

Risk Management on HDD Technology Transfer

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Abstract

Amidst the fiercely competitive economy, executives in large scale industries envision that expansion of production base globally under the International Production Network (IPN) concept yields both pros and cons in terms of risk on the investment, such as supporting policies, political situation, wages and transportation, which will affect the cost of production. Making changes in the business to cut back risks and costs is inevitable. International hard disk drive producing companies have factories scattered in every continent to distribute risks and lower cost. One company in the case study has factories for manufacturing parts and assembling hard disk drives in many continents, especially in Asia. The company focuses on investing in Thailand and Malaysia to reduce risks, and it also has a policy place its parts manufacturing factory and assembling factory in the same country, which has never happened before. Therefore, for this company, both in Thailand and in Malaysia, has to ensure technology information exchange between the manufacturing and hard disk drive assembling production lines. The technology exchange results in Bilateral Technology Transfer. This study looks into the dynamic and methods that will prevent risks which will affect time consumption and success rate of international intra-firm technology transfer, based on cases of partial production base transfer from Thailand to Malaysia. Questionnaires are handed out to staff in both part manufacturing and assembling lines, as well as management level executives, in order to assess other factors that will affect technology transfer, compared to other theories. The aim is to come up

with suggestions for hard disk drive industry or similar industries such as micro-electronics.

1. Preface

The hard disk drive industry is fast-growing and has become an important drive both for the electronics industry and the industrial sector of Thailand in general. In 2009, this industry generated 500,000 million baht a year. From 1988 to 2006, the hard disk drive industry expanded by 15.6% per year. Such growth is significantly high considering the overall picture of the electronics industry and the industrial sector of Thailand. Therefore, the hard disk drive industry quickly became an important part of the electronics industry. In 2006, the value of the hard disk drive industry was worth 132,000 million baht, or 80% of the total value of the electronics industry, and 5% of the industrial sector.

The procedure of making a hard disk begins with making several little parts, which are very complicated, containing even smaller particles specially made for the hard disk industry, such as reader part, data storage device and high speed spindle motor. It also includes general parts also used to make other electronic devices and electricity appliances, such as Integrated Circuits (ICs), semiconductor resistors, and small metal parts that hold the pieces together. When the production base is moved, technology transfer is necessary.

2. Related theories and research

The success for an organization to transfer technology relies chiefly on its human ware, work flow, and value. New organizations place importance in their human ware because work flow and value can fail without good human ware. Other resources may include techno ware due to

the specialty of the industry's devices, tools, and technology patent protection. They also include organ ware, which can help bring out the maximum potential in the staff and devices. Value can be measured by industrial and marketing analysis. Last but not least, info ware plays an important role in the staff's skills and expertise. [1]

Value and importance of technology factors

- Human ware is important because the people in the organization define the relationship within the workplace and contribute to new innovations.

- Organ ware or social capital is important because according to research, patents and knowledge were mostly generated from organizations or associations. [2]

Risk means something that happens under uncertainty, and could affect or destroy success and goals, whether on an organizational level, department level or individual level. Risk management is done by managing factors, activities, processes and actions to reduce causes for risk, so that the damage, if it happens, is in an acceptable, assessable, controllable and examinable scale. The main goal is to consider the organization's achievements. Effective risk management will help reduce losses and damages, as well as minimize fluctuation of income, which will increase the value of the organization. On the contrary, if the executives have no clear direction in risk management, the organization may take too little risk, which will affect the organization negatively. The value for risk management is worth more than the price, and ineffective risk management could lower the value of the organization. [3][4][5][6][7][8]

3. Method of study

In studying the research to link with the aforementioned objectives, hypothesis and questions are based on information from case study, discussion with engineers and executives involved in production base transfer, and research on theories from archived theses. Relevant points are connected with problems and obstacles

with international intra firm technology transfer of the hard disk drive industry, and how to make it the most efficient for better competitiveness in the future.

4. Direction and data collection

This research's direction focuses on researching published academic works and master's degree level research to find significant relevancy between theory and reality. Research is compared to case study and relevancy between knowledge management and technology transfer is studied, in order to understand risk and risk management for technology transfer. The culture of technology transfer is also studied by becoming a part of the process in the case study. In-depth knowledge was also given by the team and executives who participated in the case study. The information was later processed by comparing to research information to determine risk factors that could affect time consumption and success of international intra-firm technology transfer, as well as to offer solutions for managing technology transfer for better results. This will lead to sustainable advantages in the industrial competition.

5. Research findings

In order for the project to achieve its objectives in time, there are many factors that must be taken into account. These factors include human ware in both directions, both the giving and the receiving ends of the knowledge. Both parts must be willing to contribute in giving and receiving knowledge from the beginning, during the process and after the project has ended. For this factor, the common problem was communication which could delay the project. Once the communication process was improved, work flow was smoother and more timely according to plan. It was also proposed that communication failure could affect the project's success. The engineers and skilled mechanists said that communication and information transfer were the most vital for technology transfer, at 48%. Second to that was human ware, at 28%. Apart from that, technology,

organizational structure and budget were also considered to be important at 12%, 6% and 6% respectively.

The engineers and skilled mechanists considered information was the biggest obstacle in the project, at 65%, followed by human ware at 18%. They believed that technology, organizational structure and budget were also considered to be major concerns, at 6% for all the three factors.

The project can be divided into separate processes for assessing each process's risks.

Process 1: Staff responsible for the project in both ends, giving and receiving, look over the information and plan frame work together. This process, including information gathering, allows the staff in the project to discuss and familiarize with each other. When taking into account the risk factors, it was found that the risks in this process are in human ware, information collection, and organization structure.

Process 2: The staff in charge of setting up the machines researches on technical information crucial for setting up and preparing, such as electricity and clean space. When taking into account the risk factors, it was found that the risks in this process are in communication and budget of the project.

Process 3: Automatic internal communication system is prepared, such as computers for communication and programs for automatic manufacturing. When taking into account the risk factors, it was found that the risks in this process are in human ware and information.

Process 4: Machines are moved and set up for production. When taking into account the risk factors, it was found that the risks in this process are in human ware and information.

Process 5: Staff in every related department is trained and evaluated to make sure everyone understands the production process and can solve problems or make decisions

later on once the technology transfer is finished. When taking into account the risk factors, it was found that the risks in this process are in human ware and communication.

6. Conclusion

The most important factor in technology transfer is communication. It should be clear, precise and effective in order for technology transfer to achieve optimum results within a short period of time. Internal communication is the most important as it affects technology transfer. The appropriate method is two-way communication in which the two sides exchange views for better understanding. The second most important factor is human ware involved in the transfer process. They must be willing to participate. This factor is also the second biggest determiner of the project's success.

From this research, the researcher has suggestions for increasing efficiency and minimizing risks in the international intra-firm technology transfer. A model frame work is also suggested to adapt as a technology transfer method for the hard disk drive industry or similar industries. It could also be used in organizations that need international intra-firm technology transfer.

Suggestions for increasing efficiency and minimizing risks in the international intra-firm technology transfer are as follow:

1) Recruitment should ensure staff is capable and knowledgeable in that field, has positive outlook on the project, can work as a team and does not have communication problem such as language barrier or work culture.

2) Incentive should be given so that the people involved will be more encouraged to participate in the technology transfer and can work effectively after the project is done. Incentive can be in form of words of encouragement or allowances if appropriate.

3) Small group meetings should be arranged, such as among a specific sector of the training session, so that the people in that group can raise their ideas about the concept, method and problems encountered during work. They can brainstorm for ideas to six problems on their own. There should be a fixed timetable for the meeting, such as every Friday, to ensure maximum efficiency of communication and minimize mistakes.

4) Team meetings should be organized so that problems and ideas from small group meetings can be raised and discussed in order to plan the following week's work. This will allow all parties to be on the same page and to share ideas to create harmony.

5) Evaluation should be done after the project. All parties should have a meeting to assess the project, report problems, offer solutions and take note to use as frame work for further projects.

6) From this study, a model of international intra-firm technology transfer frame work is proposed in Image 1 below. It can be used to plan technology transfer in detail.

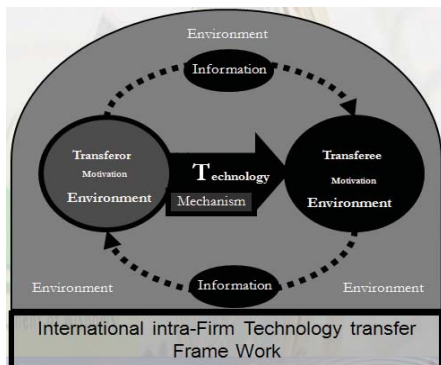


Image1. International Intra-firm Technology Transfer Frame Work.

For additional studies, this frame work can be used in designing technology transfer project in the future.

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