Transfer of Technology for Tactical Floating Bridge Local Fabrication

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Abstract: In this study, the focus was on the study of the transfer of technology that takes place in the Royal Engineer Regiment. The study began with a review of the literature on the transfer of technology that occurs in the Malaysian Armed Forces and the country's defense industry. The study includes the identification of problems, implementation strategies, and methods used to carry out the transfer of technology in the defense industry. Technical studies were conducted to gather information on the concept of construction for tactical floating bridge modules using the case study as well as the direct involvement during handling of the asset. The collection of data on the problem, the next execution of strategies and methods are reviewed and concepts to solve problems, the proposal of implementation strategy and propose methods for local manufacturing of tactical pontoon bridge. The study will be able to create better awareness to the transfer of technology and assist in the defense of the country through the provision of better war equipment and more easily available.

Keywords: Operations management, transfer of technology, military equipment, military operations

Introduction

The technological gap between the Malaysian Armed Forces (MAF) and other developing countries has further widened due to various factors. Transfer of Technology (ToT) has been an issue that involved in military technology development. As a permanent feature of defense industries, many processes occur and the processes will picture the capability of the forces. Transfer of technology however, are not without criticism and suspicion. The reduction in defense budgets has created aggressive arms and equipment exporting policies to offset the loss of domestic development and production.

In response to the current deployment, the Royal Engineer Regiment and its bridging squadron have been developing and helped to improve Army effectiveness and survivability, as

well as increase the level of mobility for troops. The capability of the bridging squadron depends largely on the numbers of bridging asset holding. At present, the tactical bridging has limited numbers of equipment especially the tactical floating bridge (TFB).

Even though technology transfer is not a new military phenomenon, the considerable literature on technology transfer that has emerged over the years agrees that defining technology transfer is difficult due to the complexity of the technology transfer process (1). The definitions depend on how the user defines technology and in what context (2). The term technology transfer can be defined as the process of movement of technology from one entity to another (3). The transfer may be said to be successful if the receiving entity, the transferee, can effectively utilise the technology transferred and eventually assimilate it (4). The movement may involve physical assets, know-how, and technical knowledge (5). Technology transfer in some situations may be confined to relocating and exchanging of personnel (6) or the movement of a specific set of capabilities (7).

The aim of this study was to identify the problems in relation to the transfer of technology in the defense industry with a special focus on the floating tactical bridge and proposed a framework towards better ToT in the field. From there, countermeasures could be then undertaken in order to facilitate the process for the transfer of technology. Thus, contributing towards continuous improvement of the Royal Engineer Regiment of the Malaysian Armed Forces.

Methodology

In this study, sets of survey questionnaires were employed to evaluate the effectiveness transfer of technology - one on the Malaysian defense industry recipients and the other on the suppliers of defense equipment to Malaysia. The survey involved selecting a one hundred percent sample from the population group which identified from experts and personnel participated in the ToT directly for the equipment.

The questionnaire focused on both descriptive and analytical aspects whereby data were gathered by counting the frequency of certain responses and analyzing the relationship between different factors involved in the research. There were face-to-face and telephone interviews. Structured and semi-structured interviews were conducted with the defense suppliers. Semi-structured and open-ended interviews were held with government officials from the Ministry of Defense: Defense Industry Division, Army Procurement Division and Science and Technology Research Institute of Defense (STRIDE).

The questionnaire from Google Form contains seven sections with several questions in each section. The questions were prepared based on the research aim and key themes identified through the literature review and theoretical framework. The questionnaire has both open and closed questions. The closed questions have a combination of different types of questions. These include lists questions as per Section A (No.7) and Section B (No.1); category questions as per Section B (No.2 – No.5) and ranking questions as per Section D (No.7). Samples of open questions include Section C (No.1 – No.5), where responses capture R&D issues as well as Section E (No. 1 – No. 9) on the impact of ToT. The questionnaire is focused on the following issues:

i. Capturing the impact of offsets on Malaysia's defense industry.
ii. Evaluating offsets recipient company operations and human resource development strategy.
iii. Evaluating indigenous firms' technology development capability.
iv. Assessing the type and quantity of technology transfer through offsets.
v. Analyzing offsets policy and implementation issues.

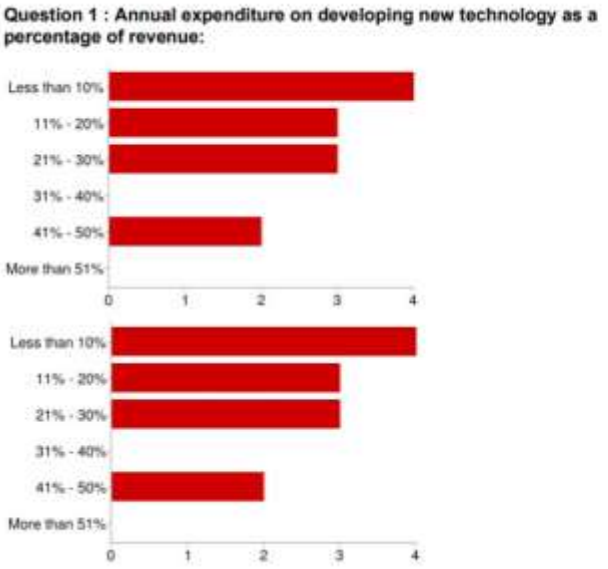
The questionnaire incorporated issues such as ToT processes, technology development issues, research and development, supply chain management, skills development, export expansion as well as seeking recommendations on the way forward for these companies.

Quantitative data were analyzed using the univariate method. Frequency tables were used to calculate percentages belonging to each category of data as per the questionnaire. Category data were classified into sets, according to the characteristics ranked in order. Tables and charts were used to show the various types, categories, and levels of impact. Responses were calculated, based on the numbers of respondents against the total population. The frequency of company response is categorized according to the percentage bracket and type of activity. The total frequency of each category is then counted, and changed into percentages or numbers, based on the total number of responses.

As respondents numbered only 12, no software packages, such as SPSS, were used to analyze the data. Excel was used to obtain pie, bar and Gantt charts which could then be used to interpret results. In relation to the semi-structured interview questionnaire responses from the suppliers, the answers were clustered according to the questions. These answers were individually analyzed to identify similar themes and issues.

Results and Discussion

Based on the questionnaire, responds were collected and also keyed in from online survey system. The analysis was based on the cumulative data collected and it will picture the ToT environment in Malaysia. Not all questions being analytically look in to, several of the questions are used to attract the respondents towards the questionnaire and maintain the effectiveness of it. This respective section will describe in general the current capability of the company in Malaysia that involves in defense ToT. The main idea of development of this section will focused on the relationship between allocation of expenditure, collaboration with other institutions and support given by the government towards their ToT project.



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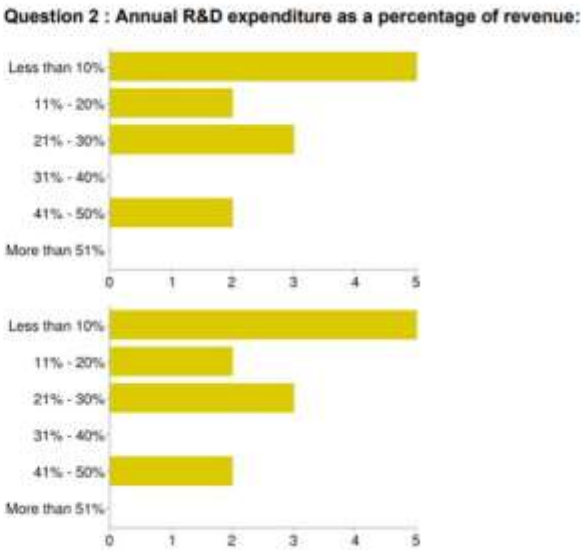

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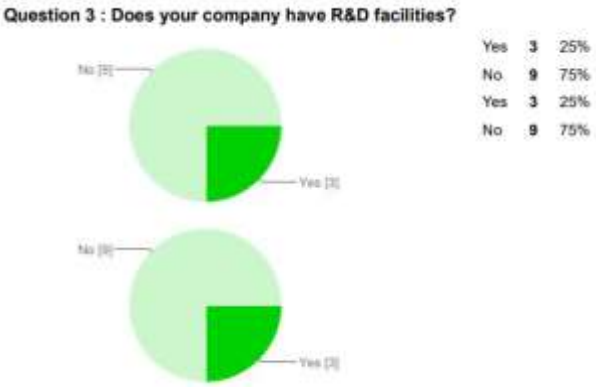

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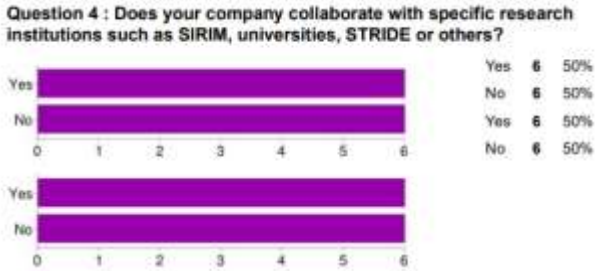

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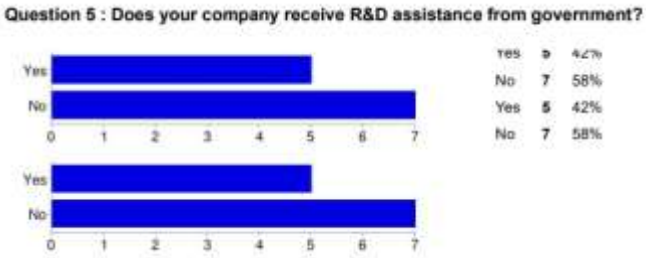

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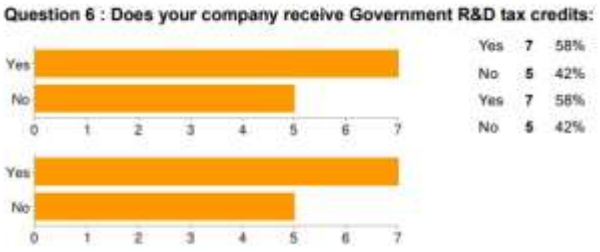

(f)

Figure 1 Summary result for questionnaire study to provide overall survey perspective

The survey found that half of the respondents agree that lack of allocation for developing new technology and to support R&D in their company. Averagely only 11% - to 20% percent are allocated for the element of R&D. At the same time, it can be proof by the presence of R&D

facilities in which show only 10% said that they do have the facilities. For the purpose to increase the capability of the company there were loop holes that must be fill up this is the neglecting of research institution. Many research institution offers expertise in very much needed field of industry. Only 77% of the companies have collaboration with specific research institution and the study believe that it is a result lack of funding by the government for R&D including tax credits. 89% of the respondents received government tax credit.

Defense industry are more likely to depend on foreign technology and resources such as physical equipment, parts and components, skilled workers and consultants and also services for specialized research and training. There were also the needs for combination of the both local and foreign resources. The dependency to foreign resources was very obvious and the local element should be build up to assist the ToT in Malaysian defense industry.

The survey found that the relation between all elements has also resulted the less number of patented product produced by defense industry players. Very much dependent on foreign resources has shown the low number of interest in patenting products and services. It is also a sign of negligence towards R&D effort. Only 1% from all respondents has introduced patented product. It might be the selection of the respondent went wrong but the study strongly shows that even the main player of Malaysian defense industry seems to be incapable and not strong enough to sustain wave of technology.

Conclusion

Survey result has given a fundamental idea on the ToT needed in defense industry. However, as most of the technology transfer activities have been in the form of basic training, maintenance, repair and overhaul (MRO), build-to-print types of manufacturing, as well as final assembly, this has not added to innovational capability. Substantive technological capabilities have been developed within the Malaysian Army and Malaysian defense industry to undertake work in support of maintaining a self-sustained RER. Maintenance, repair, over-haul and up-grade work, especially in the module and semi trailer, is now able to be undertaken locally. However, technology transfer and adaptation by itself will not be sufficient if the industries cannot sustain their businesses or are unable to utilise the skills acquired for further development. What is required is that offsets projects are well-planned and not ‘one-off’ activities and that they are able to secure work from the foreign vendors’ value chains, through buy-backs, joint-ventures and co-production.

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