1	0	0	0	0	0	1
İstanbul	4	27	31	0	8	7	7	0	9	31
İzmir	2	2	4	1	0	2	0	0	1	4
Kahramanmaraş	0	1	1	0	0	0	1	0	0	1
Kastamonu	1	0	1	0	0	1	0	0	0	1
Kocaeli	2	0	2	0	0	0	0	0	2	2
Konya	1	0	1	0	0	0	1	0	0	1
Manisa	1	0	1	0	0	1	0	0	0	1
Tekirdağ	1	0	1	0	0	0	0	0	1	1
Total	20	40	60	11	15	11	10	0	13	60

4.3 DATA COLLECTION METHODOLOGY

Due to the fact that the number of targeted SMEs is too large and scattered in different geographic areas, the main aim is to reach as many of the SMEs as possible. Therefore, the most suitable method for research in order to reach a representative sample of the target group is 'survey'. In order to reach to the largest amount of SMEs, the data collection methodology is selected as 'questionnaire'. Besides, questionnaire is defined as the best data collection method for similar purposes of knowledge transfer in the literature.

A questionnaire is developed including 161 questions and some questions were asked to collect demographic information on the SMEs and the projects. The researcher did not include some of the questions which could be reached from desk review in the questionnaire. Most of the questions are Likert type while some of them are YES/NO type questions. The questionnaire constitutes of questions which were derived from the literature review. Some factual data were asked in the first part of the questionnaire. The following parts are divided into sections based on the intended research areas which are defined in the previous chapters. The questions are categorized as per variables during data analysis process, which will be studied in detail below.

The questionnaire was first piloted with six projects from different SMEs. The questionnaire was revised after the piloting process. Some questions were made clearer and some YES/NO type questions were turned into Likert type questions.

After piloting, the questionnaires were emailed directly to the project managers of each project. They are given brief information on the objectives of the research and they are given a deadline of four weeks. Due to the fact that considerable number of SMEs did not respond within that period, a reminder email was sent to those project managers who did not respond. Thus, all the responses received after two interventions.

The survey is limited with quantitative data based on the questionnaires. Even though the researcher intended to conduct a case study in order to analyze thoroughly one of the cases and collect qualitative data, time limitations of the project managers prevented this intention.

4.4 CONSTRUCTION and MEASUREMENT of VARIABLES

The measures in this study were mainly adapted from the existing literature. Based on the literature review, some modifications were made to some of the items in order to adapt those measurements that best suit to the peculiarities of SMEs in Turkey. Besides, some new questions are created and those data analyzed as per the model proposed in the beginning of the thesis.

Most measures were five-point likert-type scales, except for number of personnel, location, award systems of the firms... The alpha coefficients are the reliability for each item, along with the references from the literature from which these measures were adapted. Cronbach's alpha¹¹ was used as a measure of reliability which is most widely used (Nunnally, 1978).

A thorough literature review resulted in the development of the variables and identification of items to measure those variables. Based on the consultations with subject experts from TÜBİTAK, SME experts from institutions, and feedback obtained when piloting the questionnaire, the researcher revisited the variables and revised the best proper variables, and to identify the most relevant items for those variables, and select their most proper wording in the questionnaire.

For easing the analysis process, mostly 5-point Likert-type scale was used. In some parts of the questionnaire the Likert scores were set as: 5: absolutely agree, 4: agree, 3: neither agree nor disagree, 2: disagree and 1: absolutely disagree. One other type of the Likert is 5: indispensable, 4: highly important, 3: important, 2: relatively less important, 1: not important. In some other questions, items were codified as Y: Yes, N: No. The overall variable scores were analyzed by standardization of the scores for each variable (Nunnally, 1978). The responses were transmitted to a standard normal deviation with zero mean and variance of one in order to scale the variables. All scales confirmed Cronbach's Alpha greater than 0.70, thus providing a sufficient level of reliability (Nunnally, 1978). Reliabilities for the final variables ranged from 0.786 to 0.919.

The questions that contribute to derivation of the same variable were combined under each particular variable. Those variables are measured by forming scales which are derived from a sum of questions under the concerned variable. Then, the standard scores were summed to form a scale score. All variables and questions are given in APPENDIX 1. Some of the questions as shown in APPENDIX 1 in the research questionnaire are derived directly from the literature as shown in APPENDIX 2 and some are created by the researcher based on the peculiarities of the Turkish SMEs.

Transfer Success:

Knowledge transfer success is the main focus area of this research. Therefore, it is highly necessary to define measurement method for transfer success initially. A set of questions identified from the literature some of whose have been adapted in order to measure transfer success. A score of the transfer success is derived via standardization which is set as the measurement for success. This score is correlated with other variables involved in the research in order to identify their relation to knowledge transfer.

¹¹ The reliability of a rating summarizing a group of test or survey answers can be assessed by Cronbach's alpha. A score is computed from each test item. Scale which means the overall rating is defined by the sum of these scores.

Szulanski (1996) measured satisfaction level of the knowledge transfer related to cost schedule and performance. The level of knowledge to be committed was also measured. Knowledge ownership is another aspect of the transfer success. Mowday et al. (1979) asked specific questions for knowledge ownership in order to measure the success level of transfer of knowledge. As embedded knowledge is difficult to access and transfer, in literature, some questions were asked to find out if knowledge transfer is successful. The level of knowledge to be utilized by Turkish SMEs for their acquisition and usage of knowledge determine the success of knowledge transfer.

Motivation:

This variable consists of questions to find out the affect of international R&D programmes management on knowledge transfer. The SMEs were asked questions to assess their success of initiation of projects. Initial stage is to seek knowledge transfer by means of motivation. The initiation process may be initiated by the source or by the recipient. As this research is willing to find out the success of knowledge transfer, initiation of projects is the first step for SMEs to get involved in knowledge transfer process.

Openness:

In line with Tsai (2002)'s approach on the importance of centralization and central networking within the firm in terms of organizational structure; the project managers were asked to what extent the employees follow directives from the top management and the extent to which the firm has rigid rules and policies.

In terms of the definition of culture of an SME (Denison and Mishra, 1995), openness was measured to have an insight on the strength of its consistency and sense of mission. Consistency, predictability and adaptability of the organizational culture in their approach for doing business, openness was measured in parallel with literature in terms of common understanding on the way in which things are done, the participation of the employees to the managerial decisions, cooperation across departments in the firm, the firm's willingness and capacity for internal adaptation in response to external environmental conditions; having long-term targets, having a shared vision for the firms' future amongst its employees, and customers' comments and recommendations are taken into consideration in the firm for developing new products and services.

Trust:

In literature, when dealing with R&D partnership between firms and research centers, three types of questions were used to measure trust. According to Mayer et al. (1995), trust was measured in terms of employees of the firms' willingness to share ideas, feelings, and specific goals with the university center and confidence in the RTD performer's competence as well as its motives and fairness in sharing these abilities.

Geographic proximity:

Geographic proximity was operationalized in the literature (Galbraith, 1990). In literature, it is stated that this control variable affected knowledge transfer activities and is measured by the extent to which the firm's geographic proximity to other organizations. Generally speaking, physical distance was measured using the number of miles between the parties. Literature stated that including average travel costs can be direct measures of this variable. Related with literature, this research tried to combine those questions by asking a five-scale question to project managers in order to learn their thoughts about to what extent SMEs' geographic proximity to the international partners is crucial for the SMEs. However, a measurement based on actual distances from their partners could not be actualized in this research due to the fact that it was very difficult to obtain this data from the SMEs.

Communication Frequency:

Project managers were asked to indicate the frequency of their international communication with other partners in other countries, and for each to distinguish between face-to-face communication and other types of communication (fax, phone, internet, etc.). The scale was the frequency of the meetings annually. It is the visits and meetings that provide technical meetings to be held with R&D personnel, personnel from other departments of the partner and provide the recipient to visit other departments of the RTD performers.

Duration:

It is the time elapsed that the partners of the R&D project could have chance to interact with each other. Duration comprises of three stages: implementation, elaboration and internalization stages. Duration enables partners to interact with each other via project meetings, internet, etc. there should be enough time to conduct a project. As the formation of trust between partners begin before the project, during the implementation of the project trust will expectedly increase between partners. Duration can be also considered as the time elapsed after finalizing the project, this thesis will not deal with this duration. Research on the duration after the project can be used for the impact assessment of such projects. Duration of each project can be collected via desk review.

Absorptive Capacity:

It is difficult to measure absorptive capacity of a firm. In the literature, empirical research reveals that absorptive capacity creation has two aspects: access to external knowledge and utilization of the knowledge. A prerequisite for absorption is openness towards knowledge sharing in the innovation process and thus in international R&D projects, but also that the proper prior knowledge is available. Thus, knowing the characteristics of the external knowledge is also important for the absorption opportunities.

The firm's capacity to value, identify, acquire, assimilate, transform and apply new external knowledge gives significant hints about its absorptive capacity. Besides, indicators of in-house R&D capabilities state that continuous R&D activities build capabilities and thus; absorptive capacity.

Knowledge Embeddedness:

Tacitness is defined within the context of knowledge embeddedness. In literature, tacitness was measured by respondents' knowledge based on a 1-7 Likert scale, where 1=strongly disagree and 7=strongly agree. Tacitness items were reverse coded so that a higher number is associated with more tacit knowledge.

In literature, embeddedness was measured by Mowday et al. (1979) in order to learn the degree of learning the tools, equipment, technologies and activities related to knowledge by the recipient, the degree of appropriation of tools to use for performing necessary tasks, activities and procedures and the degree of using the information required for understanding the knowledge.

Knowledge Articulability:

Articulability was measured in order to learn if new R&D personnel could easily learn the knowledge necessary to do their jobs by studying, talking with, or learning while working with experienced R&D personnel or not; and to what extent it is quicker and easier for R&D personnel to become capable in using the transferred knowledge. The questions were also asked to capture communication flows between employees in different departments.

Based on Simon (1979) and Kogut and Zander's (1992) definition of knowledge, knowledge can be codified in blueprints, or it may be procedural, e.g., in a recipe for carrying out a task, questions regarding knowledge articulability were designed to capture the extent to which the knowledge could be articulated in documents and software.

Teachability:

Teachability was measured by training and two types of questions were used to capture the extent to which the firms' teachability of the new knowledge comes from international partnership. Teachability was designed and measured in order to learn the extent of learning at the individual level. Although, knowledge cannot be formally articulated, it can be taught to new workers. The questionnaire was designed to learn the scope and aim of SMEs for internalizing the transferred knowledge. Some of the questions were adapted in this research.

Some factors besides the variables given above are involved in research as well as, networking, project types, location, size and award system of the SMEs.

Networking:

There are no dedicated questions in the literature in parallel with the aim of this thesis. As this thesis examined the relation and impact of being in a right network and SMEs' usage of this opportunity in order to initiate international R&D projects several questions were asked related with their being in network and the activities of them for initiating co operations.

Project Type:

This research deals with the FPs and EUREKA projects. The purpose of the thesis is to find out the overall transfer success in these international R&D projects. It should be noted that there are two types of projects within the context of this research and thus, for some variables and for the main aim as transfer success, this difference is analyzed according to being a partner in those research projects.

Location:

Location of SMEs in terms of their established zone is expected to be important. There may be several reasons to think about its importance. Being located in an industrial zone may cause to work more specifically on commercial purposes. Besides, being in a technological zone could promote SMEs focus more on researches. This thesis will look for its affect on the success of knowledge transfer.

Size:

Parallel to the literature, total number of employees in the related SMEs is collected. It could be analyzed whether there is a significant difference on the success of knowledge transfer according to SMEs size. The focus in the study is on R&D activities in international research projects, so, project managers were asked to state the number of people employed in total.

Award System:

Opportunity to get an award after accomplishing a task is generally important in organizations. An award system for being in a partner in international projects in SMEs could provide opportunity for researchers to be dedicated to finalize the work and to be motivated to learn more from the project experience.

4.5 DATA ANALYSIS

Data is analyzed in SPSS version 17.0 using zero-order, bi-variate correlations between all the variables. Data will be analyzed in line with the originally proposed model above which is a) Initiation, b) implementation, c) elaboration and d) internalization. Each hypothesis will be analyzed based on the variables which are explained in chapter 2. In the following paragraphs, multiple regression analysis is used to analyze the data from a recent mail survey questionnaire of R&D managers who are coordinators of the specific FP and EUREKA projects.

4.5.1 Transfer Success and Hypotheses

The results of zero-order, bi-variate correlations between all variables are shown in Table 7. The correlation matrix indicates that except motivation and communication frequency, each of the independent variables is significantly correlated with the dependent variable. The results expectedly indicate that the transfer success, which is negatively affected by one independent variable, is significantly negatively correlated with the dependent variable: transfer success (geographic proximity: $r = -0.279$ and $P < 0.05$). The results confirm that geographic proximity is important for the SMEs for knowledge transfer success. Therefore, it might be logical to state that the greater the distance gets, it becomes more and more difficult to sustain knowledge transfer. With respect to the other expected bi-variate relationships between the independent variables and the dependent variable, four other variables were significantly positively correlated with the dependent variable and significant at $P < 0.01$, including openness ($r = 0.362$ and $P = 0.005$), trust ($r = 0.614$ and $P = 0.000$), networking ($r = 0.449$ and $P = 0.000$) absorptive capacity ($r = 0.743$ and $P = 0.000$), and knowledge embeddedness ($r = 0.575$ and $P = 0.000$); and two was significant at $P < 0.05$, including knowledge articulability ($r = 0.306$ and $P = 0.018$) and teachability ($r = 0.298$ and $P = 0.022$).

The results show that there is a positive relation between knowledge embeddedness and transfer success. This is due to the fact that questions in this research aimed to measure to what extent the embedded knowledge was extended from international partners to SMEs. Therefore, the more the embedded knowledge is extended to national SMEs, the more successful the knowledge transfer is sustained. Due to this fact, the results confirm that knowledge has been extended to the national SMEs rather than being kept embedded and thus the level of transfer of knowledge increased.

Each variable has been analyzed with regards to their relation to each other in Table 7. **Motivation** is correlated with geographic proximity and the results demonstrate that motivation is negatively correlated with geographic proximity. The greater importance the SMEs give to the geographic proximity as a negative factor, the more difficult it is to motivate those SMEs for initiating international projects. Results also show that the greater the absorptive capacity is, the easier to motivate those SMEs for getting involved in international projects.

Openness is negatively correlated with geographic proximity and positively correlated with absorptive capacity, knowledge articulability and teachability. These results are due to the fact that the more open an SME is, the greater capacity to absorb the knowledge it will have. Further, the more open an SME, the more sharing of knowledge within the organization will

be obtained. Finally, the more open an SME is, the more the new knowledge can be taught to the personnel in the SME.

Considering **trust**, it is significantly negatively correlated with duration and positively correlated with communication frequency, networking, absorptive capacity, and knowledge embeddedness. If the duration of the projects increases, trust between partners decreases. When the frequency of the meeting during an international project increases, it would be easier for Turkish SMEs to trust their international counterparts because of the close interaction among them. It should also be stated that being in a network provides SMEs to cooperate and thus after every single cooperation the trust increases to international partners. Moreover, it should be easily stated that if trust between partners is high, it would be easier for embedded knowledge from international partners to extent to SMEs. It can be also stated from the figures that capability of SMEs to absorb knowledge from international partners is positively affected by their high level of trust to the partners.

Networking is negatively correlated with geographic proximity and positively correlated with communication frequency, absorptive capacity and knowledge embeddedness. It can be stated that the more the distance between partners, the most difficult to select the right network to be in. It can be also stated that increasing of the frequency of the meetings results in sharing of more knowledge from project partners which are part in the same network. Further, the greater the absorptive capacity is, the more sharing of knowledge will be obtained within the network. Finally, being in a right network provides more sharing of embedded knowledge.

Geographic proximity is negatively correlated with absorptive capacity, knowledge embeddedness and teachability. It can be easily stated that embedded knowledge to be shared between partners is low when the partners are located in long distances. Further, the more the distance between partners, the more difficult to learn new capabilities from the partner in order to increase SMEs absorptive capacity and thus, teach the knowledge to their personnel.

Like trust, **communication frequency** is positively correlated with knowledge embeddedness. When the frequency of the meetings during an international project increases, it would be easier for embedded knowledge from international partners to extent to SMEs.

Absorptive capacity is positively correlated with knowledge embeddedness, knowledge articulability and teachability. Results show that the greater the absorptive capacity is, the easier to absorb the embedded knowledge in international partners motivate those SMEs for getting involved in international projects. It can be also stated that, codified knowledge and

dealing with new personnel in order to teach them created knowledge within SMEs and new knowledge from international partners will increase the capability of it to understand and learn.

Duration is negatively correlated with knowledge embeddedness. Sharing of embedded knowledge decreases when the duration of projects increases. Duration itself should be evaluated with the frequency of the meeting during the implementation of the project in order to see the significance of it on knowledge embeddedness. This situation should be taken into account for further research.

Knowledge embeddedness is positively correlated with teachability. Embedded knowledge from international partners could be extended to SMEs. The more acquire embedded knowledge, the easier for SMEs to share new knowledge with their personnel.

Knowledge articulability is positively correlated with teachability. As codifiability of knowledge increases, teachability increases and thus, it would be easier for personnel in SMEs to learn and understand.

Table 7 - Zero-order, bi-variate Correlations between All Variables

Pearson Correlation	Transfer Success	Motivation	Openness	Trust	Networking	Geographic proximity	Communication Frequency	Experience	Absorptive Capacity	Duration	Knowledge Embeddedness	Knowledge Articulability	Teachability
Transfer Success	1	,136	,362**	,614**	,449**	-,279*	,125	-,262*	,743**	-,192	,575**	,306*	,298*
Motivation	,136	1	,148	-,034	,172	-,310*	,145	,173	,410**	-,139	,087	,118	,020
Openness	,362**	,148	1	,071	,203	-,276*	,032	,094	,644**	,102	,182	,655**	,555**
Trust	,614**	-,034	,071	1	,638**	-,165	,377**	-,236	,312*	-,283*	,850**	,154	,150
Networking	,449**	,172	,203	,638**	1	-,383**	,285*	,204	,495**	-,131	,565**	,133	,200
Geographic proximity	-,279*	-,310*	-,276*	-,165	-,383**	1	-,151	-,178	-,403**	-,029	-,426**	,002	-,262*
Communication Frequency	,125	,145	,032	,377**	,285*	-,151	1	,131	,118	-,196	,410**	-,003	,024
Absorptive Capacity	,743**	,410**	,644**	,312*	,495**	-,403**	,118	,080	1	-,083	,363**	,531**	,560**
Duration	-,192	-,139	,102	-,283*	-,131	-,029	-,196	-,028	-,083	1	-,372**	,035	,001
Knowledge Embeddedness	,575**	,087	,182	,850**	,565**	-,426**	,410**	-,094	,363**	-,372**	1	,166	,270*
Knowledge Articulability	,306*	,118	,655**	,154	,133	,002	-,003	,131	,531**	,035	,166	1	,669**
Teachability	,298*	,020	,555**	,150	,200	-,262*	,024	,081	,560**	,001	,270*	,669**	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The results of the multiple regression analyses are shown in table 8. It provides the results for transfer success relation with independent variables in which all the variables are included together in order to see their effect on the transfer success. It is clear in table 8 that trust is positively related with transfer success at $P < 0.05$ and absorptive capacity at $P < 0.01$; networking and teachability are negatively related with transfer success at $P < 0.05$. This result is not surprising because networking and being in a network eliminates the pitfalls of geographic distance on knowledge transfer. Openness, knowledge embeddedness and knowledge articulability are also discarded because being in a network also necessitates openness to share ideas, embedded knowledge and articulable knowledge with different organizations in such a network.

Table 8 - Multiple Regression Analyses between All Variables

Model		Unstandardized Coefficients	
		B	Sig.
1	(Constant)	-,060	,083
	Motivation	-,107	,062
	Openness	-,084	,443
	Trust	,337**	,010
	Networking	-,336**	,011
	Geographic proximity	-,006	,908
	Communication Frequency	-,263	,165
	Absorptive Capacity	,936*	,000
	Duration	-,005	,891
	Knowledge Embeddedness	,080	,497
	Knowledge Articulability	-,026	,752
	Teachability	-,182**	,047

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Motivation:

HYPOTHESIS 1: Institutional management of international programme's contribution for motivation of SMEs increases, the transfer success increases.

According to the results of the regression analysis, institutional motivation does not have significant effect on the transfer success. As motivation provides the initiation of the transfer process in literature, next session will be dealing with more on each questions within the context of initiation of this process, and thus, the international project. The results show that we have to reject this hypothesis.

Openness:

HYPOTHESIS 2: The more SMEs are open, the more transfer success can be sustained.

The results showed that openness of Turkish SMEs to international arena and to their environment in terms of cooperation and sharing ideas do not provide them to achieve a successful knowledge transfer. The results show that we have to reject this hypothesis.

Trust:

HYPOTHESIS 3: As national SMEs trust international partners, transfer of knowledge is more successful.

Trust is the variable that has one of the most significant affect on transfer success. Before and during the implementation of the international project, as Turkish SMEs trust their international partners, they will gain more knowledge which has significant effect on their business. The results show that we do not reject this hypothesis.

Networking:

HYPOTHESIS 4: Being in a right network increases the transfer success.

The results showed that networking has a negative effect on transfer success. Networking is defined in this thesis as the communication within a network and being in a right network. According to the result, we have to reject this hypothesis. It can be interpreted as SMEs are not in the right networks or do not have the know-how to take advantage of the networks.

Geographic proximity:

HYPOTHESIS 5: Geographical proximity increases, the transfer success increases.

The results show that we have to reject this hypothesis. Geographic proximity negatively affects the transfer success. As the project managers' answers were gathered to see the importance of the distance, negative relation shows that as geographical proximity increases, the transfer success increases in parallel with the correlation matrix.

Communication Frequency:

HYPOTHESIS 6: If communication frequency increases, the success of transfer of knowledge increases.

The results show that we have to reject this hypothesis. Increasing the number of project meetings does not have any affect to transfer success. Analysis is consistent with other outputs. Transfer success should be deal most with the capacity to absorb knowledge and the trust between partners.

Duration:

HYPOTHESIS 7: If duration of the projects increases, the success of transfer of knowledge increases.

The results show that we have to reject this hypothesis. Whether the duration of the projects is long or short is does not any significant affect on the success of knowledge transfer. SMEs involved in the projects should not take into account the duration of the projects while they are thinking of being a partner in projects.

Absorptive Capacity:

HYPOTHESIS 8: If absorptive capacity increases, the success of transfer of knowledge increases.

Absorptive capacity is the variable that has one of the most significant affect on transfer success. Absorptive capacity is more related with the stage after the implementation of the project. It is the ability of Turkish SMEs to absorb the learned knowledge after the implementation. The results show that we do not reject this hypothesis.

Knowledge Embeddedness:

HYPOTHESIS 9: Transfer success increases as knowledge embeddedness decreases.

The results show that we have to reject this hypothesis. Knowledge embeddedness does not have any affect to transfer success in the model. On the other hand according to the correlation matrix, it should not be surprised with the positive relation between knowledge embeddedness and transfer success because the questions regarding knowledge embeddedness provides the sharing of embedded knowledge between partners.

Knowledge Articulability:

HYPOTHESIS 10: Transfer success increases as knowledge articulability increases.

Contrary with the literature saying that codifiable knowledge is easy to transfer, the results show that we have to reject this hypothesis. Knowledge articulability does not have any affect to transfer success.

Teachability:

HYPOTHESIS 11: Transfer success increases as teachability of the knowledge increases.

Parallel with the literature saying that teachability within the firm is the final stage in the transfer process for internalization of the transferred knowledge, the more teachability of the knowledge, the more transfer success. On the other hand, the results show that we have to reject this hypothesis. Teachability of the knowledge has a negative effect on the transfer success in this research sample. Detail discussion will be shown in the next sessions.

4.5.2 Descriptive Analysis

4.5.2.1 Project Type

It should be noted that in general FPs and EUREKA projects were analyzed in terms of SMEs' transfer success in the international arena. It should be useful when we compare FP projects with EUREKA projects in terms of transfer success and other variables. As the answer to the question on Project Type has two perspectives (Yes or No), Independent samples t-test was applied to test if there is a significant difference between the groups, FP projects and EUREKA projects.

According to the results of Independent Samples t-test in table 9, with the assumption that variances between groups are equal, the condition of $p < 0.05$ is not satisfied for motivation, openness, trust, networking, geographic proximity (distance), communication frequency, absorptive capacity, duration and knowledge embeddedness (getting embedded knowledge from international partners). Thus there is no significant difference between the groups which means that being a partner whether in FP or EUREKA project do not have a significant effect on these variables and transfer success, as well. Further, the condition of $p < 0.05$ is satisfied for experience, knowledge articulability and teachability. Thus there is significant difference between the groups which means that being a partner whether in FP or EUREKA project do have a significant effect on these variables.

Table 10 shows comparison of being a partner in a EUREKA project and FP project on variables. We can state that SMEs which are partners in EUREKA projects have more R&D experience. When we look at knowledge articulability, comparing being a partner in a EUREKA project and FP project, SMEs which are partners in EUREKA projects have more codified knowledge within their organizations. With regards to teachability, comparing being a partner in a EUREKA project and FP project, SMEs which are partners in EUREKA projects can teach their new personnel the new knowledge from international partners more easily. This helps new personnel internalize the created knowledge.

Table 9 - Independent Samples t-test for Project Type

Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	Sig. (2-tailed)
Transfer Success	Equal variances assumed	1,25	0,268	0,337
	Equal variances not assumed			0,288
Motivation	Equal variances assumed	4,889	0,031	0,066
	Equal variances not assumed			0,114
Openness	Equal variances assumed	0,86	0,358	0,457
	Equal variances not assumed			0,436
Trust	Equal variances assumed	1,766	0,189	0,297
	Equal variances not assumed			0,261
Networking	Equal variances assumed	2,223	0,141	0,709
	Equal variances not assumed			0,688
Geographic proximity	Equal variances assumed	4,648	0,035	0,426
	Equal variances not assumed			0,474
Communication Frequency	Equal variances assumed	0,046	0,831	0,989
	Equal variances not assumed			0,988
Experience	Equal variances assumed	0,691	0,409	0,022
	Equal variances not assumed			0,016
Absorptive Capacity	Equal variances assumed	1,397	0,242	0,703
	Equal variances not assumed			0,683
Duration	Equal variances assumed	8,977	0,004	0,082
	Equal variances not assumed			0,028
Knowledge Embeddedness	Equal variances assumed	2,302	0,135	0,449
	Equal variances not assumed			0,428
Knowledge Articulability	Equal variances assumed	0,462	0,499	0,002
	Equal variances not assumed			0,003
Teachability	Equal variances assumed	1,148	0,288	0,036
	Equal variances not assumed			0,057

Table 10 - Independent Samples t-test for Project Type / Group Statistics

Group Statistics			
	Project Type	N	Mean
Transfer Success	FPs Project	20	0,032
	EUREKA Project	39	-0,1004
Motivation	FPs Project	19	-0,26764
	EUREKA Project	40	0,120208
Openness	FPs Project	20	0,070805
	EUREKA Project	40	-0,03111
Trust	FPs Project	20	0,12489
	EUREKA Project	39	-0,07133
Networking	FPs Project	20	0,00663
	EUREKA Project	40	-0,03499
Geographic proximity	FPs Project	20	-0,1463
	EUREKA Project	39	0,075008
Communication Frequency	FPs Project	20	-0,00048
	EUREKA Project	40	0,00026
Experience	FPs Project	20	-0,19925
	EUREKA Project	40	0,099628
Absorptive Capacity	FPs Project	20	-0,04277
	EUREKA Project	40	0,010317
Duration	FPs Project	20	-0,3177
	EUREKA Project	40	0,158808
Knowledge Embeddedness	FPs Project	20	0,119295
	EUREKA Project	38	-0,0381
Knowledge Articulability	FPs Project	20	-0,38381
	EUREKA Project	40	0,191883
Teachability	FPs Project	20	-0,22392
	EUREKA Project	40	0,109418

4.5.2.2 Location

It is important to compare the location of the SMEs in order to see its effect on knowledge transfer. As the answer to the question on the location of SMEs has four perspectives (Industrial Zone, Techno-park, Independent or other), One-Way Analysis of Variance (ANOVA) test was applied to test if there is a significant difference between the groups differ according to their locations. Being a parametric test, ANOVA assumes that the data is numerical which represents groups that are normally distributed, independent and variances and the sizes of the groups are similar.

According to the results of One-Way Analysis of Variance in table 11, there is no significant difference between the groups under the condition of $p < 0.05$ is not satisfied for transfer success, motivation, openness, trust, networking, geographic proximity (distance), communication frequency, absorptive capacity, knowledge embeddedness (getting embedded knowledge from international partners) and knowledge articulability. This means that whether the SME is located in industrial zone, techno-park, independent or technology development zone does not have significant affect on the successfulness of knowledge transfer in general. Further, the condition of $p < 0.05$ is satisfied for experience and teachability.

Table 12 shows that SMEs which are located in technological development zones have more experience than other SMEs. Besides, Table 13 SMEs which are located in techno-parks and technology development zones are significantly different than SMEs which are independent but are not significantly different from each other in terms of experience.

Table 14 shows that SMEs which are located in industrial zones have much teachability than other SMEs in terms of their total number of employees. Besides, Table 15 SMEs which are located in industrial zones and technology development zones are significantly different than SMEs which are located in techno-parks but are not significantly different from each other. SMEs which are located in techno-parks and which are independent are significantly different from each other.

Table 11 - One-Way Analysis of Variance for Location / Robust Tests

Robust Tests of Equality of Means			
		Statistic ^a	Sig.
Transfer Success	Welch	0,957	0,444
	Brown-Forsythe	0,701	0,578
Motivation	Welch	1,018	0,418
	Brown-Forsythe	1,276	0,333
Openness	Welch	1,043	0,407
	Brown-Forsythe	1,063	0,381
Trust	Welch	2,282	0,13
	Brown-Forsythe	2,294	0,115
Networking	Welch	2,524	0,104
	Brown-Forsythe	2,936	0,056
Geographic proximity	Welch	2,002	0,167
	Brown-Forsythe	2,598	0,087
Communication Frequency	Welch	0,546	0,656
	Brown-Forsythe	1,344	0,291
Experience	Welch	7,422	0,004
	Brown-Forsythe	6,682	0,003
Absorptive Capacity	Welch	0,342	0,796
	Brown-Forsythe	0,531	0,67
Knowledge Embeddedness	Welch	3,572	0,047
	Brown-Forsythe	2,076	0,162
Knowledge Articulability	Welch	0,579	0,638
	Brown-Forsythe	0,382	0,766
Teachability	Welch	4,324	0,023
	Brown-Forsythe	4,821	0,006
a. Asymptotically F distributed.			

Table 12 - Descriptives for Experience

Experience		
	N	Mean
Industrial Zone	4	0,02975
Techno-park	25	0,095848
Independent	19	-0,340216
Other	12	0,329083
Total	60	0,000002

Table 13 - Multiple Comparisons for Experience

Multiple Comparisons			
Experience			
LSD			
(I) Location	(J) Location	Mean Difference (I-J)	Sig.
Industrial Zone	Techno-park	-0,066098	0,772
	Independent	0,3699658	0,116
	Other	-0,2993333	0,224
Techno-park	Industrial Zone	0,066098	0,772
	Independent	,4360638*	0,001
	Other	-0,2332353	0,121
Independent	Industrial Zone	-0,3699658	0,116
	Techno-park	-,4360638*	0,001
	Other	-,6692991*	0
Other	Industrial Zone	0,2993333	0,224
	Techno-park	0,2332353	0,121
	Independent	,6692991*	0

*. The mean difference is significant at the 0.05 level.

Table 14 - Descriptives for Teachability

Teachability		
	N	Mean
Industrial Zone	4	0,444675
Techno-park	25	-0,270912
Independent	19	0,116589
Other	12	0,2231
Total	60	-0,001695

Table 15 - Multiple Comparisons for Teachability

Teachability			
LSD			
(I) Location	(J) Location	Mean Difference (I-J)	Sig.
Industrial Zone	Techno-park	,7155870*	0,018
	Independent	0,3280855	0,279
	Other	0,221575	0,484
Techno-park	Industrial Zone	-,7155870*	0,018
	Independent	-,3875015*	0,023
	Other	-,4940120*	0,013
Independent	Industrial Zone	-0,3280855	0,279
	Techno-park	,3875015*	0,023
	Other	-0,1065105	0,598
Other	Industrial Zone	-0,221575	0,484
	Techno-park	,4940120*	0,013
	Independent	0,1065105	0,598

*. The mean difference is significant at the 0.05 level.

4.5.2.3 Size

Parallel to literature, questionnaire was asked to provide their total number of employees in the related SMEs. It could be analyzed whether there is a significant difference on the success of knowledge transfer according to SMEs size. As the answer to the question on the size of SMEs has five perspectives (< 10, 10-20, 21-50, 51-100 or 151-250), One-Way Analysis of Variance (ANOVA) test was applied to test if there is a significant difference between the groups differ according to their locations. Being a parametric test, ANOVA assumes that the data is numerical which represents groups that are normally distributed, independent and variances and the sizes of the groups are similar.

According to the results of One-Way Analysis of Variance in table 16, there is no significant difference between the groups (the condition of $p < 0.05$ is not satisfied) for transfer success, openness, trust, networking, geographic proximity (distance), communication frequency, absorptive capacity, knowledge embeddedness (getting embedded knowledge from international partners), knowledge articulability and teachability. This means that the situation of whether it is a micro, small or bigger sized SMEs does not have significant affect on these variables. Further, the condition of $p < 0.05$ is satisfied for motivation and experience. Thus, there is a significant difference between the size of SMEs on motivation and experience.

Table 17 shows those SMEs which have total number of employees between 10 and 20 are motivated much more than other SMEs in terms of their total number of employees. Besides, Table 18 SMEs which have total number of employees less than 10 and between 10 and 20 are significantly different than SMEs which have total number of employees between 151 and 250 but are not significantly different from each other in terms of motivation. Further, SMEs which have total number of employees between 10 and 20 is significantly different than SMEs which have total number of employees between 21 and 50 and 51 and 100.

Table 19 shows that SMEs which have total number of employees between 51 and 100 do have much experience than other SMEs in terms of their total number of employees. Besides, Table 20 SMEs which have total number of employees less than 10 is significantly different than SMEs which have total number of employees between 51 and 100 in terms of experience. SMEs which have total number of employees less than between 10 and 20, 21 and 50 and 51 and 100 are significantly different from each other. Further, SMEs which have total number of employees between 21 and 50 and 51 and 100 are significantly different from each other.

Table 16 - One-Way Analysis of Variance for Location / Robust Tests

Robust Tests of Equality of Means			
		Statistic ^a	Sig.
Transfer Success	Welch	0,569	0,688
	Brown-Forsythe	0,681	0,609
Motivation	Welch	3,605	0,019
	Brown-Forsythe	3,249	0,020
Openness	Welch	1,389	0,265
	Brown-Forsythe	1,441	0,236
Trust	Welch	0,873	0,493
	Brown-Forsythe	0,743	0,567
Networking	Welch	1,398	0,262
	Brown-Forsythe	1,395	0,250
Geographic proximity	Welch	1,661	0,190
	Brown-Forsythe	0,965	0,437
Communication Frequency	Welch	1,997	0,124
	Brown-Forsythe	1,649	0,180
Experience	Welch	8,859	0,000
	Brown-Forsythe	7,074	0,000
Absorptive Capacity	Welch	0,117	0,975
	Brown-Forsythe	0,136	0,968
Knowledge Embeddedness	Welch	4,311	0,008
	Brown-Forsythe	2,094	0,096
Knowledge Articulability	Welch	0,625	0,648
	Brown-Forsythe	0,715	0,586
Teachability	Welch	1,644	0,192
	Brown-Forsythe	1,893	0,130
a. Asymptotically F distributed.			

Table 17 - Descriptives for Motivation

Motivation		
	N	Mean
< 10	11	0,229555
10-20	15	0,439633
21-50	11	-0,128
51-100	10	-0,29988
151-250	12	-0,4158
Total	59	-0,004692

Table 18 - Multiple Comparisons for Motivation

Motivation			
LSD			
(I) Size (Total # of Personnel)	(J) Size (Total # of Personnel)	Mean Difference (I-J)	Sig.
< 10	10-20	-0,2100788	0,455
	21-50	0,3575545	0,238
	51-100	0,5294345	0,091
	151-250	,6453545*	0,032
10-20	< 10	0,2100788	0,455
	21-50	,5676333*	0,047
	51-100	,7395133*	0,013
	151-250	,8554333*	0,003
21-50	< 10	-0,3575545	0,238
	10-20	-,5676333*	0,047
	51-100	0,17188	0,578
	151-250	0,2878	0,331
51-100	< 10	-0,5294345	0,091
	10-20	-,7395133*	0,013
	21-50	-0,17188	0,578
	151-250	0,11592	0,702
151-250	< 10	-,6453545*	0,032
	10-20	-,8554333*	0,003
	21-50	-0,2878	0,331
	51-100	-0,11592	0,702

*. The mean difference is significant at the 0.05 level.

Table 19 - Descriptives for Experience

Experience		
	N	Mean
< 10	11	-0,099945
10-20	15	0,14768
21-50	11	-0,237827
51-100	10	0,49448
151-250	13	-0,264954
Total	60	0,000002

Table 20 - Multiple Comparisons for Experience

Experience			
LSD			
(I) Size (Total # of Personnel)	(J) Size (Total # of Personnel)	Mean Difference (I-J)	Sig.
< 10	10-20	-0,2476255	0,134
	21-50	0,1378818	0,434
	51-100	-,5944255*	0,002
	151-250	0,1650084	0,331
10-20	< 10	0,2476255	0,134
	21-50	,3855073*	0,021
	51-100	-,3468000*	0,043
	151-250	,4126338*	0,01
21-50	< 10	-0,1378818	0,434
	10-20	-,3855073*	0,021
	51-100	-,7323073*	0
	151-250	0,0271266	0,872
51-100	< 10	,5944255*	0,002
	10-20	,3468000*	0,043
	21-50	,7323073*	0
	151-250	,7594338*	0
151-250	< 10	-0,1650084	0,331
	10-20	-,4126338*	0,01
	21-50	-0,0271266	0,872
	51-100	-,7594338*	0

*. The mean difference is significant at the 0.05 level.

4.5.2.4 Award System

After being in an international R&D project, SMEs were asked whether they have an award system or not in order to make their employees to work more on international projects. As the answer to the question on award system has two perspectives (Yes or No), Independent samples t-test was applied to test if there is a significant affect when applying an award system within the firm.

According to the results of Independent Samples t-test table 21, with the assumption that variances between groups are equal, the condition of $p < 0.05$ is not satisfied for motivation, openness, trust, networking, communication frequency, experience, absorptive capacity, duration knowledge embeddedness (getting embedded knowledge from international partners) and knowledge articulability. Thus there is no significant difference between the groups which means that whether SMEs have an award system or not does not have a significant effect on these variables and transfer success, as well. Further, the condition of $p < 0.05$ is satisfied for geographic proximity (distance) and teachability. Thus there is significant difference between the groups which means that whether SMEs have an award system or not does have a significant effect on these variables.

Table 22 shows comparison of having an award system or not within SMEs on variables. We can state that SMEs which do not have an award system do not care the distance to the international partners. With regards to teachability, comparing having an award system or not within SMEs, SMEs which do not have an award system can teach their new personnel the new knowledge from international partners more easily. Thus, personnel internalize the created knowledge and learn about international dimension of projects.

Table 21 - Independent Samples t-test for Award System

Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	Sig. (2-tailed)
Transfer Success	Equal variances assumed	3,939	0,052	0,682
	Equal variances not assumed			0,712
Motivation	Equal variances assumed	0,468	0,497	0,143
	Equal variances not assumed			0,141
Openness	Equal variances assumed	2,328	0,133	0,256
	Equal variances not assumed			0,223
Trust	Equal variances assumed	0,06	0,807	0,325
	Equal variances not assumed			0,332
Networking	Equal variances assumed	0,671	0,416	0,234
	Equal variances not assumed			0,239
Geographic proximity	Equal variances assumed	0,02	0,887	0,000
	Equal variances not assumed			0,000
Communication Frequency	Equal variances assumed	0,067	0,797	0,69
	Equal variances not assumed			0,656
Experience	Equal variances assumed	0,142	0,708	0,283
	Equal variances not assumed			0,276
Absorptive Capacity	Equal variances assumed	0,174	0,678	0,275
	Equal variances not assumed			0,309
Duration	Equal variances assumed	1,301	0,259	0,999
	Equal variances not assumed			0,999
Knowledge Embeddedness	Equal variances assumed	2,554	0,116	0,706
	Equal variances not assumed			0,693
Knowledge Articulability	Equal variances assumed	0,383	0,539	0,134
	Equal variances not assumed			0,151
Teachability	Equal variances assumed	2,196	0,144	0,044
	Equal variances not assumed			0,058

Table 22 - Independent Samples t-test for Award System / Group Statistics

Group Statistics			
	Award System	N	Mean
Transfer Success	No	36	-0,07211
	Yes	22	-0,01595
Motivation	No	36	-0,09551
	Yes	22	0,201223
Openness	No	36	-0,03267
	Yes	22	0,117809
Trust	No	36	0,069536
	Yes	21	-0,11858
Networking	No	36	-0,05643
	Yes	22	0,074082
Geographic proximity	No	36	0,4291
	Yes	22	-0,66939
Communication Frequency	No	36	-0,00708
	Yes	22	0,014859
Experience	No	36	-0,04341
	Yes	22	0,096882
Absorptive Capacity	No	36	-0,04572
	Yes	22	0,103418
Duration	No	36	-0,01733
	Yes	22	-0,01781
Knowledge Embeddedness	No	36	0,043311
	Yes	21	-0,03548
Knowledge Articulability	No	36	0,138978
	Yes	22	-0,13261
Teachability	No	36	0,136914
	Yes	22	-0,17687

4.5.3 General Comments on Survey Questions

MOTIVATION:

Means of all responses for the variable 'motivation' demonstrate a negatively skewed histogram as shown in figure 4. This means that, TUBITAK's contribution to motivation of SMEs in terms of initiating new projects is considerably good.

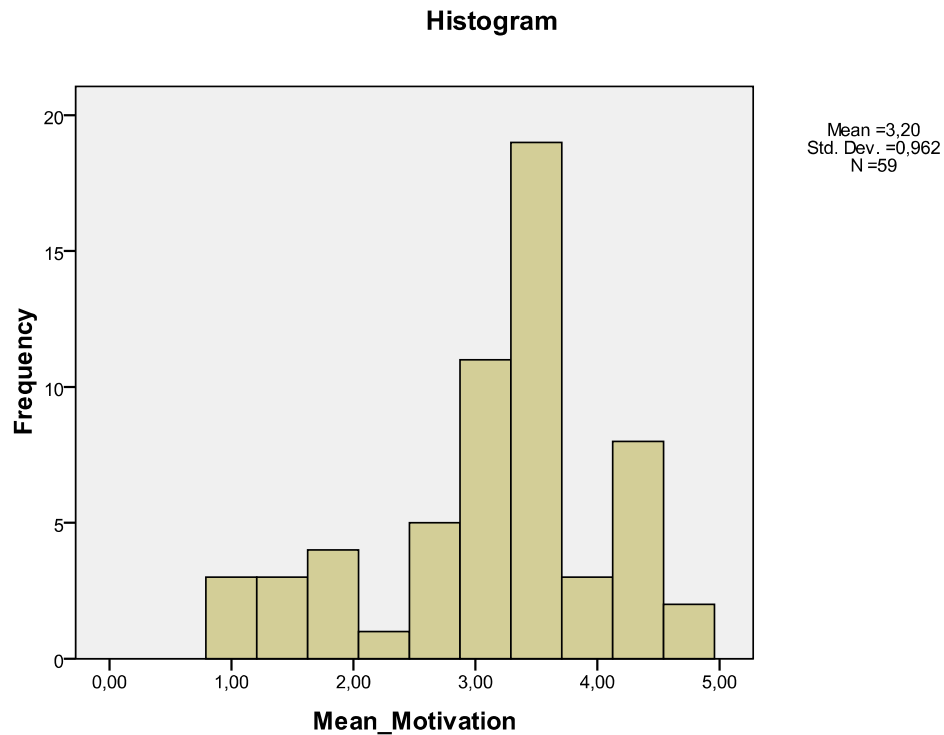


Figure 4 - Histogram of Means-Motivation

However, it is worth to go into some detailed analysis within the context of this variable. The participants were asked about their opinion whether the international events contribute to establishment of co operations between national SMEs and international partners. The results in figure 5 show that 17 % of participants neither agree nor disagree with this statement. Therefore, this may be evaluated that there is vagueness in the setting objectives of the international events. This may be due to the fact that participants are not certain about the objectives of the international events, either. Therefore, they did not compare what level of contribution is expected from the international events and what the actual situation is. Therefore, we can recommend that institutional management of the programmes may increase effectiveness of international events via setting objectives clearer in practice and also communicating those objectives to the national SMEs more clearly.

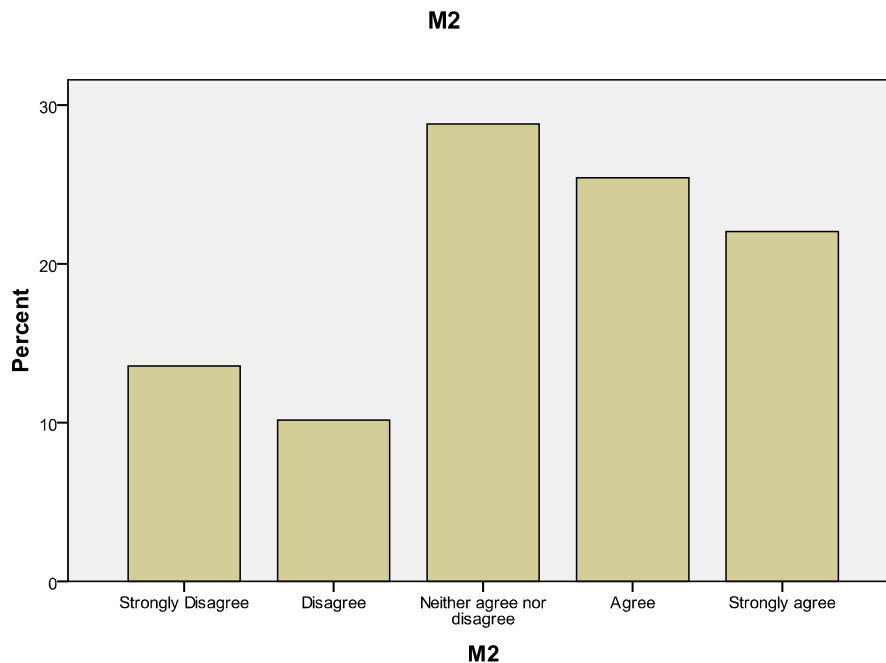


Figure 5 - Responses to Question M2

In addition, when the participants were asked about whether the events organized helped establishment of new projects, they demonstrated considerably different opinions: while 23,7 % strongly agreed, 20,3 % disagreed, and 22% neither agreed nor disagreed (figure 6). Therefore, we can conclude that while the events are useful for some SMEs, they are not useful for some others. This may be due to the fact that the objectives and content of the events are not beneficial for all SMEs as expected. Therefore, we can recommend that institutional management of the programmes may analyze real and peculiar needs of SMEs and group them in categories as per their needs. Accordingly, institutional management of the programmes can offer events which are in line with the needs of specific groups of SMEs. Thus, the events may turn into more useful tools for SMEs to initiate new projects.

The participants were asked whether TUBITAK provided scientific support during development of stages of project ideas. The results are significantly negative for this question. 23,7 % strongly disagreed, 23,7 % disagreed, 32,2 % neither agreed nor disagreed with the statement (figure 7). Therefore, we can conclude that the national SMEs are not satisfied with the support they receive from the TUBITAK on this matter. We can recommend that some mechanisms can be developed for provision of scientific support to SMEs during development of stages of project initiatives, or connect the SMEs with the technical sources within the organization. Thus, efficiency of projects will increase with rational and clearer objectives which will also be more successful in finding international partners.

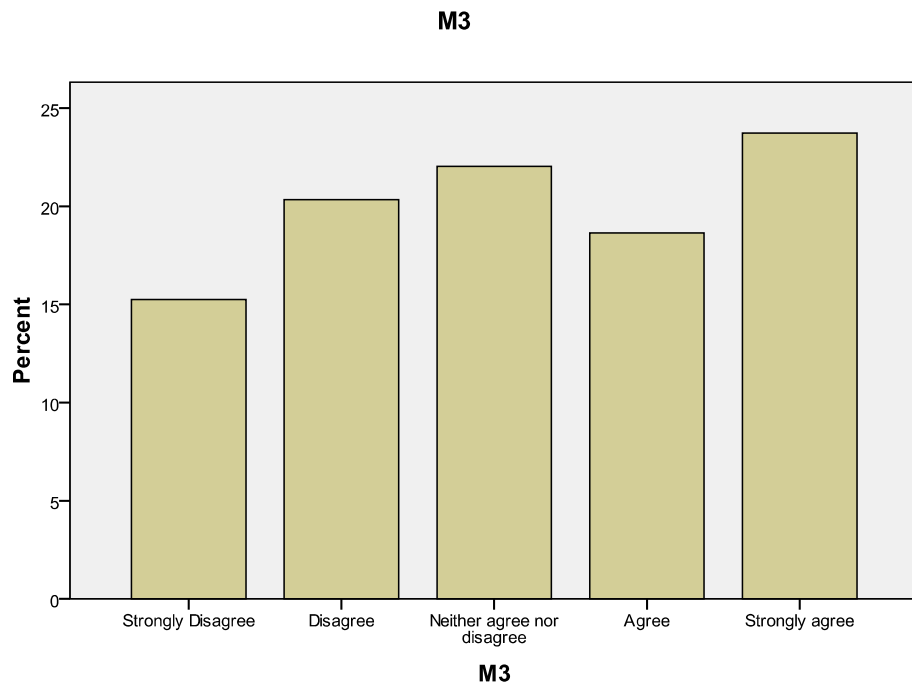


Figure 6 - Responses to Question M3

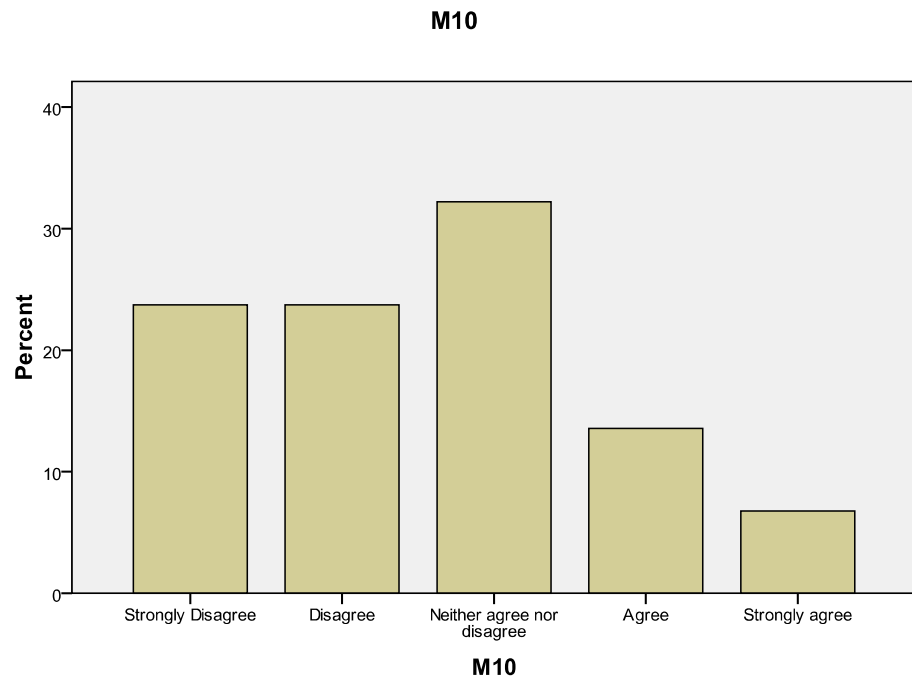


Figure 7 - Responses to Question M10

OPENNESS:

When we look at the means of all responses to the variable 'openness', we can see a negatively skewed histogram as shown in figure 8. Therefore, we can conclude that national SMEs demonstrate considerably open attitude.

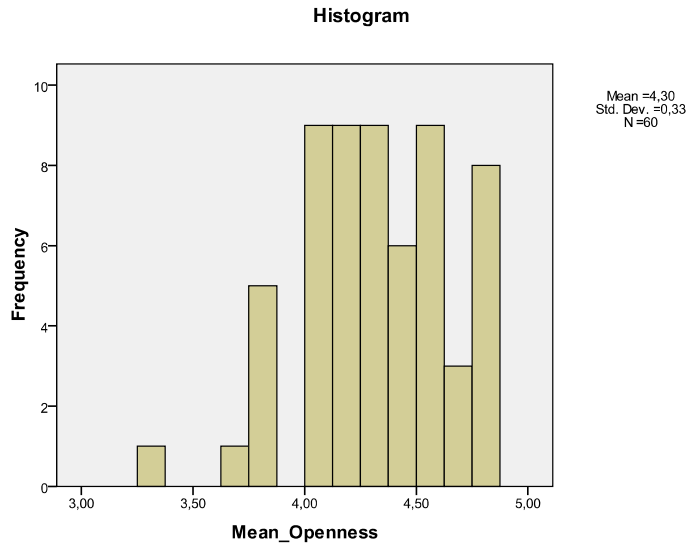


Figure 8 - Histogram of Means-Openness

However, it is worth to mention some detailed results from this variable. The SMEs were asked whether the awarding system that the management of SMEs provide to the personnel sufficient or not. The results show that 41,7 % of the SMEs neither agree nor disagree with the statement (figure 9). Therefore, we can conclude that the personnel are not very much certain on the requirement of an award system therefore they could not measure their satisfaction on this matter. We can recommend TUBITAK to raise awareness on awarding system and even develop some standards and guidelines for implementation of award system. TUBITAK can support the SMEs to develop skills in terms of establishment and effectively implementation of award system.

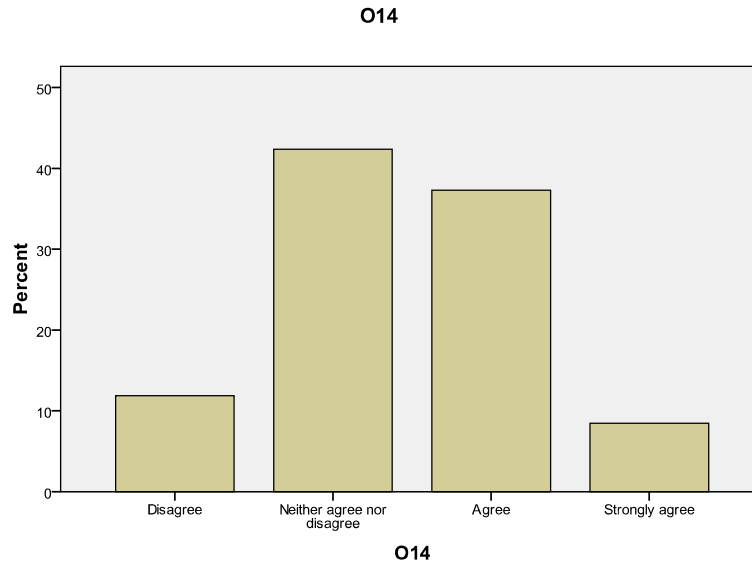


Figure 9 - Responses to Question M10

TRUST:

Histogram of all the responses received within the context of the variable 'trust' demonstrate a normal distribution, which can be considered that there is an average level of trust between the national SMEs and international partners (figure 10).

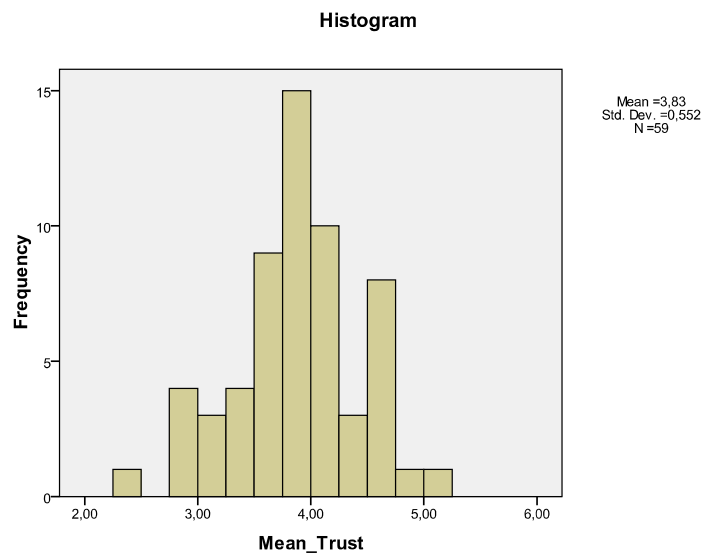


Figure 10 - Histogram of Means-Trust

In this regard, the participants were asked whether trust between the SMEs and the international partners is an important factor for initiation of new projects. The results confirm that 12 % think it is important, 27 % think that it is highly important and 19 % think that it is an indispensable factor (figure 11).

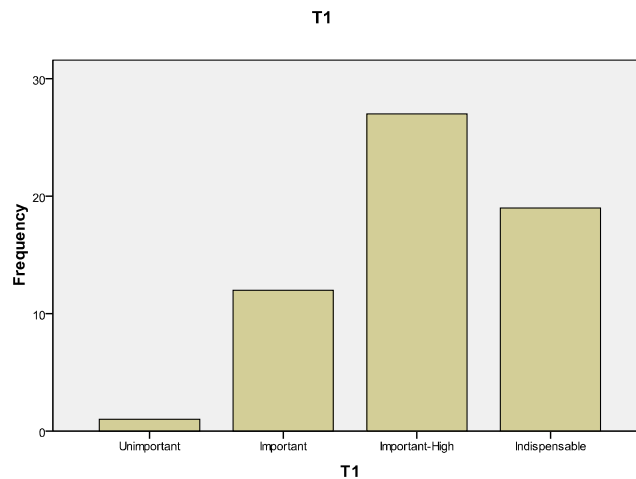


Figure 11 - Responses to Question T1

Under this variable, the SMEs were also asked whether they think that the international partners can copy their products or not. 41,7 % agree and 40 % strongly agree with this statement (figure 12). These results confirm that trust between the national SMEs and the international partners can be undermined due to this fact. Therefore, we can recommend that, mechanisms for not allowing copying of products might be useful in terms of increasing trust between the two parties.

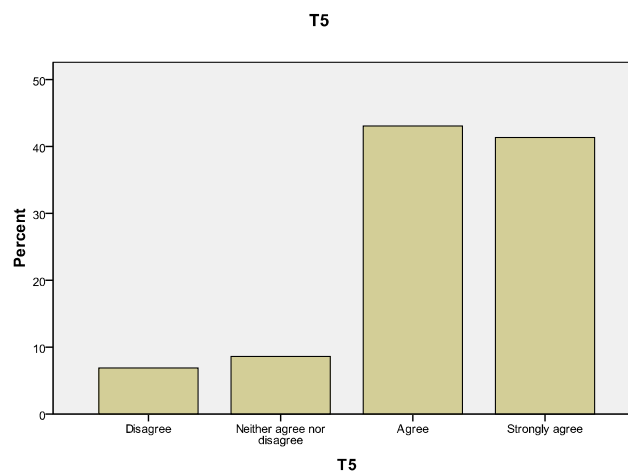


Figure 12 - Responses to Question T5

NETWORKING:

Networking is an indispensable tool for the national SMEs in order to get informed about their environment and other resources in their sectors. Thus, they can capture further opportunities for self development, strengthening their capacities and establish new co operations. However, they can achieve these objectives only if they are involved in the right networks, and they are active in the networks. In this regard, the national SMEs in Turkey are supported by TUBITAK for selecting the right network as per their area of specialization and means for being active in the network. In addition, the SMEs can themselves take initiative and get involved in the networks. The outcomes of regression analysis showed that the contribution of networking is not much significant to knowledge transfer. Therefore, this brings about the question of being in the right network and using the right methods for being active in the networks. The indicator of being in the right network can be the number and quality of projects that SMEs initiate as a result of being active in a particular network. In this regard, the researcher asked SMEs whether they have initiated any projects as a result of their being in those networks. The results showed that there are not much indicator in this sense. The number of projects initiated is considerably less.

Under the variable 'networking, the participants were asked which method they used to communicate with their international partners. The results show that, 50 % use internet, but very limited through phone, face-to-face meetings and general network meetings (figure 13).

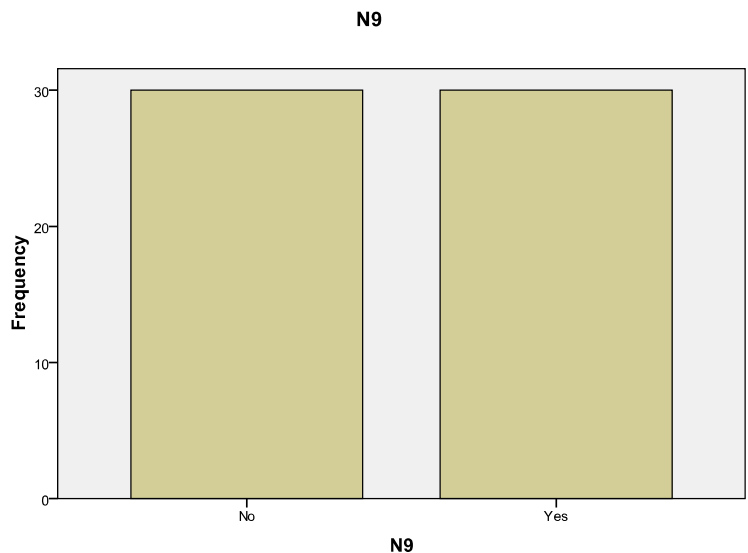


Figure 13 - Responses to Question N9

On the other hand, 85 % mentioned that English language is used for communication in the networks. However, the results show that the SMEs do not have considerable problem with English. 70 % mention that they do not have any problem with communication in English, and 70 % mentioned that they did not face any problem in communication with international partners. Therefore, we can conclude that the SMEs have the necessary foreign language capacity required for communication with international partners.

GEOGRAPHIC PROXIMITY:

Under the variable ‘geographic proximity’, the SMEs were asked whether cultural similarities with international parties are important for implementation of projects or not. 35 % mentioned that they think it has a low importance, while only 20 % think it is important (figure 14). Therefore, we can conclude that cultural similarities are not very important factor for implementation of projects.

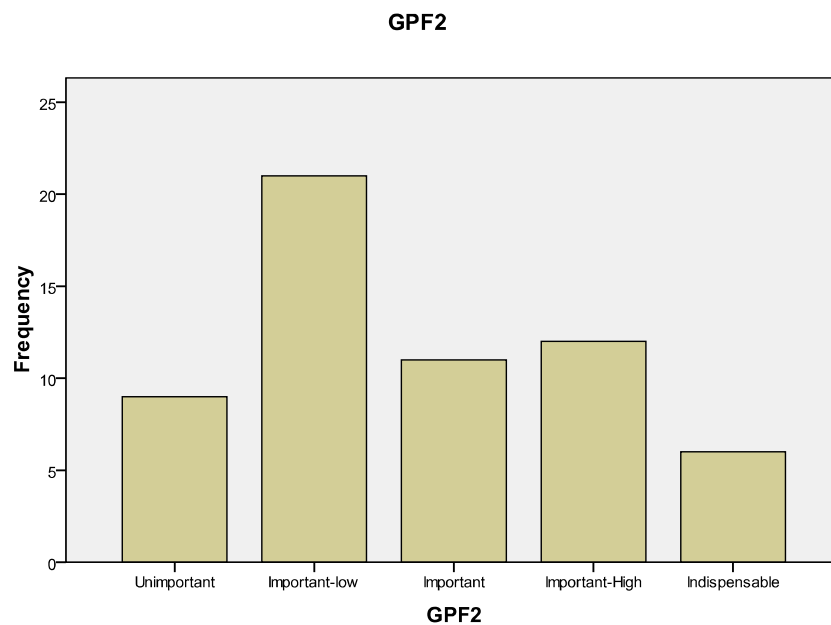


Figure 14 - Responses to Question GPF2

On the other hand, 31,7 % mentioned that face-to-face meetings are indispensably, 30 % highly and 28,3 % think that they are important for implementation (figure 15).

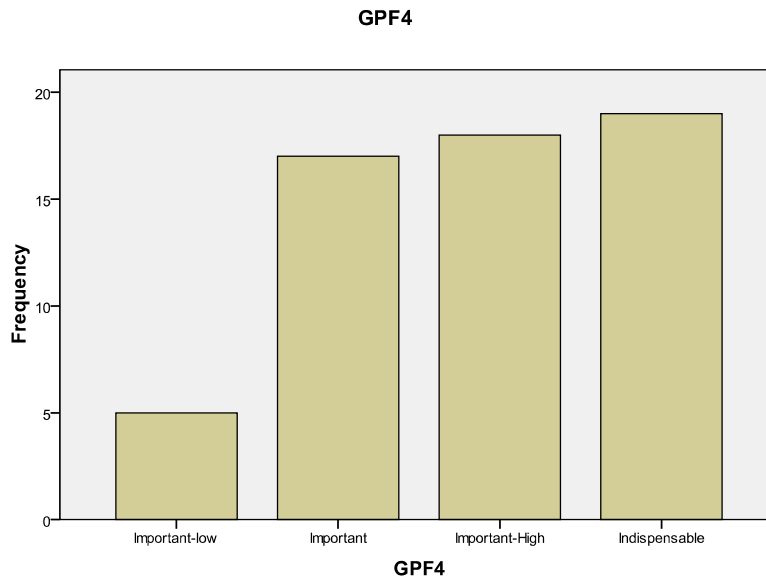


Figure 15 - Responses to Question GPF4

In this regard, we can recommend that development of mechanisms which will increase frequency of face-to-face meetings will contribute to establishment and better implementation of co operations.

COMMUNICATION FREQUENCY:

In line with the results reached in geographic proximity, 81,7 % of participants mentioned that their international partners share their technical knowledge via internet (figure 16).

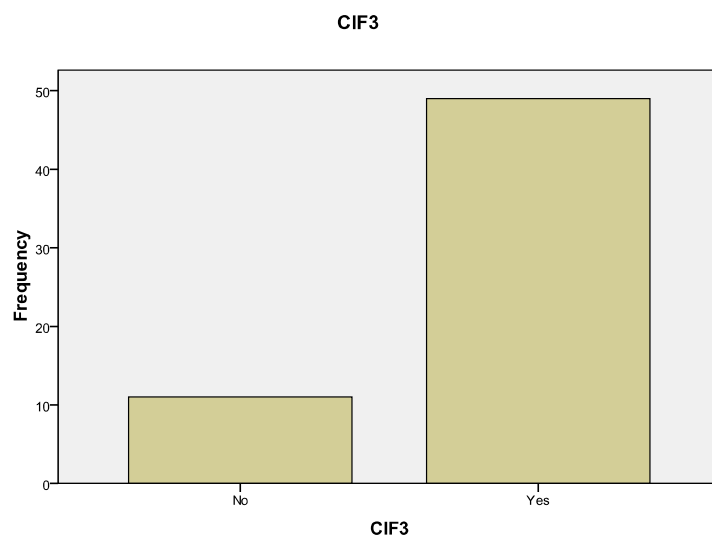


Figure 16 - Responses to Question CIF3

In addition, 31,7 % of participants found face-to-face meetings important, 38,3 % mentioned they are highly important and 16,7 % mentioned that they are indispensable for better implementation of cooperative projects (figure 17).

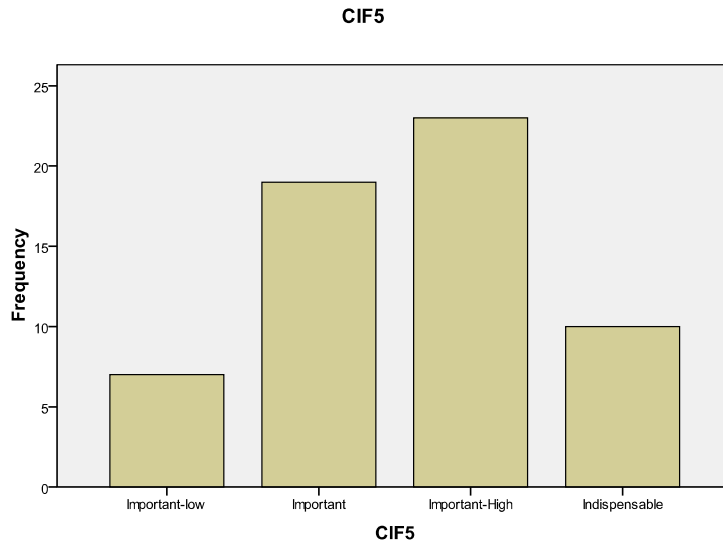


Figure 17 - Responses to Question CIF5

When we look at the number of meetings that SMEs conduct in a year, the below figure summarizes that 40 % mentioned that they can organize only 2 meetings in a year (figure 18). Therefore, we confirm that some mechanisms for enabling face-to-face meetings more often will both contribute to initiation and effective implementation of projects.

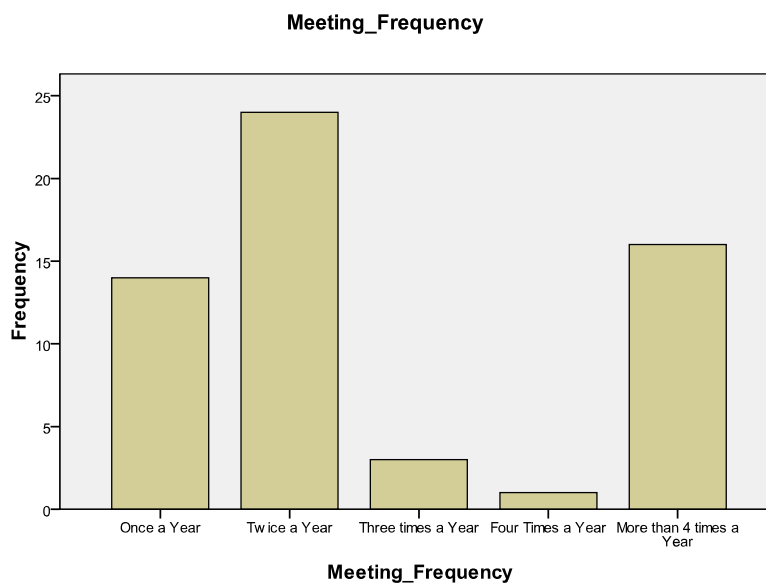


Figure 18 - Responses to Question for Meeting Frequency

DURATION:

The literature stated that length of projects have important factor on transfer of knowledge because the partners find more opportunities to meet and discuss during the projects which is expected to increase amount of knowledge transmitted. The durations of the projects involved in this study are compiled from the document review. Figure 19 summarized that 40 % of the projects are set in 24 months, and 30 % of the projects are set in 36 months. These are mainly the durations of FP and EUREKA projects.

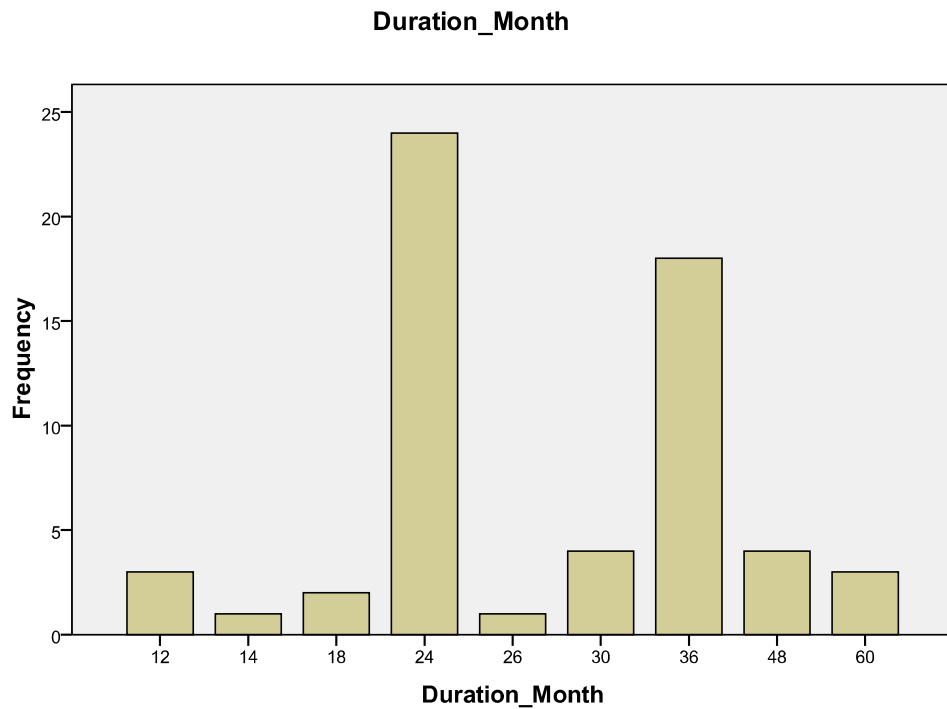


Figure 19 - Duration of Projects in Months

ABSORPTIVE CAPACITY:

Within the context of this variable, impact of knowledge transfer to the SMEs absorptive capacity have been measured. The results demonstrated that, after being a partner in FP and EUREKA projects, technical infrastructure of the SMEs, technological level, ability to identify new R&D project partners, ability to write new projects, project management skills, level of cooperation with international SMEs, RTD performers, ability to develop new and improved products and services, partnering in FP and EUREKA projects, cooperation with industrial associations and groups have significantly increased. On the other hand, tables 23 and 24 show that cooperation with national SMEs and national RTD performers has remained unchanged to the most extent.

Table 23 - Responses to Question AC10

AC10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Remain unchanged	17	28,3	29,8	29,8
	Increased	19	31,7	33,3	63,2
	Increased-too much	21	35,0	36,8	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

When we measured the absorptive capacity of the SMEs, we see that 46,7 % of the SMEs strongly agreed and 48,3 % agreed that they have the capacity to develop and design new products (figure 20). Newly hired personnel can adapt the new knowledge in the firm according to 56,7 % of SMEs (figure 21). 53,3 % of SMEs mentioned that the newly hired personnel always have the necessary education level to learn the works, technology being used and facilities in the SMEs (figure 22).

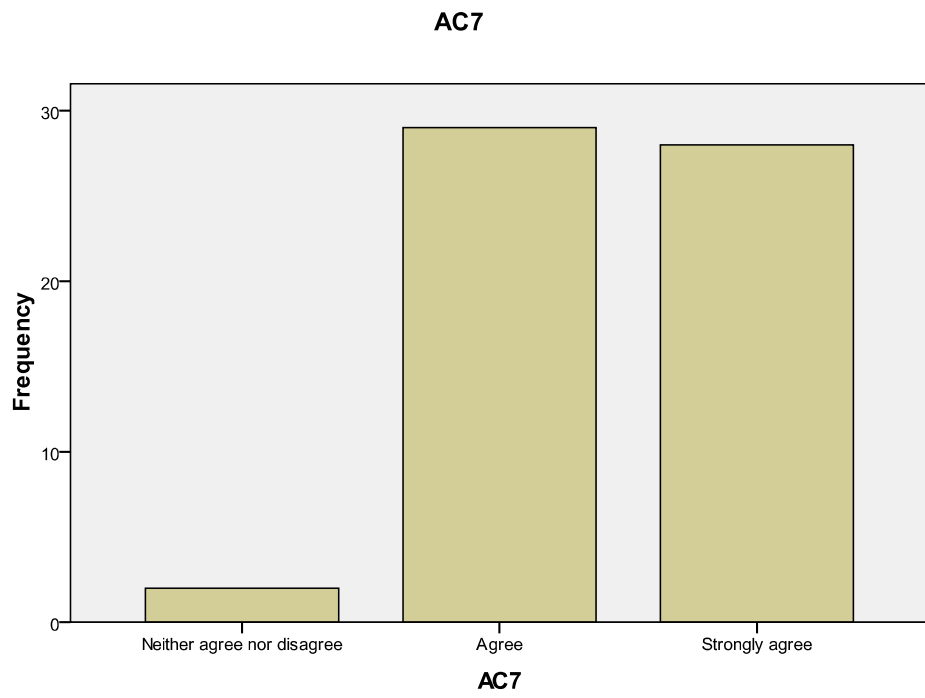


Figure 20 - Responses to Question AC7

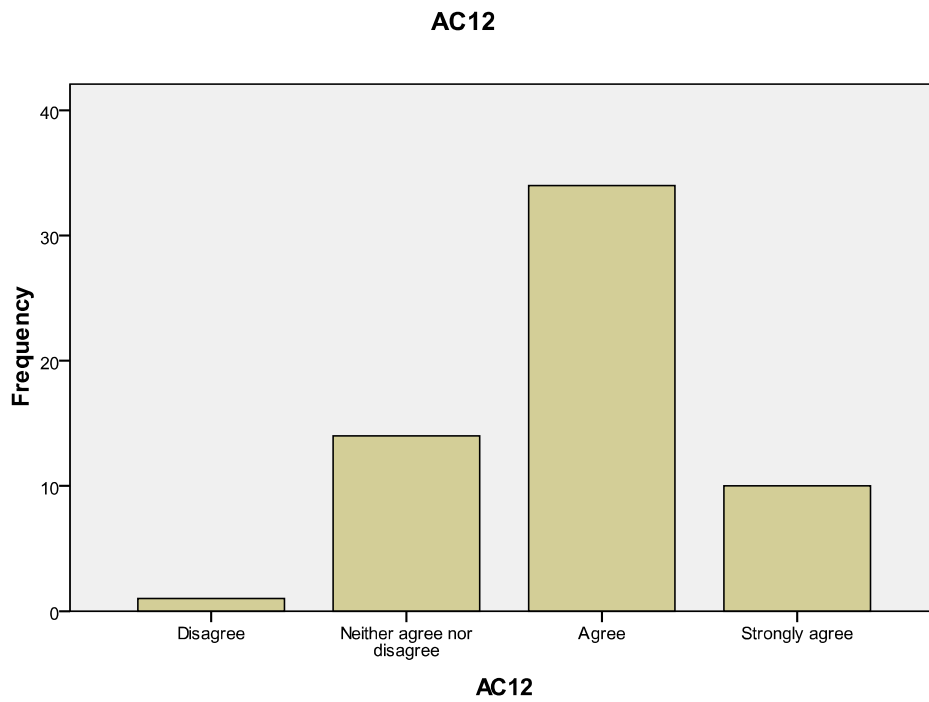


Figure 21 - Responses to Question AC12

AC13

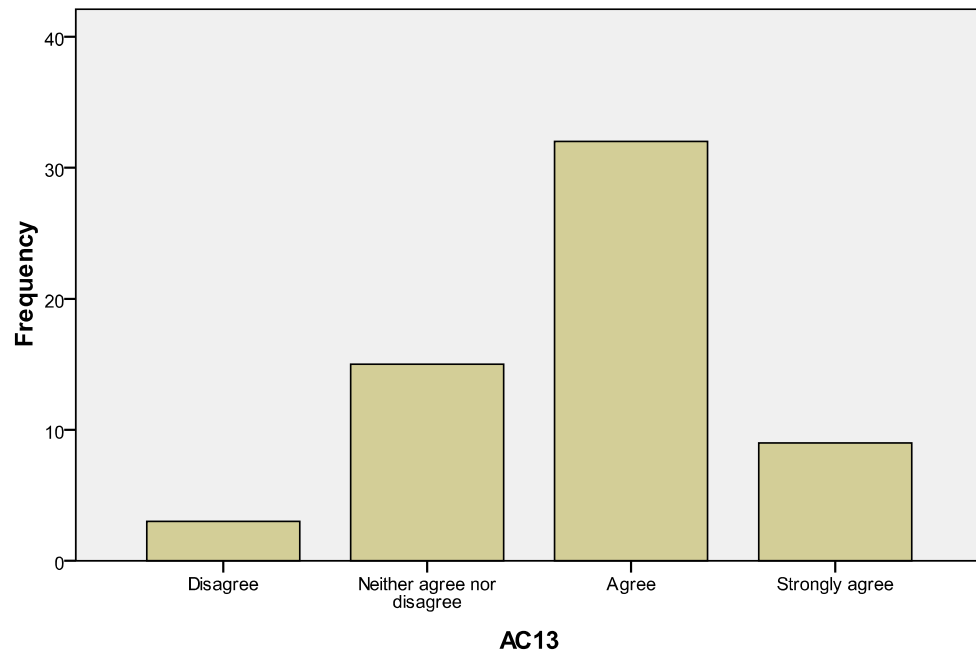


Figure 22 - Responses to Question AC13

KNOWLEDGE EMBEDDEDNESS:

With regards to knowledge embeddedness, this thesis explored whether the knowledge stays embedded in the international partners or the knowledge is transferred towards the national SMEs. The results showed that, the SMEs easily received the knowledge from experienced personnel of the international partners (figure 23). They mentioned that experienced technical personnel participate in the project meetings therefore, these meetings provide a platform which enables sharing of the knowledge (figure 24). The international partners share their technical knowledge with the national SMEs in those project meetings (figure 25). They also mentioned that they receive technical knowledge in written format as well (figure 26). Thus, we can conclude that the international projects enable transmitting knowledge from international partners towards national SMEs.

On the other hand, it is worth to mention that the results show that the national SMEs did not have much opportunity to utilize software programmes of the international partners which are used in the implementation of projects (figure 27). We can recommend that this utilization may help national SMEs to practice the knowledge they receive, which would reinforce learning. Thus, sharing of the software can be promoted in the projects.

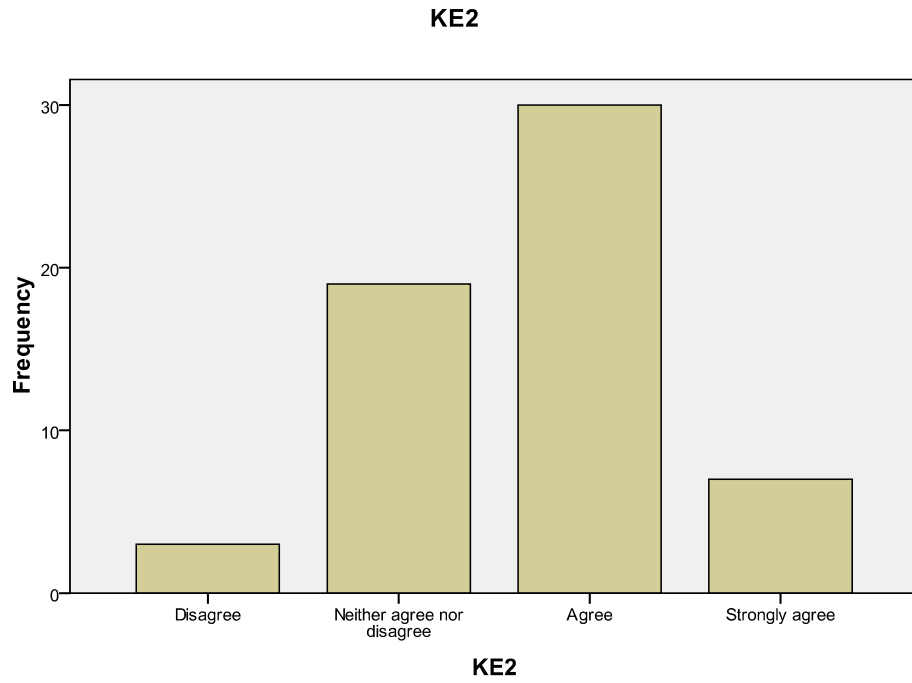


Figure 23 - Responses to Question KE2

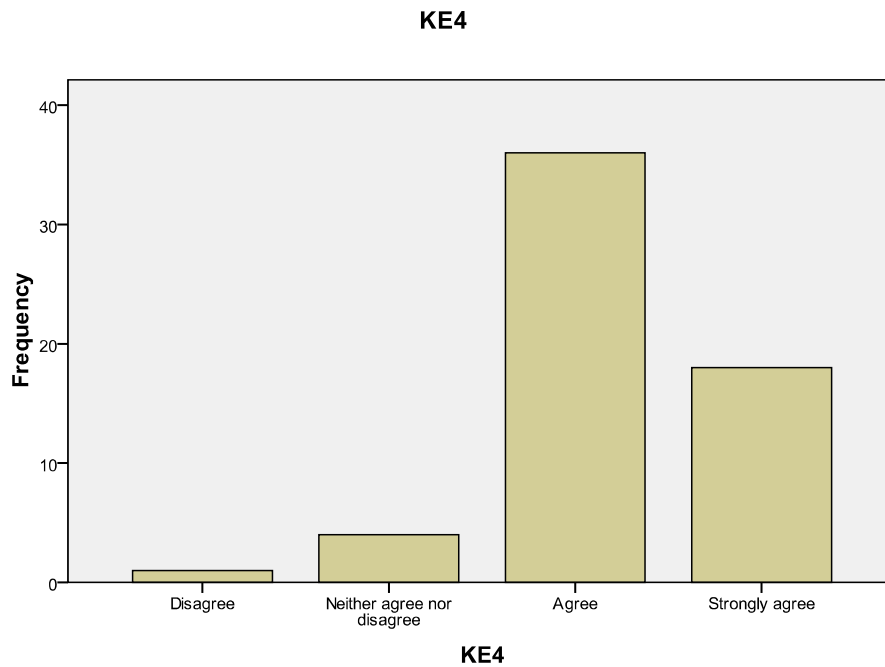
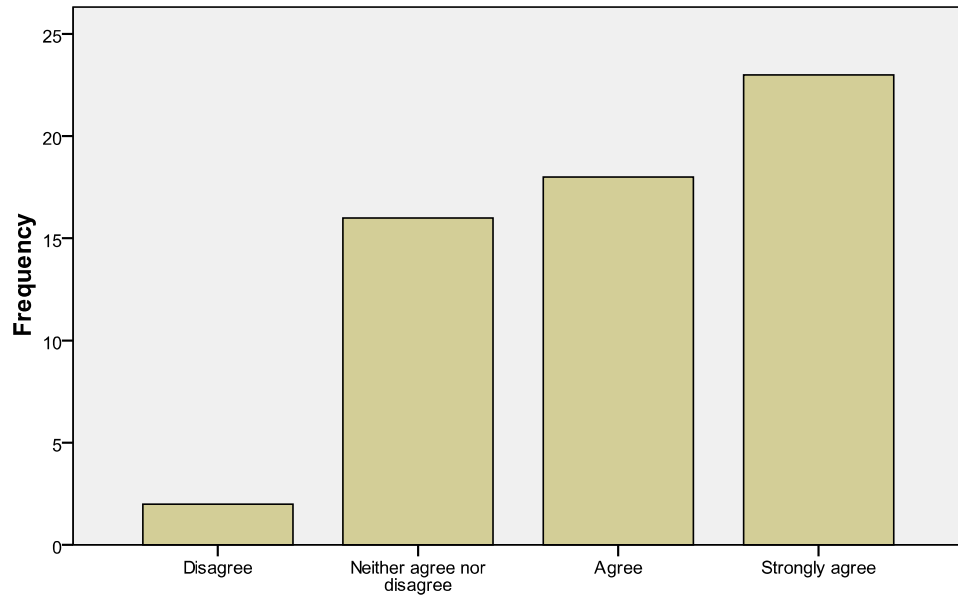


Figure 24 - Responses to Question KE4

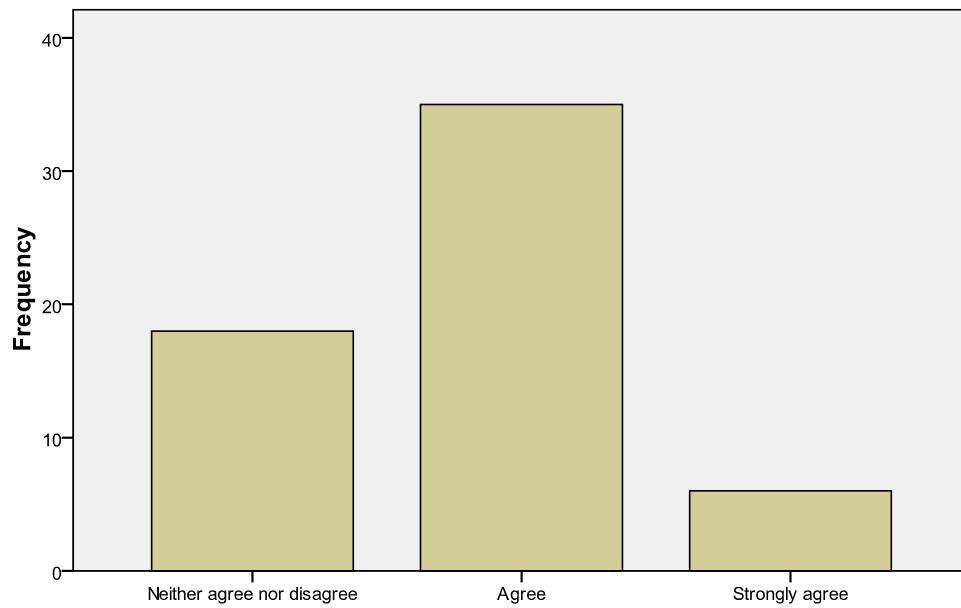
KE6



KE6

Figure 25 - Responses to Question KE6

KE3



KE3

Figure 26 - Responses to Question KE3

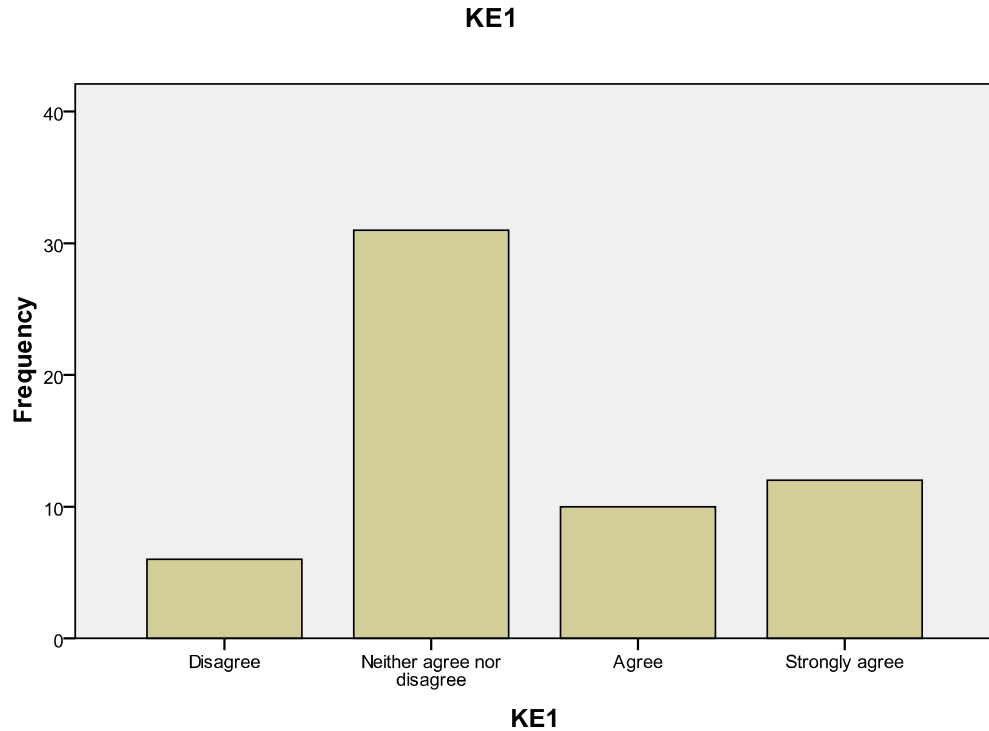


Figure 27 - Responses to Question KE1

KNOWLEDGE ARTICULABILITY:

With regards to the variable 'knowledge articulability', the responses showed that the knowledge is codified within the SMEs, which results in the fact that it is easier for the personnel working in the SMEs can learn the knowledge more easily.

The thesis explored whether the knowledge is articulated within the SMEs or not. In order to measure this, the SMEs were asked to provide data on whether the personnel are informed about all the project processes, whether outcomes of the projects are shared with other units in the SMEs, whether there is a mechanisms for regular flow of the knowledge, the attitude of management towards sharing of knowledge with other units, whether the project outputs are visible in the SMEs and whether there is a filing system in the SMES which record all the outcomes and outputs of the previous projects. The overall responses show that there is a positive tendency in all these areas which is demonstrated by a negatively skewed histogram derived from means of responses to all these questions.

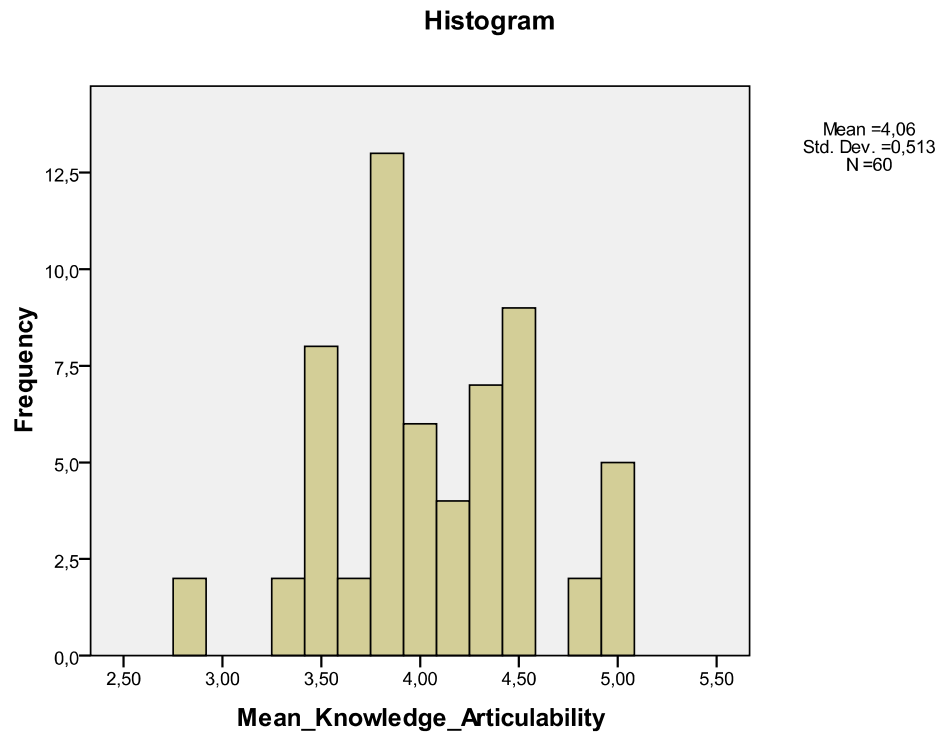


Figure 28 - Histogram of Means-Knowledge Articulability

TEACHABILITY:

The results showed that building capacity of the human resources in the national SMEs via in-service trainings, internal knowledge resources, outsourced trainings for the in-house personnel and outsourcing technical counseling, availability of focal points whom are responsible for monitoring new products in the market and measurement of awareness of the personnel on technological developments and awareness raising activities for the personnel which are constructed according to the results of measurement are important factors for teachability of the transferred knowledge within the SMEs. Therefore, teachability of the knowledge can be realized in the SMEs by enhancing these important factors.

The participants were asked whether the management of the SMEs provides necessary human resource development opportunities to the personnel for teaching the new knowledge or not (such as R&D, personal development, project management trainings...), whether there are written documents that the personnel can learn the new knowledge, whether the technically experienced personnel teaches the new knowledge to the new starters. The results showed that there is a positive attitude to all these questions which is confirmed by a negatively skewed histogram as below.

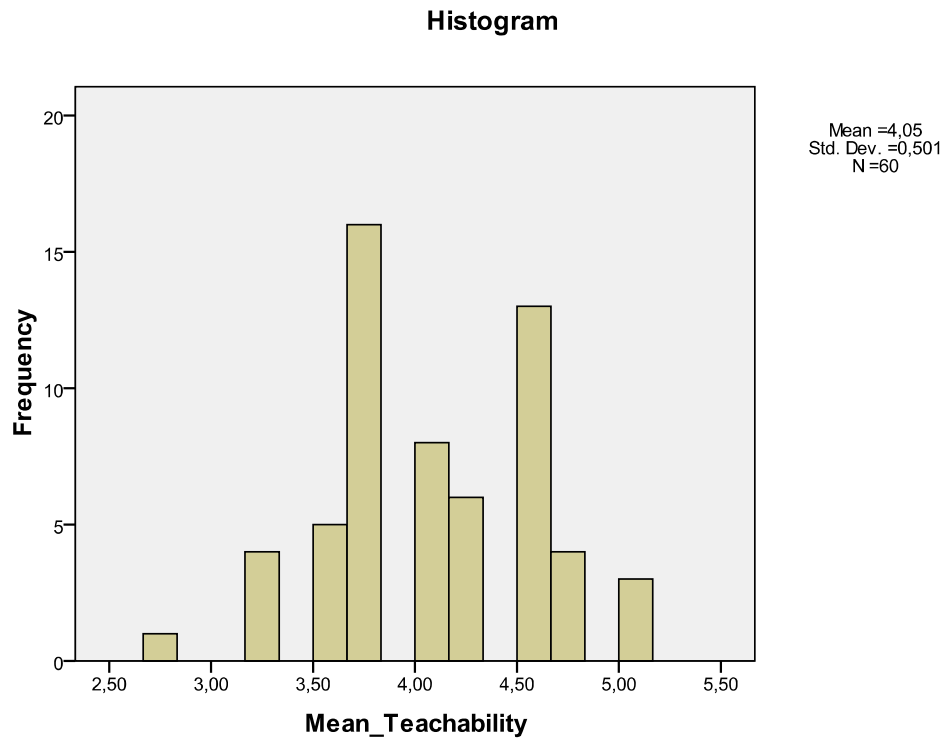


Figure 29 - Histogram of Means-Teachability

4.6 PROBLEMS OBSERVED in this STUDY

Main objective of this thesis is to measure level of success of knowledge transfer from RTD performers towards Turkish SMEs within the FP6, FP7 and EUREKA. Even though there is extensive literature on knowledge transfer at international resources, there are very limited studies on knowledge transfer in national resources. Therefore, the researcher could not benefit national resources during literature review for construction of the model and variables.

Secondly, a large number of SMEs are planned to be involved in the data collection - a grand total of 113. However, only 60 of them responded. Even though the researcher tried to contact the responsible persons from the non-respondent firms, it was difficult to communicate them because the contact details were not updated. Questionnaire was distributed in March, which is a month of intensive project meetings. This fact also prevented some of the SMEs respond the questionnaires. The data were collected from only project managers whom are actively involved in the relations with international partners. These persons reflected their perspectives on some key issues such as openness or structure. Therefore, single source for these subjects prevented reflecting different perspectives in the data. Multiple sources from the SMEs could enrich the data analysis.

Since the SMEs are located in different provinces, the researcher emailed the questionnaire to the SMEs. However, the researcher could not guide the respondents via filling in the questionnaires. He could only answer the questions of the respondents over the phone. SMEs' being in different provinces also prevented possibility of conducting face-to-face interviews with key responsible persons in the projects.

Another key limitation of the thesis is that the data is solely compiled from the national SMEs. Therefore, in order to develop more comprehensive conclusions, perspectives of international partners and also the institutional management of the programmes would be necessary. Therefore, next step for the research can be involvement of these participants in the research and make a new analysis out of the results.

Finally, this study focused on knowledge transfer which is a very broad and comprehensive subject. Therefore, following studies can focus on more specific aspects of knowledge transfer, such as administrative issues, technological knowledge transfer, products or only one stage of the model proposed – for instance initiation by itself.

CHAPTER 5

CONCLUSION

This study mainly aimed to measure transfer success within the FP and EUREKA projects, by collecting data from the SMEs which are partners in those projects. Therefore, there was a need to define transfer success and define score for success level in order to make concrete measurement. Therefore, the researcher defined knowledge transfer and derived a score out of the definition and the empirical data collected by a survey. The researcher decided to identify some variables as measurement tools that may have relation with transfer success. Based on the literature, the researcher defined 11 variables, which are motivation, openness, trust, networking, geographic proximity, communication frequency, absorptive capacity, duration, knowledge embeddedness, knowledge articulability and teachability. Various data is collected from the assigned national SMEs in response to all those variables and the comprehensive data is analyzed in SPSS with regards to those variables in order to come to conclusions.

Overall, the results showed that not all but only four of these variables – trust, networking, absorptive capacity and teachability have statistically considerable impact on success of knowledge transfer. Specifically, absorptive capacity is significant at $p < 0,01$; trust, networking and teachability are significant at $p < 0,05$.

In addition to main findings given above, the data is analyzed within the context of the model for knowledge transfer developed by the researcher: initiation, implementation, elaboration and internalization.

According to the proposed model, during the **initiation stage**, needs are identified, and the knowledge that will respond to those needs are defined, feasibility of the transfer is assessed. During the **implementation stage**, the initiated ideas will be practiced by the recipient in cooperation with international partners. During the **elaboration stage**, the practice will be improved via elaboration on the knowledge via analyzing the defects of implementation and developing more effective practices which will increase performance. Finally, during the **internalization stage**, the recipient will preserve usage of the new knowledge and extend it to daily routine work. Each of these stages have peculiar internal dynamics, therefore each stage requires a separate analysis. On the other hand, these stages are not mutually exclusive; therefore one has significant impact on another. In order for knowledge to be transferred, all four stages are expected to be completed satisfactorily.

Initiation: As mentioned above, **initiation** is the first stage of knowledge to be transferred successfully. In this regard, the variables: *motivation, openness, trust and networking* were

specifically used as variables for this stage. Each variable is analyzed within itself and also are compared amongst each other in Chapter 4. Initiation is the entry point of the entire process of knowledge transfer; therefore, it deserves much attention and effort.

The literature underlines that *motivation* is highly related with initiation of new projects. The researcher collected data in order to measure contribution of the institutional management of FPs and EUREKA to motivation of SMEs or not. When we analyzed contribution of institutional management, the results showed that it has a considerable positive effect on SMEs in terms of their initiating new projects. Therefore, we can conclude that motivating the SMEs initiating new projects is satisfactory. However, when we look at the big picture of entire process of knowledge transfer, the results confirmed that institutional management of the projects does not have significant effect on knowledge transfer success. Therefore, we can conclude that, even though the institutional management motivates satisfactorily the national SMEs for initiating new projects, there are weaknesses in other stages of the model – implementation, elaboration and internalization. Due to this fact, since the hypothesis was formulated to test contribution of institutional management to knowledge transfer, this hypothesis is rejected.

Organization size was given above as an important factor for motivation. The data analysis showed that the smaller the number of personnel in an SME, the greater the motivation of it to initiate new projects. Therefore, the institutional management should focus on relatively smaller SMEs. It can be also examined in the thesis that location of SMEs does not have significant affect on knowledge transfer success. As SMEs located in technological development zones have more experience than others in terms of having national projects before, together with project type and size, it should be easily stated that, SMEs which are located in technological development zones, having total number of SMEs between 10 and 20 and being a partner in EUREKA projects are more successful in knowledge transfer.

Openness is another important variable in terms of initiation of new projects. The data collected was analyzed in order to measure level of openness of the SMEs which took part in this study. The results showed that the SMEs demonstrate considerably open attitude to transfer of new knowledge.

Even though the specific outcomes of openness is positive, the regression analysis of openness in terms of its contribution to knowledge transfer showed that openness of the SMEs do not have a considerable impact on successful transfer of knowledge. Therefore, it is obvious that other stages of the model – implementation, elaboration and internalization are rather weaknesses in this matter. The hypothesis was rejected in this sense. Even though the SMEs are open – which is very important step for the entire process, they cannot transfer knowledge successfully. Therefore, this can be a new research area for future in

order to explore weaknesses of the following processes which undermine completion of the entire process of knowledge transfer up to internalization of the knowledge.

Trust is actually a cross-cutting variable which has effect on both initiation and implementation. In this regard, the researcher asked the SMEs whether this is also valid for them or not. The results showed that they value trust very much as a factor for initiation and implementing projects. When we look at specific outcomes of the data for initiation, we observe that there is an average level of trust in the SMEs towards international partners. However, the results from the regression analysis of trust with regard to knowledge transfer success are significant. Therefore, we can conclude that even though there is an average level of trust towards international partners, this level of trust has a significant impact on knowledge transfer success. This brings about the fact that the more the SMEs trust their international partners, the more successful they transfer the knowledge. The policies and mechanisms which contribute to establishment of trust between the two parties should be revisited and improved. Specifically, introduction of some methods which will prevent international partners' copying of the products of national SMEs may have an impact on building trust. The national SMEs should have detailed information on the international partners prior to initiating new projects and also they should have platforms to get to know each other during initiating and implementing the projects. Further project opportunities with the same partners should be explored which would build trust with longer periods of times rather than different partners for every single new projects.

Impact of *being in a right network* on transfer success was analyzed in the research as well. The SMEs mentioned that they have the capacity for English language and they do not experience much problem during communication with international partners. Though they have this capacity, the results showed that they have not initiated many TUBITAK national projects, EUREKA or FPs and corporate cooperation projects. So, obviously, we can conclude that most of them are whether not in the right networks or they do not have the know-how to take advantage of the networks for initiating new projects. The regression analysis also showed that networking negatively affects knowledge transfer. Based on these outcomes, we can recommend that the SMEs should be well directed in terms of which network is more beneficial for them and which are not. In addition, they should also be guided in terms of how they can benefit being in the network for their business. Thus, they will be more effective since they will be activating in the meaningful network. Further, networking and being in a network eliminates the pitfalls of geographic distance on knowledge transfer. Openness, knowledge embeddedness and knowledge articulability are also discarded because being in a network also necessitates openness to share ideas, embedded knowledge and articulable knowledge with different organizations in such a network.

As a result, taking into account all above with regards to initiation stage, the national SMEs demonstrate a satisfactory level of initiation process. The recommendations given above may strengthen this first stage of knowledge transfer. Obviously, success of only one level is not sufficient for successful transfer of knowledge. Other three stages should be at least satisfactory as well.

Implementation: After effectively initiation of international projects, the second stage of knowledge transfer starts: implementation process of the projects. This stage is measured by the variables *geographic proximity, communication frequency and duration*. *Trust* was mentioned as a cross cutting variable which is valid for implementation as well. Each variable is analyzed within itself and also are compared amongst each other in Chapter 4 in regression analysis.

Geographic proximity is measured in one aspect of cultural similarity. Countries in similar regions demonstrate similar cultures such as Mediterranean countries, Far East countries... The literature states that cultural similarity may have positive effect on implementation of projects. However, the results of the data analysis showed that the cultural similarity is not an important factor for effective implementation of projects. In line with this finding, having face-to-face meetings under this variable was questioned. The literature states that the more physically distant the countries are from each other, the more difficult it will be to conduct face-to-face meetings. In line with the literature, the SMEs responded that face-to-face meetings are highly important during implementation of project. On the other hand, average number of meetings that SMEs conduct with their international partners during implementation of projects is two in a year. Another finding was that the SMEs mentioned that the most used method was internet in order to establish an effective communication with international partners. Therefore, the SMEs try to compensate limited number of face-to-face meetings by focusing on communication via internet. Therefore, they undermine negative impact of geographical proximity.

Therefore, these outcomes show that distance is not an important factor for national SMEs to better implement, when internet and technological tools are used effectively. Regression analysis also confirmed that geographic proximity does not have a significant impact on knowledge transfer at large, either. Therefore, findings recommend that, in contrary to literature, physical distance may not undermine the effectiveness of knowledge transfer.

Communication frequency is another variable linked to implementation. Communication frequency is the main determinant of sharing of technical knowledge. Therefore, there should be sufficient mechanisms that both parties can communicate effectively in order to transmit the knowledge. In this regard, face-to-face meetings are found important for sharing of technical knowledge. However, due to the fact that majority of the SMEs have opportunity to

conduct face-to-face meetings with their international partners in average twice a year, they strengthened usage of internet for communication and sharing of knowledge. Therefore disadvantage of limited number of face-to-face meetings is compensated via usage of internet. The literature states that the embedded technical knowledge can be better transferred from person to person in face-to-face meetings. In that sense, we can recommend that the number of face-to-face meetings should be increased to the possible extent, via continuing effective usage of internet on the other hand.

Impact of *duration* of projects to effectiveness of knowledge transfer was explored in this study as well. The literature mentions that the partners find more opportunity to meet and discuss during the projects which is expected to reinforce transmitting knowledge. The durations of the projects involved in this study are compiled from the review of projects. This data is regressed with transfer success; the results showed that the duration of projects – whether being short or long – do not have any significant impact on transfer success. We can recommend that, in order to increase the number of the face-to-face meetings thus increase of amount of knowledge transfer, good planning and effective usage of the durations will be useful in order to use the duration effectively to the most possible extent.

Trust keeps being an important factor during implementation as well. The national SMEs initiate learning about technical capacity of their international partners and their expectations from the projects and they continue learning during implementation. They can share the outcomes of pilot implementations during implementation as well. Therefore, we can recommend trust should continue to be built during implementation processes as well.

Overall, implementation process is the platform where continuation of development of trust among parties. The national SMEs continue learning from the international partners while they practice the knowledge they acquire. It is the level where most intensive transmission of knowledge occurs. Therefore, we can recommend that necessary support should be given to national SMEs to communicate as much as possible in order to receive as much knowledge as possible from their international partners, during implementation process.

Elaboration starts from the day the SMEs receive knowledge at the first instance. The literature states that the recipient tends to use the received knowledge at the worst effective manner in initial implementation, and gradually improves implementation reaches further to the best way of using that particular knowledge. This is enabled in elaboration process. Therefore, elaboration process is vital in terms of effective usage of the knowledge. This process still involves a learning period for the recipient until reaching to the best usage of the knowledge. In line with the literature, elaboration is measured via absorptive capacity of the national SMEs.

Absorptive capacity is the ability of SMEs to absorb the learned knowledge after the implementation. Absorptive capacity of the SMEs was explored in this research. The results showed that the SMEs have the ability to design and develop new products. The newly appointed personnel have the necessary education background in order to capture and utilize the technologies and facilities used in the SMEs very quickly. This thesis brings about the fact that SMEs which are partners in EUREKA projects have more R&D experience than SMEs in FP projects. These SMEs have more systematical knowledge transfer activities. It should be taken into account that having experience in EUREKA projects should be directed to FP programmes in order to have experienced SMEs in this programme. This may then facilitate new co operations in FP. Further, the regression analysis showed that absorptive capacity has the most significant impact on transfer success. Consequently, strategies and policies for increasing absorptive capacity of the SMEs are vital for knowledge transfer. Therefore, the SMEs should be guided and supported in terms of strengthening their absorptive capacity. This can be enabled via human resource development of the SMEs with regards to scientific and technological expertise. In this regard, TUBITAK coordinated preparation of a National Science and Technology Human Resources Strategy and Action Plan. This plan has two main objectives: 1) to increase the number of R&D personnel and 2) to improve their sectoral and occupational distribution, which the SMEs can benefit. Moreover, new strategies to further increase cooperation between universities and SMEs in order to integrate academic knowledge in the technical capacity of the SMEs are required.

Overall, level of absorptive capacity is indispensable for elaboration process. Therefore, much effort is required to strengthen this stage of knowledge transfer. It should be also noted that in order to have satisfactory result in international knowledge transfer from RTD performers to Turkish SMEs, continuation of the management of FP and EUREKA programmes is crucial. As Turkish participating in these programmes is increasing year by year, level of absorptive capacity of Turkish SMEs is increasing. By this way, experience of being a partner in international projects will also be increasing every year.

Internalization is the final stage of knowledge transfer. It is the process of assimilation of the results and effects of applying the knowledge gained. The Internalization stage begins after the recipient achieves satisfactory results with the transferred knowledge. Only after internalization of knowledge, the SMEs sufficiently understand and adapt the knowledge into its ultimately use. This stage is measured with *knowledge embeddedness*, *knowledge articulability* and *teachability*.

Knowledge embeddedness is the extent to which knowledge is held within an organization's routines, systems, and social networks, which shows meaningful internalization of the transmitted knowledge. It is necessary to mention that there are two main requirements to enhance embedded knowledge to be transmitted to explicit knowledge. Firstly, there is need

for mechanisms and platforms where the embedded knowledge can be commuted to the national SMEs and secondly the embedded knowledge should be transmitted to the SMEs which are codified into relevant and useful explicit knowledge. The regression analysis showed that knowledge embeddedness does not have significant impact on knowledge transfer. In addition, the SMEs were asked to provide information on the level of sharing of embedded knowledge. The results showed that the SMEs are satisfied with knowledge sharing platforms and methods. Since the quality and the usefulness of the knowledge shared are as important as the amount of knowledge shared, there is a need for further analysis and evaluation. This evaluation should consider the success of the explicitness of the embedded knowledge with regards to success of knowledge transfer. Due to the fact that this study was limited with the data collected from only the national SMEs, we may need some further analysis on the use of the knowledge transferred. The usefulness of the knowledge is also worth to evaluate. Evaluation of the context, scope and content of transforming the tacit knowledge which is embedded in the international partners into explicit knowledge requires further analysis.

Knowledge articulability refers to the extent to which the knowledge can be verbalized, written and drawn. It is measured via measurement of ability to learn the knowledge and the availability of the resources for articulating the knowledge into different forms. The results showed that there is a positive perception on articulability of knowledge in the SMEs. Therefore, transfer of the articulated knowledge is likely to be more successful than one including less articulated knowledge. The regression analysis showed that knowledge articulability does not have significant impact on knowledge transfer. Since knowledge articulability is vital for internalization of the knowledge, the institutional management of the projects should promote intensive application of meetings, discussions, presentations, sharing of written forms of knowledge, and brainstorming, learning activities in order to create platforms for articulating the knowledge into verbal, written or drawn forms.

Teachability is very much connected with knowledge articulability. It is the variable used to measure the ease of teaching the knowledge which cannot be articulated to every individual personnel. The data analysis showed that the SMEs are satisfied with the efforts of their management for development of human resources via providing learning opportunities for the personnel. However, surprisingly, the regression analysis demonstrated a negative impact on knowledge transfer. With regards to the literature, this may be due to the fact that managers may have relatively low expectations regarding low priority projects that are managers may be more easily satisfied with regard to less important knowledge, since they focus on high priority projects. Prior researches hypothesized relationship between teachability and transfer success in a positive direction, on the contrary, this study proved that teachability is negatively related to transfer success.

Internalization process of the knowledge transfer is the last but the most difficult stage. Once knowledge reaches to the SME, the SME should set that knowledge in a new context from its own perspective; apply it to new ways by combining it with the existing knowledge. The overall outcomes of the three variables demonstrate that this is the weakest stage amongst other stages. Main result is that if the internalization is not successfully achieved, it is hardly possible to enable sustainability and systematization of the knowledge. Therefore, there is a need for special attention to this stage, from both the SMEs and the institutional management of the programmes. The SMEs should develop skills in identification of their needs better and get involved in relevant projects which will increase their motivation for spending effort to internalize the knowledge. Therefore, the SMEs will spend their effort in more beneficial projects, which will satisfy them more. In addition, the SMEs should revisit their methods to teach the transferred knowledge to their personnel. These learning activities should be based on the needs of the personnel and should be formulized according to their capacity. SMEs also should raise awareness on benefits of the sustainability of the knowledge in the long term. The institutional management of the programmes should contribute SMEs in achieving all these recommendations.

It should be taken into consideration that the FP and EUREKA projects are evaluated by experts who have deep experience in dedicated area. One the projects submitted internationally for FP and nationally for EUREKA, experts have the opportunity to comment on the projects. Not only European experts but also Turkish experts are charged to evaluate the projects. Therefore, Turkish experts will than get the insight of the structural side and the technological innovativeness of the project. As this is the situation, Turkish experts should be contacted in order to direct Turkish SMEs to be a partner in FP and EUREKA projects via motivating them by telling them the benefits of these international projects. Not only motivating them but also helping them in during implementation and elaboration stages is crucial in order to achieve a satisfactory result for knowledge to be transferred.

For further research, some good practices of internalization of the knowledge should be analyzed and they should be adapted according to the SMEs. The good practices can be explored in large scale industries due to the fact that the more institutionalized the company is, the more likely it will maintain sustainability and systematization of the knowledge.

Taking into account all above conclusions, it is confirmed that all the four stages of knowledge transfer are linked to each other. If the initiation of projects is not done consciously based on the real needs and area of expertise of the SMEs, implementation of the projects will not be so effective. Therefore, it will be difficult to elaborate on the knowledge and therefore improvement of the knowledge will not be at the expected level. Since the improvement will not sustain, the motivation to develop mechanisms to internalize the knowledge will be less which will undermine the successful transfer of knowledge.

REFERENCES

- Acs, Z.J. and Audretsch, D. (1990). "Innovation And Small Firms". MIT Press, Boston, USA.
- Adler, P. S. (1990). "Shared learning". *Management Science*, 36(8), pp. 938-957.
- Allen, T. J. (1977). "Managing the flow of technology: Technology transfer and the dissemination of technological information within the R&D organization". Cambridge, MA: MIT Press, USA.
- Almeida, P. and Kogut, B. (1999). "Localization of knowledge and the mobility of engineers in regional networks". *Management Science*, 45, pp. 905-917.
- Argote, L., Ingram, P. (2000). "Knowledge transfer: A basis for competitive advantage in firms". *Organizational Behavior and Human Decision Processes*, 82(1), pp. 150-169.
- Badaracco, J.L. (1991). "The Knowledge Link: How Firms Compete through Strategic Alliances". Harvard Business School Press, Boston, USA.
- Balm, G. J. (1992). "Benchmarking: A Practitioner's Guide for Becoming and Staying Best of the Best". QPMA Press, Schaumberg, IL, USA.
- Berger, P. L. and Luckman T. (1966). "The Social Construction of Reality: A Treatise in the Sociology of Knowledge". Doubleday, Garden City, NY, USA. (alternatif basimlar: New York: Penguin).
- Birkinshaw, J. and Morrison, A. (1995). "Configurations of strategy and structure in subsidiaries of multinational corporations". *Journal of International Business Studies*, 26(4), pp. 729-754.
- Blackers, F. (1995). "Knowledge, work and organizations: an overview and interpretation". *Organizational Studies*, 16, pp. 1021-1046.
- Bock, G.W. and Kim, Y.G. (2002). "Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing". *Information Resource Management Journal*, 15(2), pp. 14-21.
- Boisot M. (1983). "Convergence revisited: The codification and diffusion of knowledge in a British and a Japanese firm". *Journal of Management Studies*, 1.
- Boisot, M. (1987). "Information and Organizations". The Manager as Anthropologist, Fontana/Collins, Glasgow, UK.
- Boutellier, R., Grassmann, O., Macho, H., Roux, M. (1998). "Management of dispersed product development teams: The role of information technologies". *R&D Management*, 28, pp. 13-25.
- Bresman, H., Birkinshaw, J., Nobel, R. (1999). "Knowledge Transfer in International Acquisitions". *Journal of International Business Studies*, 30(3), pp. 439-462.
- Buttolph, D. (1992). "A new look at adaptation". *Knowledge: Creation, Diffusion, Utilization*, 13(4), pp. 460-470.
- Choi, C.J. and Lee, S.H. (1997). "A knowledge-based view of cooperative interorganizational relationships". In Beamish, P.W., Killing, J.P. (Eds.). "Cooperative Strategies", European Perspectives. New Lexington Press, San Francisco, CA, USA.

Cohen, W.M. and Levinthal, D.A. (1990). "Absorptive capacity: A new perspective on learning and innovation". *Administrative Science Quarterly*, 35(1), pp. 128-152.

Constant, D., Kiesler, S., Sproull, L. (1994). "What's mine is ours or is it? A study of attitudes about information sharing". *Information Systems Research*, 5(4), pp. 400-421.

Cummings, J.L. and Teng, B.-S. (2003). "Transferring R&D knowledge: the key factors affecting knowledge transfer success". *Journal of Engineering and Technology Management*, 20, pp. 39-68.

Cutler, R.S. (1989). "A comparison of Japanese and U.S. high-technology transfer practices". *IEEE Transactions on Engineering Management*, 36(1), pp. 17-24.

Daft, R. and Lengel, R. (1984). "Information richness: a new approach to managerial behavior and organizational design". *Research in Organizational Behavior*, 6, pp. 191-233.

Daft, R. and Lengel, R. (1986). "Organizational information requirements, media richness and structural design". *Management Science*, 32(5), pp. 554-571.

Darr, E. D. and Kurtzberg, T. R. (2000). "An investigation of partner similarity dimensions on knowledge transfer". *Organizational Behavior and Human Decision Processes*, 82(1), pp. 28-44.

Das, T.K. and Teng, B.S. (1998). "Between trust and control: Developing confidence in partner cooperation in alliances". *Academy of Management Review*, 23, pp. 491-512.

Davenport, T. H. and Prusak, L (1998). "Working Knowledge: How Organizations Manage What They Know". Harvard Business School Press, Boston, MA, USA.

De Meyer, A. (1991). "Tech talk: How managers are stimulating global R&D communication". *Sloan Management Review*, 32(3), pp. 49-59.

Denison, D. and Mishra, A. (1995). "Toward a theory of organizational culture and effectiveness". *Organization Science*, 6(2), pp. 204-223.

Detlor, B. (2001). "An information perspective towards knowledge work: Implications for knowledge management systems". *Proceedings of 2001 Information Resources Management Association International Conference*, Toronto, Canada, pp. 463-466.

Dixon, N.M. (1994). "The Organizational Learning Cycle: How We Can Learn Collectively". McGraw-Hill, New York, USA.

Dodgson, M. (1996). "Learning, trust and inter-firm technological linkages: Some theoretical associations". In Coombs, R., Richards, A., Saviotti, P., Walsh, V. (Eds.). "Technological Collaboration". Edward Elgar, Cheltenham, UK.

Fraser, V., Marcella, R., Middleton, I. (2000). "Employee perceptions of knowledge sharing: Employment threat or synergy for the greater good?". *Competitive Intelligence Review*, 11(2), pp. 39-52.

Galbraith, C. S. (1990). "Transferring core manufacturing technologies in high technology firms". *California Management Review*, 32(4), pp. 56-70.

Giddens, A. (1993). "New Rules of Sociological Method". Stanford, Stanford University Press, USA.

- Gilbert, M. and Cordey-Hayes, M. (1996). "Understanding the process of knowledge transfer to achieve successful technological innovation". *Technovation*, 16(6), pp. 301-312.
- Gupta, A. and Govindarajan, V. (2000). "Knowledge flows within multinational corporations". *Strategic Management Journal*, 21(4), pp. 473-396.
- Hamel, G. (1991). "Competition for Competence and inter-partner Learning within International Strategic Alliances". *Strategic Management Journal*, 12, pp. 83-103.
- Hamel, G., Doz, Y., Prahalad, C. K. (1989). "Collaborate with your competitors-and win". *Harvard Business Review*, 67(2), pp. 133-139.
- Hansen, M.T. (1999). "The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits". *Administrative Science Quarterly*, 44(1), pp. 82-111.
- Hansen, M.T. (2002). "Knowledge networks: Explaining effective knowledge sharing in multiunit companies". *Organization Science*, 13(3), pp. 232-248.
- Hedlund, G. (1994). "A Model of Knowledge Management and the N-Form Corporation". *Strategic Management Journal*, 15, pp. 73-90.
- Hirschheim, R., Klein, H. K, Lyytinen, K. (1995). "Information Systems Development and Data Modeling: Conceptual and Philosophical Foundations". Cambridge University Press.
- Hu, Y. (1995). "The international transferability of the firm's advantage". *California Management Review*, 37, pp. 73-88.
- Jarvenpaa, S.L. and Staples, D.S. (2000). "The use of collaborative electronic media for information sharing: An exploratory study of determinants". *The Journal of Strategic Information Systems*, 9(2-3), pp. 129-154.
- Jarvenpaa, S.L. and Staples, D.S. (2001). "Exploring perceptions of organizational ownership of information and expertise". *Journal of Management Information Systems*, 18(1), pp. 151-183.
- Kim, L. (2001). "Absorptive Capacity, Co-operation, and Knowledge Creation: Samsung's Leapfrogging in Semiconductors". In Nonaka I., Nishiguchi T. (Eds.). "Knowledge Emergence-Social, Technical, and Evolutionary Dimensions of Knowledge Creation", Oxford University Press: Oxford, pp. 270-286.
- Knights, D., Murray, F., Willmott, H. (1993). "Networking as knowledge work: A study of strategic interorganizational development in the financial services industry". *Journal of Management Studies*, 30(6).
- Kogut, B. and Zander, U. (1992). "Knowledge of the firm, combinative capabilities and the replication of technology". *Organization Science*, 3(3), pp. 383-397.
- Kogut, B. and Zander, U. (1993). "Knowledge of the firm and the evolutionary theory of the multinational corporation". *Journal of International Business Studies*, 24(4), pp. 625-646.
- Kogut, B. and Zander, U. (1995). "Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test". *Organization Science*, 6(1), pp. 76-92.
- Koskinen, KU. (2000). "Tacit knowledge as a promoter of project success". *European Journal of Purchasing and Supply Management*, 6, pp. 41-7.

- Kostova, T. (1999). "Transnational transfer of strategic organizational practices: A contextual perspective". *Academy of Management Review*, 24(2), pp. 308-324.
- Krugman, P. (1991). "Increasing returns and economic geography". *Journal of Political Economy*, 99, pp. 483-499.
- Kwan, M.M. and Cheung, P.K. (2006). "The knowledge transfer process: from field studies to technology development". *Journal of Database Management*, 17, pp. 16-32.
- Landry, C. and Bianchini, F. (1995). "The Creative City". London, Demos.
- Lane, P. and Lubatkin, M. (1998). "Relative absorptive capacity and interorganizational learning". *Strategic Management Journal*, 19(5), pp. 461-477.
- Leonard-Barton, D. (1995). "Wellsprings of Knowledge: Building and Sustaining the resources of Innovation". Harvard Business School Press, Boston, MA, USA.
- Leonard-Barton, D. and Deschamps, I. (1988). "Managerial influence in the implementation of new technology". *Management Science*, 34(10), pp. 1252-1266.
- Lewis, J. and Weigert, A. (1985). "Trust as social reality". *Social Forces*, 63, pp. 967-985.
- Lind, M. and Zmud, R. (1995). "Improving organizational effectiveness through voice mail facilitation of peer-to-peer relationships". *Organization Science*, 6(4), pp. 445-461.
- Loebecke, C., Van Fenema, P., Powell, P. (Dec. 1998). "Co-Opetition and Knowledge Transfer". *Information Systems: Current Issues and Future Changes*, T. Larsen, L. Levine, J. DeGross, (Ed.) IFIR Laxenburg, Austria, pp. 215-229.
- Luhmann, N. (1988). "Familiarity, confidence, trust: problems and alternatives". In Gambetta, D.G. (Ed.). "Trust", Blackwell, New York, pp. 94-107.
- Lundvall, B.-A. and Johnson, B. (1994). "The learning economy". *Journal of Industry Studies*, 1(2), pp. 23-42.
- Mansfield, E. (1995). "Academic research underlying industrial innovations: Sources characteristics and financing". *Review of Economics and Statistics*, 77(1), pp. 55-65.
- Mayer, R., Davis, J., Schoorman, F. (1995). "An integrative model of organizational trust". *Academy of Management Review*, 20, pp. 709-734.
- McDermott, R. and O'Dell, C. (2001). "Overcoming cultural barriers to sharing knowledge". *Journal of Knowledge Management*, 5(1), pp. 76-85.
- McEvily, B. and Zaheer, A. (1999). "Bridging ties: A source of firm heterogeneity in competitive capabilities". *Strategic Management Journal*, 20, pp. 1133-1156.
- Meherabian EW. (1971). "Silent messages". Belmont, Chandler.
- Meyer, J. W. and Rowan, B. (1977). "Institutional organizations: formal structure as myth and ceremony". *American Journal of Sociology*, 83, pp. 340-63.
- Mokyr, J. (2002). "The Gifts of Athena: Historical Origins of the Knowledge Economy". Princeton, NJ and Oxford: Princeton University Press.
- Mowday, R., Steers, R., Porter, L. (1979). "The measurement of organizational commitment". *Journal of Vocational Behavior*, 14, pp. 224-247.

- Nelson, R. and Winter, S. (1982). "An Evolutionary Theory of Economic Change". Harvard University Press, Cambridge, MA, USA. (alternatif gösterim: Cambridge: Harvard University Press).
- Nonaka, I. (1994). "A dynamic theory of organizational knowledge creation". *Organization Science*, 5(1), pp. 14-37.
- Nonaka, I. and Takeuchi, H. (1995). "The Knowledge-Creating Company". Oxford University Press, New York, USA.
- Nunnally, J. C. (1978). "Psychometric Theory". New York: McGraw-Hill.
- Pan, S. L. and Scarborough, H. (1999). "Knowledge Management in Practice: An Explanatory Case Study". *Technology Analysis & Strategic Management*, 11(3), pp. 359-374.
- Polanyi, M. (1966). "The Tacit Dimension". Anchor Day Books, New York, USA.
- Polanyi, M. (1967). "The Tacit Dimension". Anchor Day Books, New York, USA.
- Reed, R. and DeFillippi, R.J. (1990). "Causal ambiguity, barriers to imitation, and sustainable competitive advantage". *Academy of Management Review*, 15, pp. 88-102.
- Rice, R. E. and Rogers, E. M. (1980). "Reinvention in the innovation process". *Knowledge: Creation, Diffusion, Utilization*. 1(4), pp. 499-514.
- Roberts, J. (2000). "From Know-how to Show-how? Questioning the Role of Information and Communication Technologies in Knowledge Transfer". *Technology Analysis & Strategic Management*, 12(4), pp. 429-443.
- Rogers, E.M. (1983). "The Diffusion of Innovation". Free Press, New York, USA.
- Simon, H. A. (1979). "The Architecture of Complexity". *The Sciences of the Artificial*, Cambridge, MA: MIT Press; first published in *Proceedings of the American Philosophical Society* (1962), 106, 467-482.
- Simonin, B.L., (1997). "The importance of developing collaborative know-how: An empirical test of the learning organization". *Academy of Management Journal*, 40(5), pp. 1150-1174.
- Simonin, B. L. (1999). "Transfer of marketing know-how in international strategic alliances: An empirical investigation of the role and antecedents of knowledge ambiguity". *Journal of International Business Studies*, 30(3), pp. 463-490.
- Stasser, G., Stewart, D.D., Wittenbaum, G.M. (1995). "Expert roles and information exchange during discussion: The importance of knowing who knows what". *Journal of Experimental Social Psychology*, 31, 244-265.
- Stata, R. (1989). "Organizational learning - the key to management innovation". *Sloan Management Review*, 17, pp. 63-74.
- Sveiby, K.E. (1997). "The New Organizational Wealth. Managing and Measuring Knowledge-based Assets". Bezett Koekler Publishers, San Francisco.
- Swart, J. and Kinnie, N. (2003). "Sharing knowledge in knowledge-intensive firms". *Human Resource Management Journal*, 13(2), pp. 60-75.
- Szulanski, G. (1996). "Exploring internal stickiness: Impediments to the transfer of best practice within the firm". *Strategic Management Journal*, 17, pp. 27-43.

- Szulanski, G. (2000). "The process of knowledge transfer: A diachronic analysis of stickiness". *Organization Behaviour and Human Decision Processes*, 82(1), pp. 9-27.
- Teece, D. (1976). "The Multinational Corporation and the Resource Cost of International Technology Transfer". Ballinger, Cambridge, MA, USA.
- Tsai, W. (2002). "Social structure of coopetition within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing". *Organization Science*, 13(2), pp. 179-190.
- Uzzi, B. (1996). "Sources and consequences of embeddedness for the economic performance of organizations". *American Sociological Review*, 61, pp. 674-698.
- Wasko, M.M. and Faraj, S. (2000). "It is what one does: Why people participate and help others in electronic communities of practice". *The Journal of Strategic Information Systems*, 9(2-3), pp. 155-173.
- Wathne, K., Roos, J., von Krogh, G. (1996). "Towards a theory of knowledge transfer in a cooperative context". In von Krogh, G., Roos, J. (eds.). "Managing Knowledge -Perspectives on Cooperation and Competition", Sage Publications, London.
- Weick, KE. (1995). "Sense making in organizations". Sage Publications, London.
- Winter, S. G. (1987). "Knowledge and competence as strategic assets". In Teece, D. (eds.). "The Competitive Challenge: Strategies for Industrial Innovation and Renewal", Ballinger, Cambridge, MA, pp. 159-184.
- Zack, M.H. (1999b). "Managing codified knowledge". *Sloan Management Review* , 40(4), pp. 45-58.
- Zander, U. (1991). "Exploiting a technological edge: Voluntary and involuntary dissemination of technology". Doctoral dissertation, Institute of International Business, Stockholm.
- Zmud, R.W. (1982). "Diffusion of modern software practices: influence of centralization and formalization". *Management Science*, 28, pp. 1421-1431.

APPENDICES

Appendix A - Variables and Questions (Turkish)

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Transfer Success	TS1	Bilimsel arařtırmalara katkısı	
	TS2	Firmanın fikri mülkiyet hakları konusunda bilgi seviyesi	
	TS3	Firma olarak sektörümüzde teknik bilgi ve tecrübe kazandı	
	TS4	Proje çıktısı sanayide yeni teknolojilerin ortaya çıkmasını tetikledi	
	TS5	Proje çıktılarının geliştirilmesi için yeni Ar-Ge çalışmalarını sağladı	
	TS6	Proje çıktısı, bu konuda kullanılan teknolojiyi uluslararası standartlara uyumlu hale getirdi	
	TS7	Proje çıktısı yan sanayiye geliřtirdi ve/veya yan sanayiye bilgi aktardı	
	TS8	Farklı teknoloji alanlarında yeni uygulamalara veya arařtırma çalışmalarına yol açtı	
	TS9	Proje ortağından / hizmet sağlayıcısından kendi üretimimizde kullanılmak üzere teknolojik bilgi edindik	
	TS10	Proje ortağı / hizmet sağlayıcısı firmamıza kullanılmak üzere yeni ürün / araç / iyi uygulamalar sağladı	
	TS11	Proje sonrası ortağımız ile yeni bir AB Çerçeve Programı projesinde yer almayı düşününüz	➤ Cummings and Teng (2003)
	TS12	Proje sonrası ortağımız ile EUREKA projesinde yer almayı düşününüz	➤ Kostova (1999)
	TS13	Proje sonrası ortağımız ile AB destekli başka bir projede yer almayı düşününüz	➤ Mowday et al. (1979)
	TS14	Proje sonrası ortağımızdan ulusal destekli bir projede hizmet almayı düşününüz	➤ Szulanski (1996)
	TS15	Proje sonrası ortağımız ile karşılıklı olarak tesislerimizi ortak amaçlı kullanmayı planlamaktayız	
	TS16	Proje sonrası ortağımız ile ticari işbirliği kurmayı düşününüz	
	TS17	Ulusal patent, ticari marka, endüstriyel dizayn, faydalı model başvurunuz var mı?	
	TS18	Uluslararası patent, ticari marka, endüstriyel dizayn, faydalı model başvurunuz var mı?	
	TS19	Onaylanan ulusal patent, ticari marka, endüstriyel dizayn, faydalı model başvurunuz var mı?	
	TS20	Onaylanan uluslararası patent, ticari marka, endüstriyel dizayn, faydalı model başvurunuz var mı?	
	TS21	Yeni bir ürün tasarımınız mevcut mu?	
	TS22	Bilimsel makale yayınladınız mı?	
	TS23	Firmanıza ait tescilli bir markanız var mı?	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Motivation	M1	TÜBİTAK teknik, finansal konularında ilgili dökümanları iletti	Araştırmacı soruları
	M2	TÜBİTAK'ın düzenlediği uluslararası etkinlikler proje ortaklıklarının kurulabilmesine olanak sağladı	
	M3	TÜBİTAK'ın düzenlediği etkinliklere katılmam projenin oluşmasını sağladı	
	M4	TÜBİTAK uluslararası işbirliği fırsatlarını zamanında farkederek ilgili bilgileri zamanında Türk firmalarına iletebildi	
	M5	TÜBİTAK proje fikrime ortak bulmamda yardımcı oldu	
	M6	TÜBİTAK proje ortağı ile konu özelinde tartışabilmem için seyahat desteği sağladı	
	M7	TÜBİTAK sayesinde proje fikri sahibi ile iletişime geçtim	
	M8	TÜBİTAK çalışanları sorularıma zamanında yanıt verdi	
	M9	TÜBİTAK çalışanları teknik konularda gerekli olan bilgi birikimine sahip	
	M10	TÜBİTAK, proje fikrinin geliştirilmesi aşamalarında yardımcı oldu	
	M11	TÜBİTAK, ortaklık kurulan ülke temsilcileri ile iletişimde yeterliydi	
	M12	TÜBİTAK, diğer ülke temsilcileri ile zamanında iletişime geçebildi	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Openness	O1	Firmamız yeniliklere açık bir firmadır	➤ Denison and Mishra (1995)
	O2	Firma yönetimi tarafından fikirlerimize değer verilir	
	O3	Firmamızda ortak değerler tanımlanmıştır (Miyon / Vizyon / Strateji)	
	O4	Firmada alınan kararlar üst yönetim tarafından alınmaktadır	
	O5	Firmada belirli aralıklarla fikir paylaşımı toplantıları yapılmaktadır	
	O6	Firmamız Ar-Ge çalışmalarımızı kısıtlamaktadır	
	O7	Firma içi kurallar ve politikalar kariyer gelişimime olanak sağlamaktadır	
	O8	Yeni fikirlerin geliştirilmesi aşamasında firma dışı kuruluşlarla karşılıklı bilgi paylaşımı yapılmaktadır	
	O9	Firma içi yenilikçi fikirler, firma dışı ortaklık kurulabilecek kuruluşlarla paylaşılmaktadır	
	O10	Firma çalışanlarının ingilizce seviyesi uluslararası iletişim için yeterlidir	
	O11	Üst yönetim uluslararası projelerde ortak olarak yer almaya sıcak bakmaktadır	
	O12	Müşteri fikirleri çalışmalarımızda değişikliğe gitmemize sebep olmaktadır	
	O13	Uluslararası ortaklıklar konusunda firmamızın genel bir stratejisi bulunmaktadır	
	O14	Uluslararası projeler sonucunda kişisel olarak firmamın uyguladığı teşvik sistemi çalışanlar için yeterlidir	
	O15	Uluslararası projeler firmamızın ortak olarak bulunması gereken projelerdir	
	O16	Firmamız değişen pazar koşullarına hızlı adapte olabilmektedir	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Trust	T1	Ortak ile mevcut uzun vadeli ilişkiler (karşılıklı güven)	➤ Mayer et al. (1995)
	T2	Uluslararası çalışmalarda proje ortağıma güvenirim	
	T3	Ortağımızın çalışma ortamını ve teknik kapasitesini biliyorum	
	T4	Ortağımızın proje sonunda beklentilerini biliyorum	
	T5	Ortağımız, kataloglara bakarak ürünlerimizi taklit edebilir	
	T6	Projedeki deneme çalışmalarının sonuçları firmamızla paylaşılmaktadır	
	T7	Ortağımızın bizim ürünümüzü üretmeyi öğrenmesi ortağı olduğumuz proje ile gerçekleşebilir	
	T8	Projedeki deneme çalışmalarının sonuçları firmamızla paylaşılmaktadır	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Networking	N1	Proje ortağı / hizmet sağlayıcısının içerisinde bulunduğu işbirliği ağı içerisine dahil olduk	Araştırmacı soruları
	N2	Ortağın sahip olduğu fiziksel kaynaklar (iş ortamı, makina ve teçhizat, malzeme vb.) ve zihinsel kaynaklar (ışgücü, bilgi, Ar-Ge, tasarım, kalite ve standartlar, teknolojik yetenekleri, prestij vb.)	
	N3	Ortağın sahip olduğu uzmanlık	
	N4	Ortağın sahip olduğu dış ilişkiler (işbirliği yaptığı diğer kuruluşlar, içinde yer aldığı gruplar/ağyapılar, girdiği pazarlar vb.)	
	N5	İşbirliğinin firmaya sağladığı mali avantajlar (yenilik maliyetlerini ve zamanını azaltma, yeni mali kaynaklara erişim vb.)	
	N6	Pazar koşullarını/talebinin işbirliğini gerektirmesi (yeni gelişen pazarlar, karmaşık ürün ve teknoloji, yeniliğe dayalı rekabetçilik, yenilik riskini paylaşma, vb.)	
	N7	Ortak ile yapılan uzun vadeli işbirliği (stratejik ortaklık)	
	N8	Ağ içinde hangi yol ile iletişim kurdunuz? (Telefon)	
	N9	Ağ içinde hangi yol ile iletişim kurdunuz? (internet)	
	N10	Ağ içinde hangi yol ile iletişim kurdunuz? (yüz-yüze)	
	N11	Ağ içinde hangi yol ile iletişim kurdunuz? (genel ağ toplantıları)	
	N12	Evet ise, Ulusal teknolojik işbirliği ağı	
	N13	Evet ise, Uluslararası teknolojik işbirliği ağı	
	N14	Evet ise, ÇP	
	N15	Çalışmalarınızda ağ içindeki iletişim için zaman ayırıyor musunuz? (Evet / Hayır)	
	N16	Evet ise, TÜBİTAK ulusal proje	
	N17	Evet ise, EUREKA	
	N18	Evet ise, ÇP	
	N19	Evet ise, Ticari işbirliği	
	N20	Ağ içinde iletişim için İngilizce konuşulması gerekli mi? (Evet / Hayır)	
	N21	Yabancı dil konusunda iletişim sorunu yaşadınız mı? (Evet / Hayır)	
	N22	Ağ içinde araştırmacı değişimi gerçekleştirdiniz mi? (Evet / Hayır)	
	N23	Ağ içindeki iletişiminizde sorun yaşıyor musunuz? (Evet / Hayır)	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Geographic Proximity	GPF1	Ülkeler arası dolaşım için vize gereksinimi	Araştırmacı soruları
	GPF2	Proje ortağı ile benzer kültürü paylaşmak	
	GPF3	Proje ara ürünlerinin ortaklar arasında paylaşılması	
	GPF4	Yüz-yüze görüşmeler	
	GP1	Proje ortağı ile olan coğrafi uzaklık	➤ Galbraith (1990)

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Communication Frequency	CIF1	Proje toplantı sayısı sıklığı	Araştırmacı soruları
	CIF2	Evet ise, Yılda bir (Ortağınız ile proje süresi boyunca toplantı yapma imkanı bulabildiniz mi? (Evet / Hayır))	
	CIF2	Evet ise, Yılda iki (Ortağınız ile proje süresi boyunca toplantı yapma imkanı bulabildiniz mi? (Evet / Hayır))	
	CIF4	Evet ise, Yılda üç (Ortağınız ile proje süresi boyunca toplantı yapma imkanı bulabildiniz mi? (Evet / Hayır))	
	CIF5	Evet ise, Yılda dört (Ortağınız ile proje süresi boyunca toplantı yapma imkanı bulabildiniz mi? (Evet / Hayır))	
	CIF6	Evet ise, Daha Fazla (Ortağınız ile proje süresi boyunca toplantı yapma imkanı bulabildiniz mi? (Evet / Hayır))	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Duration	DU1	Proje süresi	Veritabanı bilgileri

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Experience	E1	Evet ise, TÜBİTAK (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	Araştırmacı soruları
	E2	Evet ise, EUREKA (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	
	E3	Evet ise, ÇP (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	
	E4	Evet ise, TTGV (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	
	E5	Evet ise, KOSGEB (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	
	E6	Evet ise, AB (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	
	E7	Evet ise, Sanayi Bakanlığı (Firmanızın daha önce aldığı Ar-Ge destekleri var mı? (Evet / Hayır))	
	E8	Çalışma saati oranı	
	E9	Çalışma saati oranı Gruplaması	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Absorptive Capacity	AC1	Doktoralı personel sayısı	
	AC2	Yüksek lisanslı personel sayısı	
	AC3	Lisanslı personel sayısı	
	AC4	Teknisyen sayısı	
	AC5	Ar-Ge bilinci firmamızın üst yönetimi dahil ilgili tüm kademelerinde yaygınlaştı	
	AC6	Firma bünyesindeki laboratuvar, test ortamları, alet-teçhizat, yazılım araçları, kütüphane kapasitesi Ar-Ge çalışmalarının gerçekleştirilmesine olanak sağlamaktadır	➤ Cohen and Levinthal (1990)
	AC7	Firma yeni ürün geliştirme ve tasarım yeteneğine sahiptir	➤ Kim (2001)
	AC8	Geçmişte gerçekleştirilen Ar-Ge çalışmalarına dayanan deneyim ve bilgi birikimi yeni fikirlerin oluşmasını tetiklemektedir	➤ Kogut and Zander (1995)
	AC9	Projelerimizde karşılaşılan sorunların bir daha yaşanmaması için , önleyici ve geliştirici adımlar atılmıştır	➤ Wathne et al. (1996)
	AC10	Üniversiteler ve araştırma kuruluşlarıyla danışmanlık, hizmet alımı, ortak çalışmalar firmamıza teknik bilgi akışını sağlamıştır	
	AC11	Tecrübeli çalışanımızın yokluğunda üretimlerimizde herhangi bir aksama olmamaktadır	
	AC12	Yeni istihdam edilen personel mevcut yapı içerisinde çabuk öğrenebilmektedir	
	AC13	Yeni istihdam edilen personelin eğitim düzeyi, firma içi çalışmaları, kullanılan teknolojileri, faaliyetleri öğrenmesinde her zaman yeterlidir	
	AC14	Yeni istihdam edilen personel için uygulanan oryantasyon programı firmaya adaptasyon sürecini hızlandırmaktadır	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Knowledge Embeddedness	KE1	Proje ortağımızdan çalışmalarımızda gerekli olabilecek yazılımı kullanma imkanı elde ettiniz mi?	<ul style="list-style-type: none"> ➤ Argote and Ingram (2000) ➤ Kogut and Zander (1995)
	KE2	Ortağımızdaki tecrübeli çalışanlardan kolaylıkla bilgi edinebilmekteyiz	
	KE3	Ortaklığımızla bilgi paylaşımı yazılı doküman olarak gerçekleşmektedir	
	KE4	Proje toplantılarına, ortağımızın temsilcisi olarak teknik bilgiye sahip araştırmacıları katılır	
	KE5	Proje toplantıları, bilgi paylaşımı için uygun bir ortam hazırlamaktadır	
	KE6	Proje toplantılarında ortağımız tarafından teknik bilgi firmamızla paylaşılmaktadır	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Knowledge Articulability	KA1	Yeni başlayan bir çalışan kolaylıkla nasıl çalışabileceğini firma içi hazırlanmış olan yazılı dokümanlardan öğrenebilir	<ul style="list-style-type: none"> ➤ Bresman et al. (1999) ➤ Zander (1991)
	KA2	Çalışanlarımız firmadaki bütün süreçlerden haberdardır	
	KA3	Proje sonuçları firma içi diğer birimlerle paylaşılmaktadır	
	KA4	Genel olarak firma içi diğer birimlerle bilgi akışı düzenli olarak sağlanmaktadır	
	KA5	Üst yönetim diğer birimlerle olan bilgi paylaşımına sıcak bakmamaktadır	
	KA6	Proje getirileri firmada görünür halde sergilenmektedir	
	KA7	Geçmişte gerçekleştirilen Ar-Ge çalışmalarının sonuçları belirli bir sistematik dahilinde kayıt altına alınmaktadır	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Teachability	TE1	Firmamız çalışanlarının yetkinliklerini arttırmak amacıyla düzenlenen/katılınan sürekli eğitim programları firma kapasitesinin artmasına olanak sağlamaktadır (Ar-Ge; kişisel gelişim, proje yönetme eğitimi; ürün, vb.)	<ul style="list-style-type: none"> ➤ Rogers (1983) ➤ Winter (1987)
	TE2	Firmada çalışan tecrübeli teknik personel yeni başlayan personele bilgilerini aktarır	
	TE3	Firma içi tecrübeli personel tecrübelerini kendisine saklar	

Etiket	Kısa Etiket	Anket Soruları	Soruların kaynağı
Descriptives	D1	Değerlendirme Yapılan Firmalar / Proje ismi	Veritabanı bilgileri
	D2	Proje Kısa İsmi	
	D3	Proje Uzun İsmi	
	D4	Kontrat No	
	D5	Çağrı Adı	
	D6	Projenin Desteklendiği Program (6.Çerçeve Programı KOBİ / 7.Çerçeve Programı KOBİ / 6.Çerçeve Programı Tematik Alan / 7.Çerçeve Programı Tematik Alan / EUREKA Standart Proje / EUREKA Küme Projesi / EUREKA-Eurostars Projesi)	
	D7	Proje Süresi (Ay)	
	D8	Ortak Olarak Desteklenen Bütçe (€ veya TL)	
	D9	Firmanızın kuruluş tarihi	Araştırmacı soruları
	D10	Firmanızın bulunduğu il	
	D11	Firmanızın konumu (Organize Sanayi Bölgesi / Teknopark / Bağımsız / Diğer)	
	D12	Firmanızda çalışan toplam personel sayısı (< 10 / 10-20 / 21-50 / 51-100 / 101-150 / 151-250 / >250)	
	D13	Firmanızın hedef pazarları (Bölgesel / Ulusal / Uluslararası / Belirli ülkeler)	
	D14	Uluslararası projeler sonucunda firmanızda uygulanan bir teşvik sistemi var mı? (Evet / Hayır)	
	D15	Ne kadar süredir firmada çalışıyorsunuz? (Yıl)	
	D16	Firmadaki göreviniz nedir?	
	D17	Yaşınız	
	D18	Teknolojik gelişmeleri nereden takip ediyorsunuz?	

Appendix B - Variables and Questions (English)

Label	Short Label	Survey Questions	Questions from
Transfer Success	TS1	Its contribution to scientific researches	
	TS2	Level of knowledge of the firm on intellectual property rights	
	TS3	Our firm has gained technical knowledge and experience in our sector	
	TS4	Output of the project led new technologies in the industry	
	TS5	Development of outputs of the projects led to new R&D studies	
	TS6	Project outputs made technology used in this area in line with international standards.	
	TS7	Project outputs strengthened supplier industry and/or transferred knowledge to the industry.	
	TS8	It resulted in new implementation and researches in various technological areas.	
	TS9	We have received technological knowledge from our project partner/service provider, which we can use in our own production.	
	TS10	Project partner/service providers provided our firm new products/materials/good implementations for our own use.	
	TS11	We are planning to take part in a new EU FP project together with our current partner.	➤ Cummings and Teng (2003)
	TS12	We are planning to take part in EUREKA project together with our partner after the current project is finalized.	➤ Kostova (1999)
	TS13	We are planning to take part in a different project funded by EU with our partner after the current project is finalized.	➤ Mowday et al. (1979)
	TS14	We are planning to receive services from our current partner in a nationally funded project after the existing project is finalized.	➤ Szulanski (1996)
	TS15	After the current project is finalized, we are planning to use our facilities jointly.	
	TS16	We are planning to develop a corporate partnership with our current partner after the existing project is finalized.	
	TS17	Do you have any applications for national patent, trademark, industrial design and utility model?	
	TS18	Do you have any applications for international patent, trademark, industrial design and utility model?	
	TS19	Have any of your applications on national patent, trademark, industrial design and utility model been approved?	
	TS20	Have any of your applications on international patent, trademark, industrial design and utility model been approved?	
	TS21	Do you have any new product design?	
	TS22	Have you publicized any scientific article?	
	TS23	Do you have any registered trademark of your company?	

Label	Short Label	Survey Questions	Questions from
Motivation	M1	TÜBİTAK provided necessary documents on technical and financial issues.	Researcher's questions
	M2	International facilities organized by TUBITAK enabled establishment of international partnership.	
	M3	Participation in the events organized by TUBITAK enabled development of the project.	
	M4	TUBITAK recognized opportunities for international partnership timely and provided necessary information to the Turkish firms as needed.	
	M5	TUBITAK helped me find partner for my project idea.	
	M6	TUBITAK provided support for travel which helped me find opportunities to share my project details with project partners.	
	M7	TUBITAK helped me contact with the owner of the project idea.	
	M8	TUBITAK personnel responded my questions in a timely manner.	
	M9	TUBITAK personnel are equipped with necessary technical knowledge on technical issues.	
	M10	TUBITAK helped during development of project ideas.	
	M11	TUBITAK satisfactorily communicated with representatives of the partnering countries.	
	M12	TUBITAK communicated with representatives from other countries in a timely manner.	

Label	Short Label	Survey Questions	Questions from
Openness	O1	Our firm is open to changes.	➤ Denison and Mishra (1995)
	O2	Management of the firm values our ideas.	
	O3	A joint value is defined in our firm. (Mission / Vision / Strategy)	
	O4	Decisions of the firm are taken by the top management.	
	O5	Periodical meetings are organized in our firm for exchanging of ideas.	
	O6	Our firm limits our R&D activities.	
	O7	Rules and policies of the firm support my career development.	
	O8	Our firm exchanges ideas with other institutions during the stages of development of new ideas.	
	O9	Innovative ideas of the firm are shared with institutions outside the firm which have the potential to cooperate.	
	O10	Level of English of the personnel of our firm is sufficient for communication in international arena.	
	O11	Top management has a positive attitude on taking part in international projects.	
	O12	Opinions of the customers lead changes in our work.	
	O13	Our firm has a general strategy for international partnerships.	
	O14	Award system of our firm in the end of the international projects is sufficient for personnel.	
	O15	International projects are the projects where our firm should take part in.	
	O16	Our firm can easily adapt changing conditions of the market.	

Label	Short Label	Survey Questions	Questions from
Trust	T1	Long term relations with the partner (mutual trust)	➤ Mayer et al. (1995)
	T2	I trust our partner in international facilities.	
	T3	I am aware about the working conditions and technical capacity of our partner.	
	T4	I am aware about the expectations of our partner on the outcomes of the project.	
	T5	Our partner can imitate our products from our catalogue.	
	T6	Outcomes of the project pilots are shared with our firm.	
	T7	Our project enables our partner learn how to produce our product.	
	T8	Outputs of the project pilots are shared with our company.	

Label	Short Label	Survey Questions	Questions from
Networking	N1	We have involved in the cooperation network where our project partner/service provider are involved in.	Researcher's questions
	N2	Physical conditions of the partner (working environment, machines, equipment, etc...) and capacity (workforce, knowledge, R&D, design, quality and standards, technological skills, prestige, etc...)	
	N3	Expertise of the partner	
	N4	Foreign relations of the partner (other cooperative institutions, networks/groups and markets, etc...)	
	N5	Financial advantages of the cooperation to the firm Reducing the expenses and duration of innovation, access to new financial resources, etc...)	
	N6	Market conditions/requirements leading partnership (newly developed markets, complex products and technology, competency based on innovation, sharing of risk of changes, etc...)	
	N7	Long term cooperation with the partner (strategic partnership)	
	N8	How did you communicate in the network? (Telephone)	
	N9	How did you communicate in the network? (internet)	
	N10	How did you communicate in the network? (face-to-face)	
	N11	How did you communicate in the network? (general network meetings)	
	N12	If yes, national technological cooperation network	
	N13	If yes, international technological cooperation network	
	N14	If yes, FP	
	N15	Do you allocate time for your personnel on communication within the network? (Yes / No)	
	N16	If yes, TUBITAK national project	
	N17	If yes, EUREKA	
	N18	If yes, FP	
	N19	If yes, corporate cooperation	
	N20	Do you have to communicate in English in the network? (Yes / No)	
	N21	Did you experience any problem while communicating in a foreign language? (Yes / No)	
	N22	Did you exchange researcher in the network? (Yes / No)	
	N23	Are you experiencing and problems on communication within the network? (Yes / No)	

Label	Short Label	Survey Questions	Questions from
Geographic Proximity	GPF1	Visa requirement for travel amongst countries	Researcher's questions
	GPF2	Sharing the same culture with the project partner	
	GPF3	Sharing of intermediate products amongst partners	
	GPF4	Face-to-face meetings	
	GP1	Geographic proximity with the partner	➤ Galbraith (1990)

Label	Short Label	Survey Questions	Questions from
Communication Frequency	CIF1	Frequency of meetings	Researcher's questions
	CIF2	If yes, once a year (Can you meet with your partner during project?) (Yes / No)	
	CIF2	If yes, twice a year (Can you meet with your partner during project?) (Yes / No)	
	CIF4	If yes, three times in a year (Can you meet with your partner during project?) (Yes / No)	
	CIF5	If yes, four times in a year (Can you meet with your partner during project?) (Yes / No)	
	CIF6	If yes, more than four times in a year (Can you meet with your partner during project?) (Yes / No)	

Label	Short Label	Survey Questions	Questions from
Duration	DU1	Duration of project	Desk Review

Label	Short Label	Survey Questions	Questions from
Experience	E1	If yes, TUBITAK (Did your firm receive any R&D support earlier?) (Yes / No)	Researcher's questions
	E2	If yes, EUREKA (Did your firm receive any R&D support earlier?) (Yes / No)	
	E3	If yes, FP (Did your firm receive any R&D support earlier?) (Yes / No)	
	E4	If yes, Technology Development Foundation of Turkey (TTGV) (Did your firm receive any R&D support earlier?) (Yes / No)	
	E5	If yes, Small and Medium Enterprises Development Organization (KOSGEB) (Did your firm receive any R&D support earlier?) (Yes / No)	
	E6	If yes, EU (Did your firm receive any R&D support earlier?) (Yes / No)	
	E7	If yes, Ministry of Industry (Did your firm receive any R&D support earlier?) (Yes / No)	
	E8	Rate of working hours	
	E9	Groupings of working hours	

Label	Short Label	Survey Questions	Questions from
Absorptive Capacity	AC1	Number of personnel holding doctorate degree	<ul style="list-style-type: none"> ➤ Cohen and Levinthal (1990) ➤ Kim (2001) ➤ Kogut and Zander (1995) ➤ Wathne et al. (1996)
	AC2	Number of personnel holding master degree	
	AC3	Number of personnel holding undergraduate degree	
	AC4	Number of technicians	
	AC5	Awareness on R&D expanded to our firm at all levels including top management	
	AC6	Laboratories, testing facilities, materials and equipments, software equipment, library are sufficient for R&D activities.	
	AC7	Our firm has the skills to design and develop new products.	
	AC8	Accumulated experience and knowledge from previous R&D activities ease development of new ideas.	
	AC9	Preventive and developmental measures are taken in order not no experience those problems again.	
	AC10	Joint activities, receipt of services and consultancies from universities and research institutions have enabled transfer of technical knowledge to our firm.	
	AC11	No delay is experienced in our firm during absence of experienced personnel.	
	AC12	Newly recruited personnel can adapt easily in the existing system.	
	AC13	Level of education of newly recruited personnel is satisfactory to enable learning in-house works, technology and facilities.	
	AC14	Orientation programme applied to the newly recruited personnel speeds up adaptation process of the personnel.	

Label	Short Label	Survey Questions	Questions from
Knowledge Embeddedness	KE1	Did your partner share its software which is required for your works?	<ul style="list-style-type: none"> ➤ Argote and Ingram (2000) ➤ Kogut and Zander (1995)
	KE2	We can easily receive information from the experienced personnel of our partner.	
	KE3	We share knowledge with our partner in written format.	
	KE4	Technically equipped representatives of our partner participate in project meetings.	
	KE5	Project meetings enable suitable platform for sharing of knowledge.	
	KE6	Our partner share technical knowledge with us in project meetings.	

Label	Short Label	Survey Questions	Questions from
Knowledge Articulability	KA1	Newly recruited personnel can easily learn how ot work in our firm from our written documents.	<ul style="list-style-type: none"> ➤ Bresman et al. (1999) ➤ Zander (1991)
	KA2	Our personnel are aware about all stages in our firm.	
	KA3	Outcomes of the project are shared with other units in our firm.	
	KA4	Generally, regular flow of knowledge with other units in our firm is maintained.	
	KA5	Top management has a negative attitude towards sharing of knowledge with other units in the firm.	
	KA6	Project outputs are exhibited visibly in our firm.	
	KA7	Outcomes of part R&D projects are recorded systematically.	

Label	Short Label	Survey Questions	Questions from
Teachability	TE1	Continuous training programmes that personnel participate in order to strengthen their knowledge and abilities contribute to increase in overall capacity of the firm. (R&D, personal development, project management, products, etc...)	<ul style="list-style-type: none"> ➤ Rogers (1983) ➤ Winter (1987)
	TE2	Experienced technical personnel in the firm transfer their knowledge to the newly recruited personnel.	
	TE3	Experienced personnel in the firm do not share his/her knowledge with others.	

Label	Short Label	Survey Questions	Questions from
Descriptives	D1	Evaluated firms / Project name	Desk Review
	D2	Project short name	
	D3	Project long name	
	D4	Contract number	
	D5	Call name	
	D6	Funding Programme of your project (6. Framework Programme SME / 7. Framework Programme SME / 6. Framework Programme Thematic Area / 7. Framework Thematic Area / EUREKA Standard Project / EUREKA Cluster Project / EUREKA-Eurostars Project)	
	D7	Project Duration (Month)	
	D8	Funded project as a partner (€ or TRY)	
	D9	Year of establishment of your firm	Researcher's questions
	D10	Which province is your firm located?	
	D11	Location of your firm (Industrial Zone / Techno-park / Independent / Other)	
	D12	Total number of your personnel (< 10 / 10-20 / 21-50 / 51-100 / 101-150 / 151-250 / >250)	
	D13	Target markets of your firm (Regional / National / International / Identified particular countries)	
	D14	Is an award system implemented in your company which is established after international projects? (Yes / No)	
	D15	How long have you ben working in your firm? (Year)	
	D16	What is your position in your firm?	
	D17	How old are you?	
	D18	Where do you follow technological developments?	

Appendix C – Measurement of Variables in Literature

TRANSFER SUCCESS

- They are willing to put in a great deal of effort beyond that normally expected to help this know-how transfer be successful
- They talk up this know-how to their friends as important to the organization's success
- They are proud to tell others that they are working with this know-how
- They have been inspired by this know-how to do their very best performance
- They are pleased that they learned this know-how over other know-how that they could have learned instead
- They feel that there is very much to be gained personally by continuing to work with this know-how
- They really care about the implementation of this know-how
- They feel that, for them, this is the best of all know-how to work with
- They feel that deciding to work with this know-how was a great decision on their part
- They feel a very high degree of personal ownership of this know-how
- They feel a sense of responsibility for how this know-how gets used
- They resent the continued control that the source has over how to use this know-how
- They have had sufficient interaction with this know-how to develop an intimate understanding of it
- They have significantly invested their time, ideas, skills, and physical, psychological, and intellectual energies in this know-how and the related transfer process
- They have been able to exercise a great deal of discretion about how this know-how was transformed and how it is used
- How satisfied was the recipient with the quality of the know-how?
- How satisfied was the recipient with the quality of the transfer process?
- Once the recipient gained experience with the know-how, how did this change their satisfaction with this know-how?
- How far was there any deviation to the planned start date of the transfer project?

- How far was there any deviation to the planned first use of the know-how?
- How far was there any deviation to the planned achievement of satisfactory results from the know-how?
- How far was there any deviation to the planned and actual costs of the transfer?

TRUST

- To what extent are you willing to share ideas, feelings, and specific goals with the university research center?
- To what extent do you doubt the university research center's competence as well as its motives and fairness in sharing these abilities? (reverse score)
- To what extent do you perceive that the university research center adheres to a set of principles that your organization finds acceptable?
- A competitor can easily learn how we manufacture our product by analyzing descriptions of our product in product catalogues, etc
- A competitor can easily learn how we manufacture our product by taking it apart and examining it carefully
- A competitor can easily learn how we manufacture our product by testing in use

OPENNESS

- Hierarchical levels in the organization (few levels versus many levels)
- Nature of rules and policies (flexible rules/policies versus rigid rules/policies)
- Source of direction (members are self-directed versus members follow directives)
- In this organization there is a high level of agreement about the way in which we do things
- Our approach to doing business in this organization is very consistent and predictable
- This organization has a long-term purpose and a clear direction for the future
- Members of this organization have a shared vision as to what this organization will be like in the future
- Most members of this organization have input into decisions that affect them

- Cooperation and collaboration across functional roles is actively encouraged within this organization
- Customers' comments and recommendations often lead to changes in this organization
- This organization is very responsive to the external environment and adapts easily

KNOWLEDGE EMBEDDEDNESS

- It was easy for the recipient to identify source personnel who could help them reconfigure and adapt this know-how
- It was easy for the recipient to identify source personnel who could help them learn the tools, equipment and technologies related to this know-how
- It was easy for the recipient to identify which tools to use to perform each activity, task and procedure
- It was easy for the recipient to locate and extract the information needed to understand this know-how
- a manual describing how our activities are executed could be written
- new staff can easily learn how to perform the services that our local company offers by talking to skilled employees
- training new personnel is typically a quick and easy job for us
- new personnel with a university education can perform the services that our local company offers

KNOWLEDGE ARTICULABILITY

- New R&D personnel can easily learn this know-how by studying a complete set of blueprint, documents and plans
- New R&D personnel can easily learn this know-how by talking to experienced personnel
- Educating and training new R&D personnel regarding this know-how is a quick and easy job
- The tasks of the unit require that personnel have long experience in this unit to achieve high product quality

- The tasks of the unit require that new employees have to work with experienced R&D personnel as “apprentices” for a long time to learn their job within important areas
- A useful manual describing our manufacturing process can be written
- Large parts of our manufacturing control are embodied in standard type software that we modified for our needs
- Large parts of our manufacturing control are embodied in software developed within our company exclusively for our use
- Extensive documentation describing critical parts of the manufacturing process exist in our company

TEACHABILITY

- New personnel can easily learn how to manufacture the product by talking to skilled manufacturing employees
- New personnel can easily learn how to manufacture our product by studying a complete set of blueprints
- Educating and training new personnel is a quick, easy job
- New personnel know enough after a normal high school education to manufacturing our product
- New personnel know enough after vocation training to manufacture our product

ABSORPTIVE CAPACITY

- Capacity to capture relevant, continuous and up-to-date information and knowledge on current and potential competitors
- The organization's capacity to use and exploit new knowledge in the workplace to respond quickly to environment changes
- Capacity to put technological knowledge into product and process patents
- Capacity of the company to use information technologies in order to improve information flow, develop the effective sharing of knowledge and foster communication between members of the firm, including virtual meetings between professionals who are physically separated—Internet B2E portals, e-mail, teleworking etc.

- Capacity to assimilate new technologies and innovations that are useful or have proven potential
- Ability to use employees' level of knowledge, experience and competencies in the assimilation and interpretation of new knowledge
- Capacity to adapt technologies designed by other to the firm's particular needs
- The firm benefits when it comes to assimilating the basic, key business knowledge and technologies from the successful experiences of businesses in the same firm
- Frequency and importance of cooperation with R&D organizations—universities, business schools, technological institutes, etc.—as a member or sponsor to create knowledge and innovations
- Firm's awareness of its competences in innovation, especially with respect to key technologies, and capability to eliminate obsolete internal knowledge, thereby stimulating the search for alternative innovations and their adaptation

SIZE

- Total # of employees in SME

GEOGRAPHIC PROXIMITY

- To what extent does your firm's geographic proximity to the university center affect this relationship?

COMMUNICATION FREQUENCY

- Frequency of project meetings annually