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Technology Transfer Success: An Investigation of Contributory Factors

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Abstract. *The purpose of the study was to investigate factors that contribute to the success of technology transfers. The specific objectives were to investigate 1) technological capabilities acquired by recipient firms through the technology transfer at the project level, 2) contributory factors that influence technology transfer, and 3) whether technological capabilities acquired by recipient firms are affected by these contributory factors. The study was conducted in Sri Lanka. The study developed a set of success factors and performance indicators to assess technological capabilities acquired by technology recipient firms. The study found two main types of technological capabilities gained by recipient firms through the technology transfer - "converting and acquiring capability" and "vending, modifying and generating capability". Further, the study found five contributing factors for technology transfer - process management, intended use of technology, transfer components, technology needs analysis, and IP protection and licensing. It is also found that all five contributing factors significantly positively predict both types of technological capabilities gained by recipient firms through technology transfer. The findings of the study presented in this paper make valuable contributions to the existing literature on technology management and technology transfer.*

Keywords: *Asia, developing countries, international technology transfer, technology transfer, technology capabilities*

1. Introduction

Countries identify the need to be up to date with technologies and keep pace with advancements in technology. In succinct, technology gives a meaning of a solution, process, and know-how required to convert inputs into finished products/services. Countries aspiring to have technologies can do so by developing them in-house or getting them transferred (Gupta et al. 2006; Huynh, 2018; Park and Lee, 2011). The former involves investments in in-house research and development (R&D) while the latter involves technology transfer. The term technology transfer gives a meaning of getting the components of technology, such as physical assets, knowledge, and human capabilities transferred from one entity (the transferor/developer or sender of technology) to another entity (transferee/acquirer or recipient of technology). Technology transfer is a good option for firms to acquire new technologies developed by others when they do not have technological capabilities and finances for in-house R&D, intend to reduce risks associated with in-house technology development as well as intend to reduce time taken for in-house R&D (Park and Lee, 2011). With technology transfer, the technology recipient can apply the transferred technology to improve its processes or use it to manufacture a product or render a service (Bozeman, 2000; Di Benedetto et al., 2003). Hence, through technology transfer, technology recipient firms can acquire technological capabilities, upgrade innovation capabilities, and ultimately compete nationally or internationally (Andrenelli et al., 2020; Hacker et al., 2015; Malik and Wickramasinghe, 2013; Sikdar and Mukhopadhyay, 2020). Technology transfer occurs in organizations in multiple forms, such as within a firm, across firms and national boundaries (Lee et al.,

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2018; Kortzfleisch et al., 2015; Schmiemann and Durvy, 2003). The present study investigated the transfer of technologies across national boundaries or international technology transfers. Previous studies suggest that international technology transfers are difficult and technology-recipient developing countries face enormous challenges in getting technology transferred (Andrenelli et al., 2020; Jayasena et al., 2005; Lee et al., 2018; Malik and Bergfeld, 2015; Malik and Wickramasinghe, 2013, 2018; Oparaocha, 2016; Wickramasinghe and Garusinghe, 2010). These challenges occur when the two functional units (foreign technology sender and local technology recipient) are influenced by their own organizational boundaries, i.e., structural and cultural (Lee et al., 2018; Malik and Wickramasinghe, 2018).

In this regard, the literature on technology transfers suggests several important aspects. First, most of the research was conducted from the foreign technology sender's point of view; very few studies were conducted from the side of technology recipient firms in developing countries. This is irrespective of concerns raised by scholars for several decades for the need to understand technology transfer projects from host firms' perspective (Ebrahimpour and Schonberger, 1984; Grant and Gregory, 1997, Malik and Wickramasinghe, 2018; Wickramasinghe and Garusinghe, 2010). Second, previous studies highlight the need to understand technological capabilities gained by technology recipient firms at the project level since the highest impact of foreign technology transfers is at the project level (Huynh, 2018; Kundu et al., 2015; Malik and Wickramasinghe, 2013).

For example, Kundu et al (2015) state that the existing literature is almost silent on the fundamental gaps and perceptions that exist between the transferor and transferee. Third, from the point of technology sending firms, the literature suggests that technology senders face numerous challenges in licensing-out and profiting from outward technology transfers mainly due to technology transfer difficulties arise at the end of technology recipients (Lichtenthaler and Lichtenthaler, 2010; Park and Lee, 2011). Hence, although a technology corporation is bi-directional between the technology sender and the recipient, what happened at the technology recipient's site has more say in deciding the success of technology transfers. Fourth, our review of the literature suggests that previous studies that investigated international technology transfer experiences of Asian developing countries are limited irrespective of the importance of acquiring foreign technologies for the innovative performance of firms in these countries. Therefore, it is important to investigate contributory (success) factors that influence the success of international technology transfers from the technology recipients' point of view at the project level.

In the above context, the present study investigated factors that contribute to the success of technology transfers. The specific objectives were to investigate 1) technological capabilities acquired by recipient firms through technology transfer at the project level, 2) contributory factors that influence technology transfer, and 3) whether technological capabilities acquired by recipient firms are affected by these contributory factors. It is believed that the findings of the study will lead to identifying factors that should be considered to achieve success in technology transfers. Regarding the significance of the study, we are unable to find previous studies that stipulate a set of indicators for measuring the success of technology transfers. It is also rare to find studies that identified factors influencing the success of technology transfers from the perspective of developing countries. Hence, we believe that the findings of the study presented in this paper are important and make valuable contributions to the existing literature on technology management and technology transfer.

Regarding the organization of the paper, the next section provides a review of the literature relevant to the present study. Thereafter, the methodology adopted for the study is

presented. After presenting the findings of the study, the final section discusses the implications of the findings to the existing literature and practice, provides a conclusion, and suggests avenues for future research studies.

2. Literature Review and Hypotheses Development

Technology Transfer and its Success

Most firms traditionally focused on internal R&D where technological advancements are mainly developed and applied in-house (Lichtenthaler and Lichtenthaler, 2010). However, during the last few decades, firms have increasingly collaborated with external partners to acquire technologies from external sources. Technology transfer is defined as a process of deliberate and systematic acquisition of equipment/machinery and facilities, technological designs, skills/knowledge and knowhow, intellectual property rights, and business processes for the application in a process, the manufacture of a product, or the rendering of a service (United Nations, 2001). This definition identifies technology transfer as an ongoing process. The technology transfer process involves at least two parties, i.e., the transferor who sends the technology and the transferee, who receives the technology (da Silva et al., 2019). This transfer is a complex process when viewed with technology transfer models, main parties involved and facilitators, and inhibitors/barriers encountered in transferring technologies. We investigated international inbound technology transfers and the experiences of technology-acquiring firms.

It is important to understand the ways to assess the success of technology transfers (Battistella et al., 2016; Lee et al., 2018). Previous studies such as Kumar et al. (1999) suggested the importance of evaluating two aspects - physical and informational. The physical aspects comprise several elements such as processes, tools and techniques, and products/services whereas informational aspects comprise several elements such as know-how and capabilities gained by employees. It is important to consider the appropriateness of technological capabilities acquired by the technology recipient (Ramanathan, 1994). According to Fransman and King (1984), acquiring capabilities to master a foreign technology, use the foreign technology for converting input into output, and adapt the foreign technology to the local context are important. Huynh (2018) also stated the importance of acquiring adopting and adapting capabilities of foreign technology.

Based on Fransman and King (1984), the present study identifies five types of technological capabilities that technology recipients should be able to acquire from technology transfers. These are converting, acquiring, vending, modifying, and generating capabilities. In the present study, technology transfer success is evaluated based on the extent to which these technological capabilities are acquired by technology recipients. These capabilities are as follows.

- Converting capability includes the recipient's capability to utilize machinery and equipment, plan and control operations, troubleshoot and maintain systems, and use information and control systems to provide information support for the operation of the technology.
- Acquiring capability is the recipient's capability to source and procure technologies, which include capabilities to justify the technology bought, undertake project planning, undertake project execution, and undertake system improvements. This also includes capabilities gained in identifying suitable sellers of technology, identifying suitable transfer mechanisms, and negotiating terms for the transaction of technology.
- Vending capability includes the recipient's capability to utilize capacity and resources optimally, meet service requirements, use the technology to improve market share if product/service technologies are transferred and enhance perceived customer satisfaction.

- Modifying capability is the recipient's capability to adapt and modify the technology to suit local conditions and for superior performance. This includes capabilities to substitute/duplicate equipment and spare parts, carry out incremental improvements for systems, and implement skill development programs for personnel involved.
- Generating capabilities include the recipient's capability to introduce innovations to acquired technology, i.e., product innovations, process innovations, application innovations, and system innovations as well as reverse engineer the acquired technology.

Factors Affecting Technology Transfer

In the process of transferring technology, the technology recipient and sender should accomplish specified technology transfer-related tasks (Mom et al., 2012). The literature suggests that several factors could be present in the transfer process which could enhance or weaken the achievements of technology transfer, i.e., technological capabilities acquired by the recipient (Lee et al., 2018; Huynh, 2018; Malik and Wickramasinghe, 2013, 2018; Wickramasinghe and Garusinghe, 2010). Hence, it is important to understand factors that contribute to successful technology transfers from the technology recipients' point of view. Mostly cited factors that contribute to technology transfers could be identified as follows.

- The awareness and identification of the type of technology required for the recipient firm. An effort must be put into identifying the real need for the technology and the type of technology to be sought since it could influence the technology transfer experiences of the recipient (Coadour et al., 2019.
- The awareness and identification of alternative technologies available in the market and the identification of potential technology suppliers (Coadour et al., 2019; Huynh, 2018; Mahboudi and Ananthan, 2010).
- The awareness and identification of components of technology to be transferred (Mahboudi and Ananthan, 2010). The literature emphasizes the importance of paying attention to four types of components, i.e., object, human, document, and institution-embodied components (Asian and Pacific Centre for Transfer of Technology, 1989; Jayasena et al., 2005; Malik and Wickramasinghe, 2013, 2018; Molas-Gallart 2000; Ramanathan, 1994; Technology Atlas Team, 1987; Wickramasinghe and Garusinghe, 2010).
- An understanding of the importance of licensing-in for the technology recipient and licensing-out for the technology sender (Park and Lee, 2011). As per Park and Lee (2011), technology transfer is not just a one-way activity but rather a bi-directional activity. Hence, the use of accepted mechanisms to acquire or sell the technology is important.
- The management of the technology transfer process by the recipient firm at the project level (Huynh, 2018; Wickramasinghe and Garusinghe, 2010). Designing, modelling, executing, and monitoring the transfer process help to make significant gains in the transfer.

It is also important to review specific literature on technology transfers in Sri Lanka. Previous research studies were conducted in various business sectors such as engineering, manufacturing, IT, and construction in Sri Lanka (Jayasena et al., 2005, Wickramasinghe and Garusinghe, 2010, Malik and Wickramasinghe, 2013). When evaluating technology transfer success, Malik and Wickramasinghe (2013, 2018) and Wickramasinghe and Garusinghe (2010) showed that technological capabilities acquired by the recipient should be evaluated to understand gains from technology transfers. Jayasena et al. (2005), Malik and Wickramasinghe (2013, 2018) and Wickramasinghe and Garusinghe (2010) showed that gaining capabilities to identify the components of technology to be transferred is important. When the contributory factors that influence technology transfers are taken into consideration, Wickramasinghe and Garusinghe (2010) showed the importance of

effective management of the technology transfer process at the project level. Further, Malik and Wickramasinghe (2013, 2018), Wickramasinghe and Garusinghe (2010), and Jayasena et al. (2005) showed that structural and cultural factors influence technology transfers. Hence, Malik and Wickramasinghe (2013, 2018) emphasised the importance of understanding the responses of technology recipients. Furthermore, having considered the lack of information available on the technology transfers from the side of technology recipient firms as well as technological capabilities gained by technology recipient firms at the project level, Malik and Wickramasinghe (2013, 2018), and Wickramasinghe and Garusinghe (2010) showed the importance of investigating technology transfers from the side of technology recipient firms at the project level.

Overall, the literature reviewed above suggests that inter-organizational technology transfers could involve major challenges or complexities when transferring technologies across boundaries. Firms involved in the transfer process should make considerable effort to overcome these complexities since these could limit their technology transfer success, i.e., technological capabilities gained by the recipient. Based on the literature reviewed above, we propose that the extent of technological capabilities gained by the recipient could be affected by several factors prevailing at the recipient.

3. Methodology

Measures

The measures used in the study can be divided into two – contributory factors that influence technology transfer and the level of technological capabilities gained by the recipient firms through the technology transfer at the project level. A 10-item scale was developed to assess the level of technological capabilities gained by the recipient firms. These items are shown in Table 1. A 22-item scale was developed to identify factors that influence the transfer of technology, which are shown in Table 2. Both scales used a 5-point Likert scale ranging from strongly agree (5) to strongly disagree (1).

Sample

When selecting the sample, four technology-based sectors were targeted - engineering, manufacturing, information technology, and construction. Firms were narrowed down to large size, i.e., more than 100 persons are engaged. The firms surveyed had project-level experiences of getting foreign technologies transferred, i.e., process or product/service technologies, and the transferred technology was in operation for at least three years. The second author of this article identified 30 firms that fulfilled the sample selection criteria, and consent was obtained to distribute the survey questionnaire to five to six employees from each firm who were actively engaged in the technology transfer process and holding managerial-level job positions in the firm. We identified these targeted respondents as "subject matter experts", and we have received a total of 150 fully completed questionnaires. Of the respondents, 68% were less than 35 years of age, 23% were between 36 to 45 years of age and 9% were between 46 to 55 years of age. Most of the respondents identified themselves as male (67%) while 33% identified as female. Regarding the highest education qualification of the respondents, 51% had bachelor's degrees or equivalent professional qualifications, 22% had postgraduate qualifications, and 27% had higher diplomas. Regarding work experience, 96% had less than 5 years of experience with the current firm while the remaining had more than 10 years of experience.

Method of Data Collection and Analysis

A self-administered survey questionnaire was developed. The first part of the questionnaire inquired about the contributory factors important in technology transfers. The second part of the questionnaire inquired about the technology capabilities achieved. The third section collected data on the demographic characteristics of the respondents. The questionnaire was distributed as a Google

form. Regarding the methods of data analysis, regression analysis was used after testing the measures for validity and reliability.

4. Results and Discussion

Table 1 shows the results of factor analysis and fit measures for technological capabilities gained by recipient firms. The total-item scale had Cronbach's Alpha of .910. The factor analysis derived two components. One is named "converting and acquiring capability" while the other is named "vending, modifying, and generating capability". These two factors explained 67% of the technological capabilities achieved.

Table 2 shows the results of factor analysis and fit measures for contributory factors that influence technology transfer. The total-item scale had Cronbach's Alpha of .918. The factor analysis derived five components. These were named process management, intended use, transfer components, technology needs analysis, and IP protection and licensing. These five factors explained 73% of the variance. Correlations between the variables are shown in Table 3.

Table 1.
Technological Capabilities

	F1	F2
Gained capabilities to effectively utilize the acquired technology	.778	
Gained capabilities to carry out troubleshooting, handle breakdowns, and perform predictive maintenance of the acquired technology	.733	
Gained capabilities to use the acquired technology in information and control systems	.789	
Gained capabilities to justify and specify the acquired technology	.783	
Gained capabilities to identify alternative compatible technologies if total replacement of the acquired technology becomes a necessity	.769	
Gained capabilities to use the acquired technology to expand into new markets, offer new products, and/or offer new products to new markets		.765
Gained capabilities to use the functionalities of the acquired technology to satisfy future needs		.766
Gained capabilities to modify the acquired technology for more effective performance		.730
Gained capabilities to use the acquired technology for product, process, and/or system innovations		.816
Gained capabilities to reverse engineer the acquired technology		.716
Eigenvalue	5.55	1.17
% of Variance	34.33	32.88
Cronbach's Alpha	.879	.872
Average variance extracted	.594	.577
Construct reliability	.880	.871

Note: F1: Converting and acquiring capability, F2: Vending, modifying, and generating capability.

Table 4 shows the results of the regression analysis. Two separate regression analyses were conducted for each dependent variable - "converting and acquiring capability" and "vending, modifying and generating capability". As shown in Table 4, the effect of all the five factors on converting and acquiring capability is significant. Overall, a regression coefficient of .595 ($p < .001$) suggests that these three variables account

for 60% of the variation in converting and acquiring capability. Further, the effect of all the five factors on vending, modifying, and generating capability is significant. Overall, a regression coefficient of .687 ($p < .001$) suggests that these three variables account for 69% of the variation in vending, modifying, and generating capability.

Table 2.
Contributors in Gaining Technological Capabilities

	F1	F2	F3	F4	F5
Technology transfer process is monitored with its baselines	.679				
Technology transfer process is monitored for continuous improvement	.780				
Technology transfer process is modelled to minimize waste	.800				
Technology transfer project team held discussions on a need-basis to solve issues in the transfer process	.771				
Technology transfer project team maintained good relations with experts from the technology provider	.704				
Technology transfer project-team maintained records for future reference	.738				
My organization tries to obtain technologies that comply with engineering standards		.795			
My organization tries to obtain technologies to satisfy customer requirements		.834			
My organization timely reviews existing technologies to be on par with/outperform its competitors		.783			
My organization pays attention to acquired technology's capacity to add value to our customers		.748			
My organization values upgrading with technology transfer		.651			
Project team understands the need to acquire hardware components of the technology from the technology provider			.673		
Project team understands the need to acquire tools/techniques for the installation of the technology from the technology providers			.735		
Project team understands the need to acquire the capacity to operate the technology from the technology providers			.744		
Project team understands the need to acquire operating instructions from the technology providers			.767		
Project team understands the need to engage in-house experts in the operation and maintenance of the technology			.684		
My organization is aware of technological developments in its trade				.775	
My organization evaluates its technological position to identify technology gaps				.829	
My organization evaluates alternative technologies for technology upgrades				.818	
Project team understands the need to obtain patents, trademarks, copyrights, or other ownership rights for the transferred technology					.751
My organization maintains appreciable relationships for IP protection					.844

My organization persistently pays attention to protecting the acquired technology					.748
Eigenvalue	4.07	3.62	3.40	2.49	2.43
% of Variance	18.50	16.45	15.44	11.33	11.06
Cronbach's Alpha	.912	.891	.874	.855	.849
Average variance extracted	.557	.585	.521	.652	.612
Construct reliability	.883	.875	.844	.849	.825

Note: F1: Process management, F2: Intended use, F3: Transfer components, F4: Technology needs analysis, F5: IP protection and licensing.

Table 3.
Correlation

	Variable	Mean	S.D.	1	2	3	4	5	6
1	Process management	3.50	.81						
2	Intended use	3.72	.74	.526**					
3	Transfer components	3.67	.71	.633**	.523**				
4	Technology needs analysis	3.61	.82	.449**	.536**	.472**			
5	IP protection and licensing	3.30	.95	.535**	.467**	.559**	.390**		
6	Converting and acquiring capability	3.71	.66	.636**	.550**	.513**	.543**	.426**	
7	Vending, modifying, and generating capability	3.66	.64	.524**	.592**	.404**	.607**	.351**	.654**

Note: $^{**}p < 0.01$

Table 4.
Regression Analysis – Summary of Results

Variable	Converting and acquiring capability		Vending, modifying, and generating capability	
	β	R^2 (Adj.)	β	R^2 (Adj.)
Process management	.397***	.595***	.264**	.687***
Intended use	.183*		.312***	
Transfer components	.148*		.184*	
Technology needs analysis	.241**		.375***	
IP protection and licensing	.137*		.135*	

Note: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

5. Conclusion

Summary of Findings

The paper presented the findings of a study that investigated factors contributing to the success of technology transfers and technological capabilities gained by recipient firms through the technology transfer at the project level. The results led to the identification of two main types of technological capabilities gained by recipient firms through the technology transfer, which are named "converting and acquiring capability" and "vending, modifying and generating capability". Further, the results led to the identification of five types of

contributing factors for technology transfer, which are named process management, intended use of technology, transfer components, technology needs analysis, and IP protection and licensing. It is also found that all five contributing factors significantly positively predict both types of technological capabilities gained by recipient firms through technology transfer. The findings of the study have important scientific, practical, and policy contributions.

Conclusion

Technology transfer efforts strengthen two main types of technological capabilities gained by recipient firms through the technology transfer, which are named "converting and acquiring capability" and "vending, modifying and generating capability". These technology transfer capabilities are affected by process management, the intended use of technology, transfer components, technology needs analysis, and IP protection and licensing. The effects of these five factors on gaining technology transfer capabilities are significant.

Scientific Contributions

When considering scientific contributions, first, the importance of foreign technology transfer for the survival and growth of firms has long been established. However, there are a limited number of studies on technological capabilities at the project level such as Andrenelli et al. (2020), Hacker et al. (2015), Malik and Wickramasinghe (2013), and Sikdar and Mukhopadhyay (2020). Hence, there is a need for measurement scales that allow for generalizing the findings across different country contexts. In this context, the present study developed a 10-item measure to evaluate technological capabilities gained by recipient firms through technology transfer at the project level. We identify our study as one of such studies and the scale we have developed can be used in different country contexts to evaluate technological capabilities gained by recipient firms through the technology transfer at the project level.

Second, there are a limited number of studies on success factors when transferring foreign technologies at the project level such as Lee et al. (2018), Huynh (2018), Malik and Wickramasinghe (2013, 2018), and Wickramasinghe and Garusinghe (2010). Therefore, a need can be identified for measures to evaluate contributory factors that influence technology transfer at the project level. We have developed a 22-item scale to identify contributory factors of technology transfer. Five factors emerged from the factor analysis. These five factors suggest the main contributors to the success of technology transfers from the point of technology recipient firms. Further, the factors we have identified may serve as key indicators when monitoring the success of technology transfer projects. The scale we have developed can be used across various firms to isolate factors contributing to technology transfers, and any differences in the importance across different contexts.

Third, our study was conducted in a developing country located in Asia, Sri Lanka. It is very difficult to identify the technology transfer experiences of developing countries in the mainstream literature. For example, the literature provides evidence for previous studies that investigated international technology transfers, where technologies were received by firms in developing countries and the developer or the sender of technology is in a developed country (Lee et al., 2018; Malik and Bergfeld, 2015; Oparaocha, 2016). In the Sri Lankan context too, over the years several single-firm case studies have investigated international technology transfers at the project level, such as Jayasena et al. (2005) and Malik and Wickramasinghe (2013, 2018). Although single-firm case studies provide valuable information, these do not support generalizing the findings or do not stipulate a set of measures, which can be tested in different contexts. Therefore, our study makes a novel and valuable contribution to the literature on technology management and technology transfer.

Practical Contributions

Getting technology transferred from developed countries is identified as an ideal option for the technological capability development of firms (such as Park and Lee, 2011; Malik and Wickramasinghe (2013, 2018). However, the transfer of technology is difficult, especially due to the level of understanding and responses of technology recipients. The findings suggest that firms intending to get involved in technology transfer should pay attention to process management, the intended use of technology, transfer components, technology needs analysis, and IP protection and licensing. Of these, although process management and technology transfer components can be tied to specific actors of a technology transfer project team, the intended use of technology, technology needs analysis, and IP protection and licensing need the involvement of organizational actors beyond the specific technology transfer project team.

Further, firms could be interested in having an assessment of their success in obtaining technological capabilities through technology transfer at the project level. Such firms could use the measures we have developed to evaluate their success. In a similar vein, there could be firms that are interested in identifying factors that played important roles when transferring foreign technologies at the project level. Such firms could also use the measures we have developed to evaluate contributory factors they had experienced in technology transfer. In this regard, previous research such as Battistella et al. (2016), Lee et al. (2018), and Malik and Wickramasinghe (2013) emphasize the need to evaluate one's own position in international technology transfers.

Policy-level Contributions

Governments that encourage private sector organizations to initiate technology transfers, policies covering several aspects of technology transfer should be in place. First, policies should be available on the availability and capacity of experts to be involved in technology transfer projects. Second, policies should govern the requirements of available resources and human capability of organizations aiming to engage in technology transfers. In this regard, previous research in the context of Sri Lanka such as Wickramasinghe and Wickramasinghe (2023) on projects however emphasises the importance of organizations having appropriate strategic orientations to achieve success. Third, international technology transfer partners should be able to encourage learning, sharing and engagement as much as possible for the experts engaged in technology transfers. In this regard, in the context of Sri Lanka, Wickramasinghe and Wickramasinghe (2023) emphasise the importance of learning, sharing and engagement to achieve success. Fourth, appropriate policies should be introduced for international technology transfer partners to work with local counterparts in developing a well-defined technology transfer process with key performance indicators and milestones. Fifth, the governments should introduce policies for international technology transfer partners and local counterparts to adhere to governing licensing and patent protection requirements. Finally, policymaking bodies should consider establishing and maintaining historic data logs of technology transfers as a lessons-learned archive for the benefit of future technology transfers. In this regard, as suggested by Wickramasinghe (2022), social network analysis could be one of the ideal methodologies to probe lessons learned.

Limitations and Future Research

When considering the limitations of the study, the study was limited to investigating foreign technology transfers to local firms and investigated local recipient firms' experiences of technology transfer success at the project level. The sample was confined to selected sectors and respondents as detailed in the section on "sample". This is one of the main limitations of the study. Inter-organizational technology transfer cannot be identified as a one-way activity. Hence, future research could obtain the experiences of

both the technology sender and the recipient to broaden the scope of the study. We used well-conceptualised and operationalized technological capabilities proposed by Fransman and King (1984). Future research could find other insightful models to adopt.

When generating the scale items for contributory factors of technology transfer, we considered the entire technology transfer project as a single entity. However, some studies prefer to identify technology transfer activities across several stages, such as pre-acquisition, in-acquisition, and post-acquisition and suggest that technology transfer is non-linear (see Jarohnovich and Avotins, 2009). From our research point of view, factors such as IP protection and licensing can be identified as belonging to the post-acquisition stage. Therefore, future research could attempt to identify factors contributing to each stage of the technology transfer. Regarding data analysis, if the sample is larger, a more robust analysis with confirmatory factor analysis could have been performed. In addition, we believe that quantitative data presented in the study could be enhanced by incorporating qualitative data in future research. Finally, future research could consider longitudinal studies or cross-country comparisons to broaden the depth of the understanding of technology transfers.

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