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Risk Taking of University to Hold Equities in Technology Start-Ups

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Abstract: Technology start-ups are tend to be more successful in cases where their host university holds equity as essential part of their polices in their start-ups. However, equity is not considered in many Malaysian universities. The aim of this study is to highlight the reasons of their inclusion and exclusion in technology start-ups of universities. Thematic analysis and theoretical replication is applied to process the interview and secondary data collected. Finding shows that universities are doing risk diversification in order for them to invest and hold equities in technology start-ups. An unexpected finding discovers university intentionally do not want to take equity to avoid slow decision making that affect the start-ups. This study contributes to university technology commercialization literature by proposing a framework to reduce risks in taking equity in start-ups and revealing why some university chose not to take equity.

Key words: Innovation, entrepreneurship, agency theory, entrepreneurial orientation, risk

INTRODUCTION

During the late 19th century, research was not considered as a part of education until the first academic revolution (Veysey, 1965; Jencks and Reisman, 1968). In the second academic revolution, the university was then transformed into an economic development enterprise, besides teaching and research. The Massachusetts Institute of Technology (MIT) was the first to experience this transformation. It was a "land grant" university when it was created in 1862. The second evidence is found in Stanford in the early and mid-20th century when the liberal arts university culture adapted an entrepreneurial academic model. All around the globe, this phenomenon is proceeding.

Etzkowitz (2003) proposed that to fulfil the increasing global requirements to generate new firms from knowledge resources in order to stimulate employment and productivity growth, a model of entrepreneurial university now is being moulded from a veriety of historic university system.

Hailing to commercialization and technology transfer, the funds declining problems by government are very much solved and universities emerged as great assistance for society. To bridge the gap between invention and commercialization of high-technology products, Malaysian government has established a Business Growth Fund (BGF) with an allocation of RM 150 mln. The fund has focused on supporting companies commercializing public sector research results and has provided hybrid grant-equity funding. The government also established Commercialization of Research and Development Fund (CRDF) which provides funding for commercialization activities of locally developed technologies/Research and Development (R&Ds) undertaken by eligible Malaysian-owned companies.

Despite all these out of the total 802 number of Intellectual Properties (IP) in Malaysian universities, only 116 of them are commercialized with low rate of commercialization of 14%. This figure shows that Malaysian universities are very upright in research but deprived on entrepreneurship. It is important to note that in Malaysia all IP rights belong to universities.

Bekkers *et al*. (2006) suggested universities to take equity stake in their start-ups as a step towards innovation. This opens a door to interesting research questions such as how many universities are taking equities in start-ups? What are the risks involved if the university take equities in start-ups? The fact that the government is providing financial grants and universities are the agents that doing the commercialization work makes it most suitable to use principal-agent theory as the foundation of our study. And the popular theory of agent-principal undoubtedly suggests that the risk taking behavior of the agent is positively related to outcome-based contracts. In this study a thorough literature survey is carried out to address these gaps.

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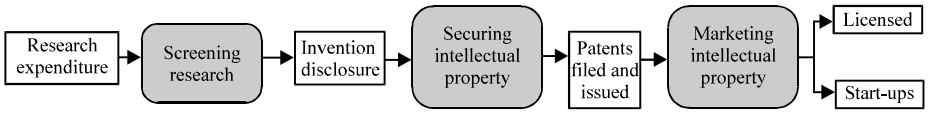

Fig. 1: Research commercialization process (Kim *et al*., 2009)

Also the reasons of including and excluding equity as a part of university IP marketing are March 30, 2017 emphasised to a new level.

Framework

Commercialization process in universities: A university research will start with the funding for research purpose as shown in Fig. 1. This first step will produce an output of research disclosures, leading to the output of patents (among other intellectual properties) filed and issued and eventually will lead to the formation of start-ups or the execution of licenses.

Equity holding of university: Gilsing (Kim *et al*., 2009) in Sweden found out that spin-off companies with radical technology is perceived unattractive and very risky. Swedish policy is in favor of seemingly 'safer' incremental innovations and runs the risk of sacrificing more radical innovations. This shows investing in university start-ups is a risky business. That was why, Bekkers *et al*. (2006) tried to convince universities to take equity stake in their spin-offs to assist the success and establishment of the ventures. It is because the scarcity of cash inhibit spin offs ability to cover marketing activities, costs of research equipments, up-front license fees and patent costs.

Markman *et al*., (2005) in his study found out that university licensing for equity would be positively related to new business formation. Also around the globe we could see the result of this policy in Oxford ISIS innovation that so far produced 59 university spin-off companies. Stanford university also is willing to hold 15% of the equity in the university's spin-off companies in 2013.

These examples show that the formation of university spin-offs could be realised if the university takes some equities in it. Little is known about university taking equity policies in Malaysian universities. It is the intention of this study to investigate the risks involved in adopting equity by Malaysian universities and to explain them using agency theory framework.

Agency theory framework: Agency theory tried to solve problems when the principal and agent have different attitudes toward risk and how both will share those risks. The dilemma here is that the agent and principal have different risk preferences and both may prefer different

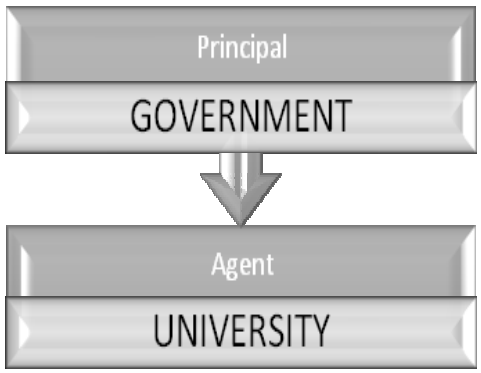

Fig. 2: Government transferring risk to university

actions. But the most important issue in the agency theory is the trade-off between the cost of measuring outcomes and transferring risk to the agent and the cost of measuring behavior. Based on the two costs, we could extend the theory further. Harris and Raviv suggested to loosen up the risk-averse agent assumption. Even latest study Ismail *et al*. (2010) shows that people in universities attitudes towards risk are diverse. The outcome-based contracts are risky depending upon agent's approach towards taking risks.

As the agent becomes increasingly less risk averse, (e.g., a wealthy agent) it becomes more attractive to pass risk to the agent using an outcome-based contract. Conversely as the agent becomes more risk averse, it is increasingly expensive to pass risk to the agent. Based on these assumptions, Eisenhardt (1989a, b) proposed that the risk taking of the agent is positively related to outcome-based contracts and negatively related to behavior-based contracts.

Since the government is dispersing funds to universities, here the government is considered as principal and the university who is doing the commercialization work are the agents. In Malaysia all universities own 100% equities of their holding companies, making them entitled to an outcome-based contract. Therefore, the study would like to propose the following (Fig. 2).

Research proposition: Risk taking of the university to take equity in start-ups is positively related to outcome-based contract.

MATERIALS AND METHODS

Analysing case studies, make research more effective and statistically reasonable (Yin, 2009; Eisenhardt, 1989a, b) agreed that case studies are appropriate when the aim is explanatory to attain desirable results or test some theory and to provide description.

Selecting cases: The approach in this study is using multiple case studies by Yin (2009). The study uses theoretical samplingto select cases that is most likely to extend or replicate the emergent theory. This is because in practical, only limited number of cases that could be studied and Pettigrew (Eisenhardt, 1989a, b) stated that it makes sense to select cases such as polar types and extreme situations which has "transparently observable" process of interest. In this study two cases were chosen. The first case represents universities which are taking equity in technology start-ups. The second case represents universities which did not hold any equity in technology start-ups (Fig. 3).

Thematic analysis: The application of thematic analysis in qualitative research is commonly the fundamental concepts that have been identified from research data (Bernard and Ryan, 2009) and which emerge as being important to describe the phenomenon under study (Fereday and Muir, 2006). We employed thematic analysis method to provide a structured way of understanding how to develop thematic codes and sense themes.

The employment of thematic analysis in this thesis was conducted based on six phases of thematic analysis as recommended by Braun and Clarke (2006); data familiarisation; initial codes generations; themes searching; themes reviewing; defining and naming themes and producing the report. In implementing this analysis, the researcher also adopted three stages of coding processes as proposed by Corbin and Strauss (1998): open coding, axial coding and selective coding to enhance the thematic analysis in this study.

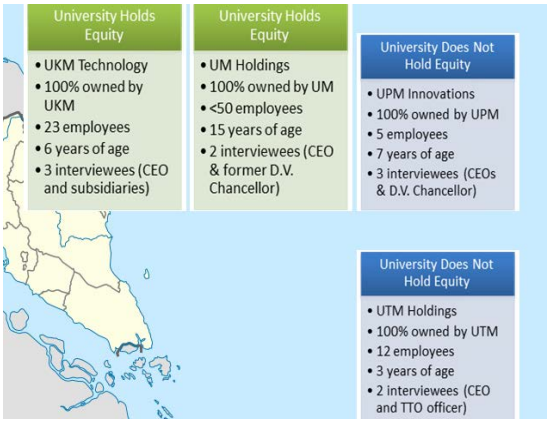

Fig. 3: The 2 contrasting university policies

RESULTS AND DISCUSSION

What are the risks?

Liability: The main subject in the study is liability. Taking equity in technology start-ups is an obligation to the university. One of the cases is UTM Possessions. SYMBIOSIS is one of the start-ups programs started in the Campus, on the other hand most of the start-ups CEOs are around 20 year old and UTM Holdings panel is not concerned to take equity. They inquired what the CEO can do. Perhaps it senses good like 'Yay. You open up a business. You secured a contract'. But:

- Are you going to be successful to secure every year?
- Are you certain that agreement makes money?
- How skilled are you with those 20 year-old age?
- Are you certain that you can race with the opponents out there? Just because you are given a business with a product
- And acquiring a plan now is not a key thing. The main thing is handling your cash-flow. If you held a plan, can you gather your money or not? How are you going to wage your staff at the end of the month? That is more important (Fig. 4 and 5)

Selecting a business to capitalize contains supply-demand. It encompasses struggle and to organize. Whether it is sensible or not to go on and form this business. You must see the sustainability of the business.

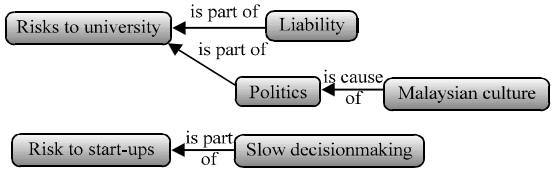

Fig. 4: Total risks

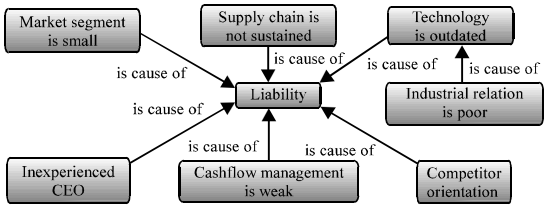

Fig. 5: Liability risk

For example, you have a product. Through the manufacturing of this product, there is a supply chain. You are not even assured the supply chain will lasts incessantly. Say the product is made of sugar cane. here did you get the material? From the contractor. If the dealer is out of business? Say he did not want to plant sugar cane any longer and the dealer is willing to plant palm oil where will you get the sugar cane? You might not answer. You should be able to come out with alternative supply chain, say pineapple or coconut.

We have not even stated the demand. Occasionally we think big. We believed that this is good for us and people. But there are other technologies out there that could whack us just like that. Since a lot of laboratories do not have the right of enter the market size and competition which is very essential. If the market is so little why do we have to go big? There is no point. That is why, participation with business is good. People are trying to slender the crack among university and industry. There are still a lot of studies doing things that are not essential by the industry.

Politics: Investment is about capitalizing in risk; risky asset. And risky asset is not only 1, it is a collection of assets. Some will fail, some will success. When someone invests in a portfolio of 10, he does not expect that all 10 will success. In normal practice when people do investment they will expect only 3 will be fruitful. Among those 3, only 1 will be the most successful. Another 7 are failures. But that 1 most successful will cover the entire investment portfolio.

In Malaysia the culture is from 10 investments, if we failed 1 people will regard us as useless and kick us out. They will say we do not know to do business and investment. If you fail 5, they will bang you worse. If you fail 7, they will kill you. If there is one leader that made 1 mistake, we will not look at his other 10 contributions. Malaysians will kill him. In the US the culture is different. If a start-up converts into an IPO company it could be RM10 million worth of equity. But that is after 11 year. Malaysian university leaders do not dare to wait. After all their tenure as Vice Chancellors is only for 3 year. He will be criticized and exposed to risk of people not continuing his tenure.

Slow decision making of university holding company: When the agreement is out come based, the agent is more likely to behave in the interest of the principle (Eisenhardt, 1989a, b). Here the university (principal) wants to switch the start-ups (agents). One inventor appealed that UKM Technology was getting in the way among him and the ministry's grant money. He appealed UKM Technology

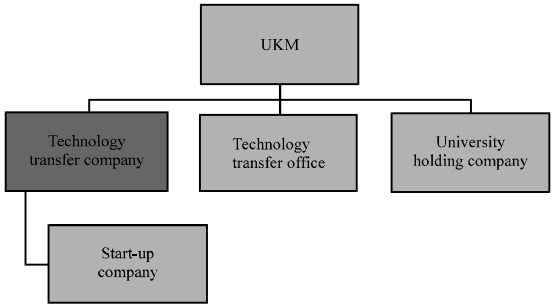

Fig. 6: Organizational structure of technology transfer in UKM

did not support to fill up the form and pitched to get the money. He was the one who did everything. Complications arise when UKM Technology was keeping the cheque book. They claimed they have the rights and they hold 80% of the equity.

CRADLE (the ministry funding) permitted the start-up 5-pax salary. UKM Technology asserted the auditor that they were the one who will open the account in the bank. UKM Technology said they will open the account in 3 month but for months it was not opened. CRADLE delayed for some time to put the money. The originator was not reimbursing his employees for 7 month. Occasionally the employees demanded to inventor their mileage. Undoubtedly, in this case we could see the adverse effects on the star-ups.

How universities become risk taker? The findings showed two practices in Malaysian universities to expand risks in order to take equities in technology start-ups.

Creating Technology Transfer Company (TTC): UKM formed a for-profit TTC. The TTC acts as a technology transfer company for the university. So all the agreement relating commercialization plus licensing, the TTC will act as the university's advertising agent.

In the meanwhile, the University Holding Company (UHC) was involved in a business providing facilities and skills from the UKM out to the market. For example: consultation and medical services. The holding company also managed and commercialized the university's assets. Though, the university's Technology Transfer Company (TTC) is a very detailed business organization set by the university to start or venture into the IP commercialization business. Whatever related to IP is going through the TTC. That is the pure difference.

The motive to have a discrete body from the University Holding Company (Fig. 6) was firstly because technology transfer business is a new business and very high risks. If they put the university TTC under the portfolio of the UHC, it would disturb the alliance account and performance of the holding company. It is because

this is high risk. They have to put in a lot of money to a success rate that is uncertain. The second reason was the management of technology transfer business and services business is very different in nature. They need to be a more risk taking team and willing to venture into a new technology which the prospect is very uncertain. But how do they mitigate those risks? They mitigate the financial risk by working with the grants provided by the government. The funds are either from the university or from other ministries and agencies under the government. This is a business that leveraged on the financial assistance provided by the government.

Having large assets: Risks are there. But UM did not put them in one basket. For financial management they allocated some money for commercialization but at the same time they have some capital. This is because UM is an old university. Previously they had a lot of assets. Even when they were in they were in stock markets. They deposited their money and they have a financial manager. They invested in all sorts of fund. They are not using their core fund for commercialization. They are using money from their profits.

There is one start-up got a soft loan from UM about RM 1.25 mln. There is a company got a soft loan from UM about RM 500 thous. There is one company got RM 70 thous. No company got beyond RM 2 mln. But they are all soft loans. These are all for start-ups.

Theoretical contribution: Literature discussing parallel results is vital as well because it ties together underlying resemblances in phenomena normally not associated with each other. The results are often a theory with stronger internal validity, wider generalizability and higher conceptual level (Eisenhardt, 1989a, b). Modern portfolio theory has verified that broadening could abandon out the nonsystematic risks of individual investments, thereby reducing the total risk of a portfolio (Markowitz, 1952). University holding businesses in our case are parallel to Corporate Venture Capital (CVC) that includes direct equity investment by firms (corporate investors) in external privately held entrepreneurial companies (portfolio companies) projects (Maula *et al*., 2013). Latest finance literature proposes that a more expanded CVC portfolio would present less risk and thus be subject to a smaller discount rate than a less diversified portfolio (Yang *et al*., 2014). By enclosing the literatures, we come out with our first hypothesis (Fig. 7).

- H_1: University taking equities in holding companies is not a sufficient condition to risk taking equity in technology start-ups. Rather,university taking equity in holding companies leads to risk taking equity in technology start-ups only when their risk portfolio are diversified

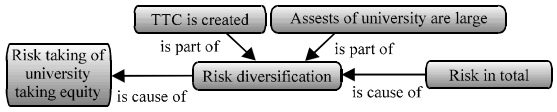

Fig. 7: Risk diversification framework

Fig. 8: University controlling start-up finance

One of new theme that was created is the slow decision making of the university that affected start-ups such as UKM, leading other university such as UPM to take a decision not to take equities anymore in any start-up. Here a new principal-agent association is recognized; the relation among university (principal) and the start-ups (agent).

From a theoretic viewpoint, the positivist stream has been most worried with telling the governance mechanisms that solve the agency problem. Jensen (1993) defined this interest as "why certain contractual relations arise". Eisenhardt (1989a, b) came out with a suggestion that when the contract between the principal and agent is outcome based, the agent is more likely to behave in the interests of the principal. Our findings found that when the agreement among university and start-up is equity based, the start-up is more likely to be affected by slow decision making of the university. A constant variable in all of these slow decision making cases involved universities controlling the cheque book, i.e., controlling the finance of the start-ups. Therefore it is safe for us to come up with our second hypothesis (Fig. 8).

- H_2: University taking equities in start-ups is not a sufficient condition for slow decision making. Rather, university taking equity in start-ups leads to slow decision making only when university control the start-up finance

Policy contribution: Malaysian RUs should set up a TTC/marketing agent independent of the UHC. By expanding risks in capitalizing in these start-ups, the university could also concentrate and do an improved job in marketing their developments. The universities also could relaxed their prospects as by now it is clear that the most risk taking universities in Malaysia is UM where is by far had the largest assets that are backing their investments in university inventions.

Malaysian universities also should consider the option of not taking equity at all in any start-ups.

Considering the negative effects of taking equity on the start-ups, by not having control on start-ups would not be such a bad idea. Monitoring the start-ups financial aspect will slow down their working activities wherein we know that start-ups must be fast and active. In this respect some start-ups should be given a little autonomy. By having too much control on start-ups sometimes will kill creativity and innovation.

CONCLUSION

These case studies do demonstrate associations that align with predictable patterns. Though, these case studies provide a snapshot at a single time of the associations among actors and decisions to take equity and so do not demonstrate temporal precedence. In addition, it is not certain that all potential variables backing the causal associations are addressed. Future quantitative study could help to prove the generalizability of hypotheses created from this study.

LIMITATIONS

The capability of these case study findings provided strong provision for direction of connection is limited. Indication for causality must be addressed by the following three criteria's. First, the results must demonstrate sequential superiority, i.e., must show that the proposed causal variable precedes the proposed outcome. Second, the results must demonstrate the expected patterns of relationships. Third, the data must account for internal validity by accounting for other possible explanations of the results. Without strong internal validity, there might be an alteration of the determination of causal effects because omitted variables are not accounted for.

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