KEY ELEMENTS OF SUCCESSFULLY TRANSFERRING MILITARY TECHNOLOGY BY A FOREIGN MANUFACTURER INTO THE UPCOMING MODERNIZATION OF THE INDIAN DEFENSE SECTOR

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Abstract: With an estimated 225 billion United States dollars to spend on military modernization over the next three years (Choudhary, 2024), India has become one of the world's most attractive markets for defense equipment producers. Consequently, a large number of foreign investors are stepping in the Indian defense production industry but due to the local specific regulatory, cultural, managerial, administrative and legislative environment, they have contributed their funds in the sector without having a clear overview how to enhance their returns on such ventures. This article wishes to analyze the present situation in India and possibilities of drawing a roadmap on how an outside supplier of military technology can penetrate the market as a supplier to the local Ministry of Defense. Due to these incentives, in order to give appropriate guidelines to successfully transfer technology, this article looks into a variety of tools and models which analyze how a potential transfer should be executed. This research considered academic models applied in a similar manner in the same region or in similar industries. As a result the study triangulated the model's eligibility and applicability to the Indian reality and cross-validated them with the interviews conducted with the experience and knowledge of people in the industry. According to the Ministry of Defense of India (2024) which states that India was far too long depended on foreign suppliers for its military equipment and that the desire to achieve self-sufficiency has always been present. They believe the obstacles which are stopping them are: their inability to absorb resources properly and their inability to adopt technology correctly on their own. The abovementioned incentives have attracted a number of foreign investors to step in India defense production industry (Bhowmic, 2012). However, due to the local specific regulatory, cultural, managerial, administrative and legislative environment, lots of foreign investors have contributed their funds in the sector without having a clear overview how to enhance their returns of such ventures (Baskaran, 2004). According to members of the Center for Strategic and International Studies (Lombardo & Ben-Ari, 2011) the announced by the Indian Ministry of Defense strategic ambitions to start producing 70 percent of their required military equipment domestically by the end of this decade, rather than the 30 percent it is currently manufacturing, is driven by two main elements namely: a desire to boost defense-related domestic industry sectors and the belief that satisfying their own defense requirements is a characteristic of being a global power. Furthermore, the same scholars indicate that the previous attempts for generating domestic defense manufacturing on a sufficient level were postponed by the nation's ambitions to possess high-end military technology composed of foreign equipment. Supporting these ambitions in January 2024 the Indian government released its Defense Production Policy (Confederation of Indian Industry, 2024) which supports the agenda for supporting the domestic defense industrial base, rather than focusing in procurement documents for future purchases from foreign suppliers.
Keywords: transfer of technology, management, Ministry of Defence, India,

1. INTRODUCTION

With approximately 46 billion USD to spend on military modernization this year (Choudhary, 2024), India has become one of the world's most attractive markets for defense equipment producers. The topic of this paper was inspired by a potential private company wishes to make use of the present situation in India and further penetrate the market but this time as a supplier of technology. A future Transfer of Technology according to the Board of Directors of one such company: Arsenal JSCo will lead to various benefits for the company such as: strengthen the existing relationship with the Indian government, off-set future contracts with the Ministry of Defense of India, gain competitive advantage over other foreign manufacturers, increase financial returns in the form of either coproducing or receiving annual royalties for the transferred know-how and develope their desorptive capacity. Arsenal JSCo is a "distinguished multi-functional infrastructural company with great experience in design, manufacturing, engineering and trade in military and civilian products." (Arsenal JSCo, 2024). The headquarters are based in the city of Kazanlak (Stara Zagora Province, Bulgaria) with currently 13 factories operating in the region. The company uses 7,044,267 square meters of land with 412,510 square meters of build area and employs approximately 9,500 employees at this moment (Arsenal JSCo, 2024). Arsenal JSCo "designs, manufactures and trades small arms and artillery armaments, ammunition, primers, powders, charges, pyrotechnic products, cemented carbide tools, tip, inserts, universal milling machines etc." (Arsenal JSCo, 2024). As an industry leader the company will be used as an example to further help this study. According to the Board of Directors the company is the biggest producer and

market leader of military equipment in southeast Europe. According to Choudhary (2024), with an estimated 225 billion USD to spend on military modernization over the next three years, India has become one of the world's most attractive markets for defense equipment producers. Furthermore, the Confederation of Indian Industry (2024) states that India was far too long depended on foreign suppliers for its military equipment and that the desire to achieve self-sufficiency has always been present. They believe the obstacles which are stopping them are: their inability to absorb resources properly and their inability to adopt technology correctly on their own. The abovementioned incentives have attracted a number of foreign investors to step in India defense production industry since 2014 till the present day (Ankit, 2024). However, due to the local specific regulatory, cultural, managerial, administrative and legislative environment, lots of foreign investors have contributed their funds in the sector without having a clear overview how to enhance their returns of such ventures (Singh, 2024). Currently in the public domain there is no available research which provides manufacturers with a detailed overview of how a Transfer of Technology should be successfully executed in India and what should they be aware of while doing such a strategic move. The main reason for formulating the article topic in such a way was to consider the models and tools discussed in this study both from academic and practical perspective in order to aid Arsenal JSCo in their decision making. As the research question indicates, the target of this paper is Arsenal JSCo as a transferor of technology in India. For the sake of avoiding any assumptions and bypassing ambiguity in the audience not familiar with the concept of Transfer of Technology, this paper will analyze the essence of one and describe it briefly. In order to answer the main research question, this paper looked into a variety of tools and models which analyze how a potential Transfer of Technology should be executed in order for it to be successful. The main limitation in this process was the fact that there is not much public information available for the Indian Defense manufacturing infrastructure, maybe due to its current phase of developing and opening itself to foreign companies. However, this research considered models applied in a similar manner in the same region or in similar industries. As a result the research triangulated the model's eligibility and applicability to the Indian reality and cross-validated them with the interviews conducted with the experience and knowledge of Arsenal JSCo's directors and related Indian regional employees. The main motive for choosing such research design was to compare what the decisions makers in Arsenal JSCo are aware of and what they should further take in consideration while choosing the exact way such venture can be executed successfully. Furthermore, this paper was prepared with the idea in mind to provide the Board of Directors with a clear and structured way of adequately utilizing academically proven models which could be applied in the Indian business environment. In fact, the main goal of this paper is – to provide Arsenal JSCo or other private companies with an eligible framework of the most important practices to be observed by them upon a potential Transfer of Technology in India. In turn, each of the models and tools used could be analyzed in a greater detail and be a topic of a follow-up studies.

2. MATERIALS AND METHODS

In order to form the main research question, several preliminary interviews were conducted with Mr. Hristo Ibouchev - Chief Executive Director of Arsenal JSCo –who expressed the importance of such research designed particularly for Arsenal JSCo in order to assist the board of directors in their plans for the company's future strategy and goals. In order to answer the main research question, this paper looked into a variety of tools and models which analyze how a potential Transfer of Technology should be executed in order for it to be successful. The study considered various secondary researches, in-depth and semi structured interviews with Arsenal JSCo board of directors and business development division's employees as well as Secondary research in the form of analyzing market summaries, collecting and utilizing synthesis of existing researches, journals and studies about technology transfers, cultural and managerial issues. The interviews were semi-structured to allow for some degree of flexibility in asking questions to the interviewees. The afore mentioned interviews as well as the available literature were used to determine the information that is required in order to determine the characteristics, opportunities and threats related to transferring technology in the Indian defense industry. This information was later used to generate additional questions for the Secondary research. The participants in the qualitative research were the board of directors considered to be decision makers and the consultants and advisors for the Indian market inside the company such as regional managers and back office employees. The participants were divided in two groups due to their responsibilities and standing in the company. The interviews with each of these people were conducted in order to understand their point of view regarding the Indian defense industry, threats and opportunities related to transferring technology in India, willingness to work with Indian contractors, strengths and weaknesses of such cooperation, etc. In order for the secondary research finding to be further triangulated and analyzed, this study considered interviews with not only the abovementioned two groups but also with an intellectual property and a human resources experts. The research used a nonprobability sampling due to the fact that the choice of people capable and willing to give their opinion on the topic of India as an absorber of technology was rather limited.

Furthermore, an important obstacle was the fact that Arsenal JSCo wishes not to disclose its company capabilities, strategic orientation and other relevant information to external for the company entities. The interviews took approximately from an hour to hour and a half each. They were stretched in the time frame of four months due to the availability of the participants and the time they managed to spend on the topic. They included specific questions retrieved from the secondary research, followed by in-depth discussion about relevant problems which came up during the interviews. Most of the participants were interviewed more than once. The qualitative output was processed using Strategic Options Development and Analysis (SODA) analytical tool for a graphic overview of the complex problem which consisted of multiple variables. Due to the fact that all the interviews had different structure and were all conducted in Bulgarian language, it was difficult to record them in appropriate manner. In the following chapters the outcomes will be discusses in a manner that represents the participants opinions and points of view on the discussed topics.

The research comprises the following seven sub-questions:

- What is the Indian relation to foreign suppliers for military modernization?
- What is Transfer of Technology?
- What are the elements which shape the degree of success of a Transfer of Technology?
- What is a clear definition of the transfer?
- What is absorptive and desorptive capacity?
- How should the cultural and managerial stability factor be approached while executing TOT?

3. RESULTS

According TheEconomicTimes (2024) the announced by the Indian Ministry of Defense strategic ambitions to reduce its dependency of foreign suppliers, is driven by two main elements namely: a desire to boost defense-related domestic industry sectors and the belief that satisfying their own defense requirements is a characteristic of being a global power. Furthermore, scholars (Lambardo, 2012) indicate that the previous attempts for generating domestic defense manufacturing on a sufficient level were postponed by the nation's ambitions to possess high-end military technology composed of foreign equipment. Supporting these ambitions since 2011 the Indian government released its first Defense Production Policy (Confederation of Indian Industry, 2012) which supports the agenda for supporting the domestic defense industrial base, rather than focusing in procurement documents for future purchases from foreign suppliers. Furthermore, this DPP release indicates the need for greater involvement by the Indian private sector and for improving the country's Research and Development base. According to the conducted interview this is something which was supposed to happen earlier and right now there is no better time to use this opportunity to transfer technology in India and develop Arsenal JSCo's product portfolio on focusing on technology transfers. Furthermore, the qualitative research shows that Indian institutions are with old-dated and inefficient technology when it comes to producing medium and small caliber weapons and ammunitions which can prove to be a major strength for Arsenal JSCo in the upcoming future. Furthermore, according to the conducted interviews, it's a common practice for the Indian Ministry of Defense to include a Transfer of Technology as requirement for the sellers when they execute purchases with their military budgets. Consequently, this new direction according to Choudhary (2024), will attract many international companies to make greater attempts in order to gain market share and key partnerships in the Indian defense market. Such moves might include more generous offers for technology transfer and willingness of the government to actually support such ventures in India. According to the interviews, India is incapable of coming up on their own with up-to-date technology at this point in time and due to this fact they will be looking for foreign suppliers which are willing to step in that part of the industry. A transfer of technology according to Blakeney (1989) is the process by which commercial technology is disseminated. The "disseminated" according to the United Nations Conference on Trade and Development (1996a, vol.I), involves the communication of the relevant knowledge from the transferor to the transferee. The draft TOT Code provided by UNCTAD (1996, vol. I) defines technology as "systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of service. "Technology" also includes the "entrepreneurial expertise and professional know-how" (Simonin, 1999). The Draft International Transfer of Technology Code lists the provision of know-how and technical expertise in the form of feasibility studies, plans, diagrams, models, instructions, guides, formulae, basic or detailed engineering designs, specifications and equipment for training, services involving technical advisory and managerial personnel, and personal training as a type of transfer transaction. According to Barrett and Sexton (1999) whether based on explicit or tacit knowledge, some technologies are just more complex than others. The more complex a technology is, the more difficult it is to decompose it. According to the interview it was concluded that the abovementioned characteristics of such production are believed to be achievable by the board of directors under Arsenal JSCo's Transfer of Technology but

only if it is managed properly and executed with people who are "willing to learn". The questions that arise are mainly related to how they should choose the right way to transfer technology in order to do that. Inter-organizational technological transfer according to scholars (Mowery, Oxley and Silverman, 1996) is a major managerial challenge because of its complexity. More specifically the nature of the technological knowledge complicates its transfer across the organizational boundaries. In general for simplicity and convenience such transfer can be described according to Naito (1989) by using four elements namely: information, human resources, capital and resources. On the contrary, Sung and Gibson (2000) indicate that the following elements to be crucial in order to shape the degree of success for a Transfer of Technology (TOT): attitude and values; understanding the nature of business; person-to-person contacts; variety of communication channels; knowing whom to contact; a sense of common purpose; increase in awareness of transfer; concreteness of knowledge/technology; setting up transfer office or committee; clear definition of transfer; provision of incentives for transfer and product champions. Furthermore, as a result of the data analysis it was revealed that also monitoring systems, management stability and cultural problems are predominant in TOT among the factors known in India (Baskaran, 2004). Consequently, in order to triangulate the models' eligibility and applicability to the Indian reality it was needed to cross-validate them with the conducted interviews in order to keep the study focused and chose the right elements which will be discussed in this study. By doing so the interviewed participants were introduced to all these elements and then after discussions on the topic, it was decided that some of these elements will not be observed due the fact that they are either irrelevant for the case or they are something that the company's management team perceives as either as a Strength for the company or something that will be further considered after conducting this study in order to further research the topic. The participants in the conducted interviews do share the same worries about the Indian defense industry and its ability to properly absorb technology and maintain their performance. They believe the Indian military development is not progressing as far as its leaders had hoped due to the drastic government changes in regulations and other changes in the defense industry administration. The obstacles preventing India from developing a more advanced military technology according to the board of directors are indeed mainly technical and economic, stemming from chronic problems with project management rather than any lack of scientific resources. As a result from several interview with the board of directors of Arsenal JSCo the following elements were chosen to be discussed in this study: clear definition of transfer, absorptive capacity, desorptive capacity, barriers for transfer of technology, management stability and cultural factors. The chosen key elements that shape the degree of success for the Transfer of Technology were selected after all the theories and cases mentioned above were discussed with the board of directors. Several elements will be discussed which were not part in the ones presented to the board due to fact that they came up during the discussions. Furthermore, some of them combine elements mentioned in the theories above which will be latter on discussed in this study. According to Lichtenthaler (2010), for inward technology transfer the technology receivers have to develop absorptive capacity, which is the firm's ability to acquire and utilize external skills and knowledge. The concept was developed by Cohen and Levinthal (2001) and they explain it as the company's ability to recognize, assimilate, and apply external knowledge in the context of innovation and learning processes. Basically this is to possessing prior technological knowledge which is needed to successfully acquire external for the company technologies. The same prior knowledge helps an absorbing company to identify needed external knowledge in order to try and absorb it. The need for better technology is there and according to the conducted interviews a transfer is believed to be possible. At this point this study will only focus on the technology transfer and skip the final stage of the absorptive capacity which is the applying of the acquired knowledge, but rather focus on the desorptive capacity. Gupta (2000) states that he believes the main problems with Indian organizations are the inability to absorb the resources properly and that they are unable to adopt technology correctly on their own. After being confronted about the matter Arsenal JSCo's board of director expressed their certainty that they can offset this problem by successfully exercising their desorptive capacity. Nevertheless, a company with developed absorptive capacity will be a better match for Arsenal JSCo. Based on Lichtenthaler (2010) definition of desorptive capacity, we can describe it as the organization's ability to identify technology transfer opportunities based on the company's strategic objectives and to settle the application of this technology at the obtaining company. Furthermore, desorptive capacity defines the potential volume of technology transfer based on the company's technology portfolio and consists of two process stages namely: identification and transfer. According to Lichtenthaler (2010) the identification of TOT opportunities is most of the time underestimated, although it combines a major managerial challenge for a company's strategic planning. According to the conducted interviews and the past history of Arsenal JSCo it was concluded that the company is until now was focusing on internal product development rather than transferring this technology. The reasons behind it are related to fear of losing market share and weakening their strategic advantages. According to the chief executive director it is crucial for the company to formulate an active technology transfer strategy. Key element will be according to the abovementioned scholar is for Arsenal JSCo to develop their desorptive capacity. This might lead to difficulties in

order to identify technology transfer opportunities because of the unclear demand and targeting in the technology market. A problem which should furthermore be considered is that according to the interviewed employees responsible for the Indian market it is not that much choosing what exactly to transfer but to whom it should be transferred. Rivette and Kline (2000) state that desorptive capacity, withholds relatively limited additional costs for a company once the technology is already developed. Consequently, Arsenal JSCo can achieve high profit margins with the planned technology transfer compared to their traditional core business. In addition, the interviews show that they will achieve several non-monetary benefits such as strengthening the existing relationship with the Indian government, off-set future contracts with the Ministry of Defense of India, gain competitive advantage over other foreign manufacturers and set industry standards which they will easily meet with their current production capabilities. According to Levin (1997) the major management difficulties is to apply technology transfer processes as a vehicle for creating a learning environment. The insides of a technology transfer process, includes ascertains relationships, transferring information to people at the right organizational levels and delivering the know-how, which can be established as a set of routines used in educating of the targeted employees. Furthermore, Gilbert and Cordey-Hayes (1996) invented a model that observes the stages of the transferred knowledge as a movement within the organization in order to lead to the development of a set routines, which can be seen in the behavior and practices in the employees of the receiving organization in order to become a part of the core routines, or in other words – assimilation occurs. The stages of this model are namely: "acquisition" of knowledge, "communication", "application" and "assimilation". The importance is indicated to be the process of transfer seen as the assimilation of the results and efforts for applying the gained know-how. According to Muduli (2011) in the field of human resource management not all HR tools and mechanisms can be equally applied to each and every company operating in culture with a different cultural context from the one they are invented for Hofstede (1984) define culture as a collective programming of the mind which distinguish the members of one group from another. Due to the fact that the name of Hofstede was mentioned during the conducted interviews as a reference to a scholar who is believed to contributed significantly on the perception of culture, his model will be used in this study in order to observe the Indian culture and advise Arsenal JSCo on what should they pay attention during a potential transfer of technology. Hofstede (1990) divides national culture in four dimensions namely: power distance, individualism/collectivism, uncertainty avoidance and masculinity/femininity. An important element for the Indian culture according to Muduli (2011) is that there is no uniform culture across the nation due to the fact that the country combines many religions, cults and castes. He furthers suggests that managers who are intervening into the organizational structures in India focusing on a cultural based management practice will not be as excellent as planned.

4. DISCUSSIONS AND CONCLUSIONS

As the finding from the previous chapter imply, India is on its way to modernize its defense manufacturing capabilities and thus foreign suppliers of technology will be needed. The Ministry of Defense of India will try to gain competitive advantage over other foreign manufacturers, increase financial returns in the form of either coproducing or receiving annual royalties for transferred know-how and developing their desorptive capacity. In order for a private company to participate in this process successfully they should pay attention mainly to defining and identifying properly the following key elements: clear definition of transfer, absorptive capacity, desorptive capacity, barriers for transfer of technology, management stability, cultural factors. These factors were chosen after carefully examining the existing studies in the field of transfer of technology and triangulating it with the interviews in order to design this study in the most appropriate for the company way. Furthermore, some factors were also discussed in this study but under different more global sections. Nevertheless, the choice was oriented to still be realistic and objective. The selected factors were chosen after discussing all the theories mentioned in the previous chapters and only the factors that were considered relevant are discussed in this study. The Indian organization's absorptive capacity is considered a key element in order for them to acquire and utilize external skills and knowledge. The ability to recognize and assimilate in the process of acquiring foreign for the company knowledge from the Indian side of view, will be later a leading element in Arsenal JSCo's agenda for selecting a right match for the company. Based on the theories discussed in the previous chapter desorptive capacity is described as the organization's ability to identify technology transfer opportunities based on the company's strategic objectives and settling the application of this technology at the obtaining company. It was concluded that at this point in time Arsenal JSCo will do it's best to start planning a future transfer directed in the required by the Indian government technology. The company should focus on component level while transferring technology rather than focusing at the system as a whole. Focusing at the system as a whole should go on a second plan. This recommendation was drawn from the fact that according to the board of directors the best way of transferring the mentioned technology in this report is by introducing it on steps due to the learning capabilities of the receiving companies. This was later on supported by scholars competent in this field in India. Furthermore, focusing at the system as a whole must be taken

as a last step. According to the interviews, another important part is the actual technology transfer strategy. All the participants agree on the fact that the managerial and cultural side of the transfer will be the most difficult to overcome. Arsenal JSCo will be expected to focus in particular management heuristics in order to further develop their outward technology transfer performance through the desorptive capacity which will potentially help the company to acquire the additional profits they are aiming at. According to the desk research, the major management difficulties are to apply technology transfer processes as a vehicle for creating a learning environment. The insides of a technology transfer process, includes ascertains relationships, transferring information to people at the right organizational levels and delivering the know-how, which can be established as a set of routines used in educating of the targeted employees. Based on these boundaries a specific strategy was prepared with the assistance by the board of directors and the employees of the regional deparment which utilizes a formal networking instead of "open management". A specific managerial approach orientated at the Indian culture should be prepared in order to motivate and manage the employees in the Indian organization during the actual transfer of technology. Its purpose according to the several discussions on the topic, with the participants in the interview, is crucial due to the differences in applying the approach in organizations based in countries in different cultures.

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