Knowledge Transfer, Macro Stickiness and Human Capital Development among Technology-based Firms in Malaysia

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Abstract

The study investigates the presence of macro stickiness in knowledge transfer for human capital development among technology-based firms in Malaysia. Macro stickiness refers to vague and inadequate guidance for knowledge transfer for innovation and knowledge development promoted by national policies on innovation and economy. The study used personal interview with twenty (20) informants, who included two (2) policy makers, three (3) government officers, and fifteen (15) executives of technology-based firms in selected Malaysian technology parks. The findings suggest that policy makers and government officers confirmed that national policies on innovation and economy cannot exclude three national unity, foreign direct investment and sound economic growth. The industry informants were not convinced to active in knowledge transfer for human capital development due to the inclusion of three elements. The study proposed that future research to increase the number of interviewees and to include technology parks from other major cities.

Keywords: Macro stickiness, human capital development, Malaysian technology-based firms

1. Introduction

Knowledge transfer among industry players contributes to human capital development that is essential for the industry to gain sustainable competitive advantage and to contribute to the prosperity of the economy. In the innovation-based economy, knowledge transfer activities contribute to value added capital, capacity building and sustainable competitiveness that are vital engine of economic growth. The economic indicators are no longer emphasized on the productivity of mass production, tangible products, and satisfaction of economic exchanges (Taylor, 2003). The innovation-based economy uses knowledge as the base to produce products and to provide services based on the demand of the customers. In other words, customization and personalization are important elements in the economic activities.

Under a transformed economy that emphasises on the increase in wealth, wellness, and wellbeing, knowledge transfer activities allow industry participants to engage, interact and harmonize for better performance. This kind of economy requires the economic participants to produce essential substance that derivatives in nature instead of productive. Derivatives are kind of property that generated from ideas, thoughts and creativity that are useful commercially to others (Macdonald, 2004). This is the basis for the production of tangible products to satisfy the needs and wants of the customers. Since the economic is depending on human derivatives property, human potentials are essential factor for the economy. As such, human capital development becomes very important activities. Without this, the economy is simply stagnant.

The study aims to investigate the presence of "macro" level stickiness in human capital development in Malaysia, with specific reference to the effort to produce more scientific and technical experts. By doing this study, it will add the literature of innovation and human capital development through the revision of "macro" level stickiness model that introduced by Sweeney (1996). The results of the study also provide new perspectives for both academic and practitioners in addressing national innovation development and capacity building through the human capital development efforts.

This study is very significant for both academic and policy implications. Academically, the study revises Sweeney's (1996) innovation-based human capital development model to meet specific situations and national culture identity, particularly in Malaysian contexts. Practically, the study facilitates and guides innovation-based economists and policy makers to formulate economic and technology policies that are fruitful for the national competitiveness. The research problem for this study refers to what extend Sweeney's (1996) model of human capital development is applicable in the Malaysian context. Thus, the research questions for the study are as follows:

a. What are the factors that have been considered by the government when formulating economic policies to encourage human capital development in scientific and technical areas?
b. Why does the government include the national agenda in economic policies which are supposed to encourage national human capital development?
c. How do Malaysian technology parks assist human capital development among technology-based firms that operate in Malaysian technology parks?

2. Literature review

This section has five parts. Firstly, it discusses the nature of macro level stickiness. Secondly, it applies Sweeney (1996) model to understand macro level stickiness in human capital development process. Thirdly, it argues on the government role for human capital development. Fourthly, it discusses about the role of technology parks for human capital development. Finally, the study relates the previous components of macro level stickiness to the innovation-based economy.

2.1 Macro level stickiness

The national human capital development is however constrained by the "macro" level stickiness that occurs at national policy formulation and implementation levels. In this study, the "macro" level stickiness in human capital development of scientific and technical areas adopted the model introduced by Sweeney (1996). In fact, Sweeney (1996) argued that there are external forces which contributed to stickiness associated with scientific and technical human capital development. The government policy on this area is inadequate to support the effort.

2.2 Sweeney (1996) model

Sweeney (1996, pp. 6-7) argued that governments contributed to stickiness in human capital development through knowledge transfer among experts and professionals in which the governments sought for "learning" to be a means to attain economic growth. Governments perceived that "learning" from others can lead to "technological progress", which boosts economic development. Accordingly, governments invested heavily to encourage firms in the science and technology sectors to expedite technological development via "learning" between firms (Sweeney, 1996, p. 6).

Sweeney (1996, p. 7) argued that investment in science and technology that generated "new knowledge" did not encourage national human capital development. As such, the government contribution to "macro" level stickiness by introducing economic policies to boost economic growth that were not consistent with the use of technology parks as instruments to promote human capital development.

2.3 Government role

Likewise, governments also play an important role in contributing to "macro" level stickiness through economic policies designed to achieve the desired level or rate of economic development. Governments believe that economic development requires the development of technology.

While this knowledge can be generated within the country concerned, Sweeney (1996, p. 6) has pointed out that the development of technology can be achieved through "learning." Accordingly, Sweeney (1996, p. 6) contended that learning can contribute to the development of technology in two ways, namely (a) by improving the existing ways of doing things in organisations, and (b) by introducing new ways of doing things in organisations. Both of these contributions can be achieved by investing in "learning" activities.

Sweeney's (1996, pp. 6-7) argument is concerning the role of governments in promoting human capital development to generate economic growth and capacity building through increasing the intensity of technology development. There are two factors involved when change occurs, namely (a) the change resulting from pressure on firms to adopt new technologies ("technology push") and (b) the pressure from the market to produce new technologies ("market pull") (Macdonald, 1998, p. 45). These forces are beyond the firms' control (Macdonald, 1998, p. 45). However, these forces serve to make firms proactive.

Macdonald (1998, pp. 46-47) argued that innovation is important to economic growth and that this means that governments are motivated to encourage innovation. The efforts by governments are not purely in line with the those of business owners, however, because governments seek to gain political advantage by achieving good economic growth and prosperity (Joseph, 1997, pp. 289-290). For instance, to address the slowing economic growth, some governments seek to activate the economy by increasing spending on research and development in high technology in order to encourage (at least) domestic economic growth and also to provide more employment opportunities that are associated with jobs in the high technology sector. In doing so, governments attempt to establish essential facilities, such as science or technology parks, to encourage innovation.

Sweeney identified a number of factors that will affect the extent to which human capital development via knowledge transfer between firms in technology parks. As such, firms had to consider a variety of factors to ensure that "learning" takes place between firms. These included (a) "information behaviour" (Sweeney, 1996, p. 8), (b) "socio-cultural" effects (Sweeney, 1996, p. 9), (c) "distinctiveness" (Sweeney, 1996, p. 11), (d) the "technology culture" within the firms (Sweeney, 1996, p. 13), (e) their "technological progressiveness" (Sweeney, 1996, p. 14), (f) "entrepreneurial vitality" (Sweeney, 1996, pp. 15-16), (g) the "interactive creation of innovation" (Sweeney, 1996, p. 17), and (h) the evaluation of "future and past structure" (Sweeney, 1996, pp. 18-19). Sweeney's (Sweeney, 1996, pp. 6-19) discussion of "learning," "technological progress," and "economic development are illustrated in Figure 1.

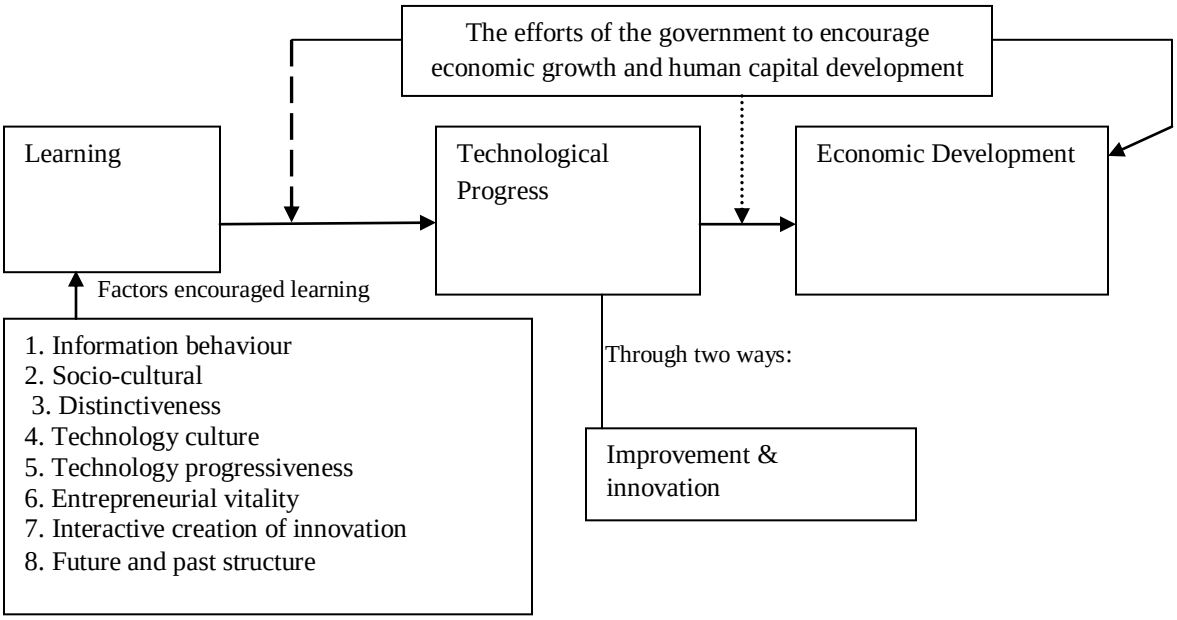

Fig 1. Sweeney (1996)'s model of human capital development under the influence of "macro" level stickiness

2.4 Technology parks

Technology parks are not the only instruments to promote human capital development via knowledge transfer between firms. There are other instruments that are equally functional to encourage knowledge transfer between firms as long as these instruments encourage communication and collaboration between firms.

In this study, technology parks are discussed in this research as specific instruments to demonstrate stickiness in for human capital development. In addition, technology parks are just physical infrastructure; this alone is not enough because they need input from all active industry participants and other institutions (Singh, 2001). Governments have used technology parks to encourage innovation in the high technology sector even though, as Macdonald argued, this is a risky sector in which firms are reluctant to participate (Macdonald, 1998, p. 162). Governments insist that lower technology ICT firms that operate in technology parks with high technology firms will gradually become interested in participating in innovation in the high technology sector. Nevertheless, governments focus on the physical aspects of the technology parks and pay inadequate attention to supporting knowledge transfer between the firms in that location (Joseph, 1994, p. 46).

The high technology sector is a dynamic industry that requires that participants are proactive with respect to innovation; otherwise, they will not survive. Since the industry is dynamic, governments established technology parks to assist firms in acquiring knowledge that would promote innovation that contributed directly to technological development. The enhanced intensity in technological development is taken to bring prosperity to society. Joseph (2004, p. 118) argued that the high technology sector is highly knowledge intensive and that this requires participants in this sector to be innovative.

Governments have continued to emulate the approaches taken in other countries (Cook & Joseph, 2001, p. 378) even though industry players are not yet convinced that the technology parks generate economic growth

(Joseph, 1997, pp. 289-290). Governments continue to believe that technology parks are powerful instruments to create innovation in the high technology sector, even though some question whether this is the case.

2.5 Economic Transformation Program (ETP) and Malaysian innovation economy directions

Malaysia's innovation-based economy seeks to use knowledge to produce more valuable knowledge and innovation. Thus, all industries emphasize the use of knowledge and, in this regard, Malaysia promotes knowledge-based industries, as defined by the OECD. Knowledge-based economic indicators provide signs of an economy that emphasised the production of knowledge. In Malaysia, the Economic Planning Unit (EPU) is the federal government agency that ensures that the Malaysian economy is developing into a knowledge-based economy.

The EPU (2002, pp. 132-133) identified seven indicators of a Malaysian version of a knowledge-based economy; namely (1) the capacity to train sufficient skilled workers, (2) the readiness of public and private institutions to support a knowledge-based economy, (3) the continuous provision of incentives and infrastructure, (4) the ability to acquire and apply science and technology, (5) the ability to get the private sectors to play an active role in the market , (6) active involvement of the public sector, and (7) the bridging the gap between the knowledgeable and those who lack knowledge.

The early initiative of the knowledge-based economy has emphasised on human capital development as foundation of national capacity building to prepare dynamic and competitive Malaysians. The Eight and Ninth Malaysia Plans have already prepared the solid foundation for Malaysia to move forward into competitive world economy (Malaysia, 2001a, 2001b, 2006). Table 1 summarizes recent Malaysia Plans.

Table 1: Malaysia Plans and other Development Planning Documents

Plan Title	Duration	Date Tabled	Concern areas
Outline Perspective Plan (OPP) 3	2001 – 2010	3 Apr 2001	Various sectors of industrial investment
Eight Malaysia Plan	2001 – 2005	23 Apr 2001	ICT industry
MTR Eight Malaysia Plan	2001 – 2005	30 Oct 2003	ICT industry
Ninth Malaysia Plan	2006 – 2010	31 Mar 2006	ICT industry plus human capital development
Tenth Malaysia Plan	2011 – 2015	10 June 2010	Economic prosperity and social justice, driven by 1Malaysia: People First, Performance Now with Government Transformation Programme (GTP) and Economic Transformation Programme (ETP) premised on high income, inclusiveness and sustainability.

Note: MTR- Mid Term Review.
Source: Government of Malaysia (2001a, 2001b, 2006, 2010)

The achievement of the Ninth Malaysia Plan (Malaysia, 2006) was impressive when Malaysian economy has grown at 4.2% annually with gross national income (GNI) per capital RM26, 420 in year 2010. In the mean time, the unemployment rate was steady at 3.6% in year 2010 and the federal government fiscal deficit at 5.3% of the GDP in 2010. As for the human capital development, Malaysian Government has been committed and continued to be committed in human capital development. His Excellency Prime Minister of Malaysia, Dato' Sri Mohd Najib Tun Abdul Razak (Malaysia, 2010) mentioned:

> *Apart from external factors, Malaysia faces various internal challenges to drive economic growth to a higher level, while having to implement a prudent fiscal policy. The nation is confronted with the challenge of providing a conducive investment environment as well as developing high quality human capital, which are critical to enable the shift to a higher level of value added and productivity.*

The Tenth Malaysia Plan (2011-2015) emphasises on the ambition of the government towards greater economic prosperity and social justice through the concept of 1Malaysia: People First Performance Now (Malaysia, 2010). In fact, YAB Dato' Sri Mohd Najib (Malaysia, 2010) said:

…these achievements did not happen by chance nor without proper planning and diligent efforts, instead, it was a result of visionary Government leadership, coupled with the rakyats unwavering support since independence. In this respect, we are greatly indebted to the past leadership and previous generations, because their great efforts and sacrifices provided us with a strong foundation, from which we can build on. This developmental journey has spanned Two Malaya Plans, Nine Malaysia Plans, Three Outline Perspective Plans as well as a National Mission before coming to this juncture today.

When Malaysia is implementing Tenth Malaysia Plan, it decided to get more robust into the international arena. According to Performance Management and Delivery Unit (PEMANDU) (2011a), Malaysian Government launched Economic Transformation Program (ETP) guided by 'People First Performance Now' aims to increase wealth, wellness and wellbeing through 19 entry point projects worth of RM67billion that involve twelve National Key Economic Areas (NKEAs) namely (1) oil, gas and energy, (2) business services, (3) agriculture, (4) healthcare, (5) tourism, (6) electrical and electronics, (7) financial services, (8) communication content and infrastructure, (9) education, (10) wholesale and retail, (11) palm oil, and (12) greater Kuala Lumpur and Klang Valley. ETP was on 25 October 2011, but it has yield impressive outcomes. The indicators of ETP are measured in terms of number of projects, worth of investment, contribution to gross national income (GNI), and number of jobs created. The element of "People First" is proven when the outcome hit the unemployment issue by offering a lot of job opportunities. Table 2 highlights the progress of ETP.

Table 2: Progress of Economic Transformation Programme (ETP)

Date of progress reporting	No of Projects	Worth of Investment (in RM)	Worth of Gross National Income (GNA)	No of jobs created
19 April 2011	12	11.16b	16.62b	74,457
8 March 2011	23	14.75b	20.1b	88,354
11 January 2011	19	67b	32.5b	52,404
30 November 2010	9	8.3b	84.5b	70,500
25 October 2010	9	5.3b	100m	13,100

Source: PEMANDU (2011b).

According to PEMANDU (2011c), the ETP uses six secrets to enable it mobilizes and achieves the targets, namely (1) the game of impossible, (2) KPI anchorage, (3) discipline of action, (4) situational leadership, (5) winning coalitions, and (6) divine interventions. The first secret requires Malaysian to change their perspective and confidence level from negative perception. As for the second secret, all economic activities are anchored on key performance indices (KPI) for monitoring, controlling and performance evaluations. The third secret requires everyone to be discipline in planning and tracking of results on various periodical bases such as daily, weekly, monthly, quarterly and so forth. The fourth secret refers to the application of situational leadership to direct and empower people for better results and performance. The firth secret requires every participant of the economy to work on winning coalitions. The final secret refers to the Divine interventions.

PEMANDU (2011a) argued that when the ETP was launched, it has ten NKEAs, but to date, it has increased to twelve. This indicates that the NKEA sectors are not fixed and will evolve over times. The main reasons for PEMANDU selected certain NKEAs due to their significant role as critical engines of future economic growth and also their expected contribution to Gross National Income (GNI). In the mean time, PEMANDU will evaluate rigorously the performance of each NKEAs and will remove them if proven not productive to increase the national wealth, welfare and well being.

3. Methodology

The study examines the perceptions key informants on the effect of macro stickiness in knowledge transfer among technology-based firms for human capital development. The study approached technology-based firms located in Technology Park Malaysia, Selangor Science Park, and Cyberjaya. It interviewed twenty (20) informants, who included two (2) policy makers, three (3) government officers, and fifteen (15) executives of technology-based firms in Malaysian technology parks.

The data collection method is a qualitative research method. The qualitative method enables the study to explore a context deeply, which could not be done adequately by quantitative methods, such as survey (Wainwright, 1997; Patton, 1990). By interviewing the informants, the study is able to disclose various issues, especially in the relation to the social and cultural contexts (Myers, 2000). In the interview method, the main activity is talking and listening to informants. This is important to understand how informants think and do, which is not very easy to obtain in a structured survey. Interview also enables the research to continue probing and crosschecking information and not strictly follow a fixed set of questions. The results from qualitative research may not be applied to all situations, but they help generalizations and theories (Ezzy, 2002).

The study decides to use note-taking approach after not getting consent from all informants to use tape recording devices. Moreover informants' consent is part of the research ethics requirement. After the interview process, the notes were typed and the hardcopy sent to the informants for verification. The informants were given 14 working days to verify. For the non reply interview scripts, the study considered them as final copy version. Due to the confidential nature of the information provided by the informants, their names and affiliated organizations were not disclosed.

Two (2) policy makers (PM), three (3) government officers (GO), and fifteen (15) firms' executives (FE) from Malaysian technology parks were asked three questions:

a. What are the factors that have been considered by the government when formulating economic policies to encourage human capital development in scientific and technical areas?

b. Why does the government include the national agenda in economic policies which are supposed to encourage national human capital development?

c. How do Malaysian technology parks assist human capital development among technology-based firms that operate in Malaysian technology parks?

4. Findings and discussions

The following findings are based on the feedback of two (2) policy makers (PM), three (3) government officers (GO), and fifteen (15) firms' executives (FE) from Malaysian technology parks. Table 3 highlights the informants' codes and profiles.

Table 3: Informants' Codes and Profiles

Code	Title	Code	Title
PM1	Federal Deputy Minister	FE6	Senior Executive
PM2	Federal Minister	FE7	Senior Manager
GO1	Assistant Director	FE8	Chief Operating Officer
GO2	Principal Assistant Director	FE9	Manager
GO3	Assistant Director	FE10	Senior Engineer
FE1	Manager	FE11	Executive
FE2	Senior Manager	FE12	Business Manager
FE3	Vice President	FE13	Vice President
FE4	Senior Manager	FE14	Senior Executive
FE5	Senior Manager	FE15	Senior Executive

4.1 Feedback from policy makers

Two policy makers argued that macro level stickiness influences human capital development in scientific and technical areas as experienced by firms in Malaysia technology parks. The responses for the first interview question (What are the factors that have been considered by the government when formulating economic policies to encourage human capital development in scientific and technical areas*?*), can be classified into a few factors, namely (a) economic and business advantages, (b) employment opportunities, (c) skill enhancement, (d) sustainable wealth, and (e) good quality of life.

The informants emphasised that due to rising costs of production, especially the labour cost, foreign firms sought for cheaper locations to run their production. Thus, the informants perceived that if the foreign direct investment shifted to other countries, then this situation disadvantaged Malaysian economy and competitiveness. Under the flagship of 'People First, Performance Now', the government has mobilized and optimized national competencies and resources to generate new wealth for the welfare and well being of the people in Malaysia. In fact, the policy making process is now more inclusive of all key stakeholders. Policy makers gave top priority in

providing new jobs when they formulated the economic policies. In doing so, they have to juggle between job opportunities provision for the people and human capital development in scientific and technical areas, which is essential for knowledge and innovation competencies.

As for the roles of Malaysian technology parks, policy makers believed that there are three key roles in terms of incentives, infrastructure, and networking for Malaysian technology parks to promote human capital development. The main reason the government established Malaysian technology parks was to attract technology-based firms to venture into essential scientific and technological areas such as biotechnology, nanotechnology, nuclear technology and ICT technology, which is part of the national economic policy and ETP to attract foreign direct investment. Additionally, the informants said that the government established technology parks not only as infrastructure for these technological areas, but also to provide financial and technical assistance. The feedback from policy makers confirmed that the government established technology parks as a mean to start up these scientific and technical areas in Malaysia. Beyond that, the government has limited ability to assist these firms to develop and leverage human capital development. The informants also asserted that Malaysian technology parks could only offer basic facilities.

4.2 Feedback from government officers

Government officers (GO) argued that the government included three important factors when formulating economic policies, namely, (a) to secure economic and business advantages, (b) to provide employment opportunities, and (c) to ensure national unity, essential for good economic growth. Thus, the three factors are used as guidelines in the economic planning process. Based on the responses to the first interview, three important factors emerge, namely (a) to secure economic and business advantages, (b) to provide employment opportunities, and (c) to ensure national unity, when formulating the economic policies.

The second interview question asked the government officers to provide the reasons for the incorporation of the three factors mentioned in the first interview question (to secure economic and business advantages, to provide employment opportunities, and to ensure national unity) in the economic policies in general and the policy for technology parks in specific to encourage human capital development in scientific and technical areas.

In the third interview question, government officers were asked to explain the roles of Malaysian technology parks in promoting human capital development in Malaysian technology parks. The responses from three government officers on the third "macro" stickiness interview question (*How do Malaysian technology parks assist human capital development for firms that operate in Malaysian technology parks?*) indicated nine roles of Malaysian technology parks, namely, incentives, infrastructure, networking, stimulus, incubation, knowledge, real estate, image, and subsidy. An additional three roles were mentioned by the government officers, which were not mentioned by the policy makers.

4.3 Feedback from firms' executives

For the first interview question, 15 firms' executives argued that economic and technological policies that formulated by the government were aimed to provide: (a) economic and business advantages, (b) employment opportunities, (c) wealth creation, and (d) economic development. For example, FR 1 said:

> *Our firm does not invent our own technology because it is costly. We contacted other firms, normally overseas firms and enquired about the technology. Then we will send our technical staff to study the technology under the guidance of those firms.*

In the case of FR 2, the company has experienced technical staff made them ready to face any hardship. The main reason to stay in Technology Park Malaysia is to secure some government projects. FR 2 said:

> *This arrangement is not so expensive if we were to invent the technology by our own staff. Yet, we do not have the ability to do so. If that arrangement is very expensive, we have to find ways to get them.*

In the second interview question, 15 firms' executives concluded that key reasons for the government to include national agenda in the economic policies are (a) national interest, (b) political stability, (c) multiracial context, and (d) national unity. For example, FR 7 argued that the national economic policies whether the traditional Malaysia Plans or ETP are good for the national interest, but they did not prepare firms to be globally competitive. FR 7 explained:

> *... whatever policies, our business must follow our customers' standards. Nowadays customers are all over the world. At our firm, we need to ensure our workers are competent enough to perform the job. Our customers are very fussy and we need to follow their demands.*

Finally, in the third interview question, these firms' executives contended that technology parks have some roles to assist human capital development, but they are not sufficient. FR 15 mentioned:

> *... for us TPM is just for get the MSC status. Once we got it, it helps our marketing efforts with such reputation. However, TPM itself is not a learning place for companies because TPM only provides and supervises the place for us.*

Table 4 summarizes the feedback of executives from technology-based firm.

Table 4: Summary of Firms Representatives (FR) Responses

Code	Question 1 (What factors?) = Economic advantages	Question 2 (Why national agenda?) = Employment opportunities	Question 3 (How tech parks?) =
FR1	Good economic prospects, opportunities	Political agenda	Business park with subsidized rental
FR2	Growth, jobs, more business opportunities	National interest, very political	Real estate agent
FR3	More jobs, more business, more profit	Multiracial agenda, multiracial interest	Networking, access to one stop centre
FR4	Jobs, businesses	No idea	One stop centre meeting
FR5	Prospects, jobs, business	Political interests	Good rental rate, secured building
FR6	Prospects, new opportunities, social-economic concerns	National politics	Business networking
FR7	More wealth, more opportunities	Pledge to voters (politically driven)	Meeting point for technology investors
FR8	Economic wellness, people in good shape (united), harmony	Working guideline based on social nature	Subsidized facilities with good image
FR9	Economic advantage, people wellness, stability	National agenda is irrelevant in business	Physical infrastructure only
FR10	Jobs, business, growth, wealth	Protection of national interests	Subsidized facilities
FR11	More money, growth, employment security	Nationalism, political interests	Incubation
FR12	People welfare, economic competitiveness	Compass/guideline in competing	Networking, collaboration
FR13	People, economy, job, wealth	Political will, mileage, national interest	Facilities, networking
FR14	Give people jobs, ensure good growth	Political things, no idea	Sharing facilities
FR15	Economic development, prosperity, social welfare	National interest	Infrastructure for K-economy

The feedback from the respondents has added a few elements into Sweeney's model of knowledge transfer to enable knowledge transfer among technology-based firms in Malaysia. The additional elements are (a) incubators to support learning process, (b) one stop centre or network facilitator to assist in knowledge networking between and among technology-based firms, and (c) rewards for all the efforts in knowledge transfer. In short, Sweeney (1996)'s model of human capital development in Malaysia has to be incorporated with "macro" economic variables, namely economic advantages, political interest, national unity, and incubation to make it practical. Table 5 provides the summary of the study.

Table 5: Summary of Research Questions, Answers and Informants

Research questions	Answers	Informants
What are the factors that have been considered by the government when formulating economic policies to encourage human capital development in scientific and technical areas?	Economic advantages, employment availability, national unity, good economic growth	Two policy makers, three government officers and 13 out of 15 firms
Why does the government include the national agenda in economic policies which are supposed to encourage national human capital development?	National interest, political interest, and social interest	Two policy makers, three government officers and 9 out 15 firms (6 firms pointed out strongly on political mileage)
How do Malaysian technology parks assist human capital development among technology-based firms that operate in Malaysian technology parks?	Business networking, collaboration, and assistance from the government	Two policy makers, three government officers, 12 out 15 firms.

Thus, Sweeney's model has to be modified for Malaysian context. Figure 2 shows the additional three elements in the Modified Sweeney's model.

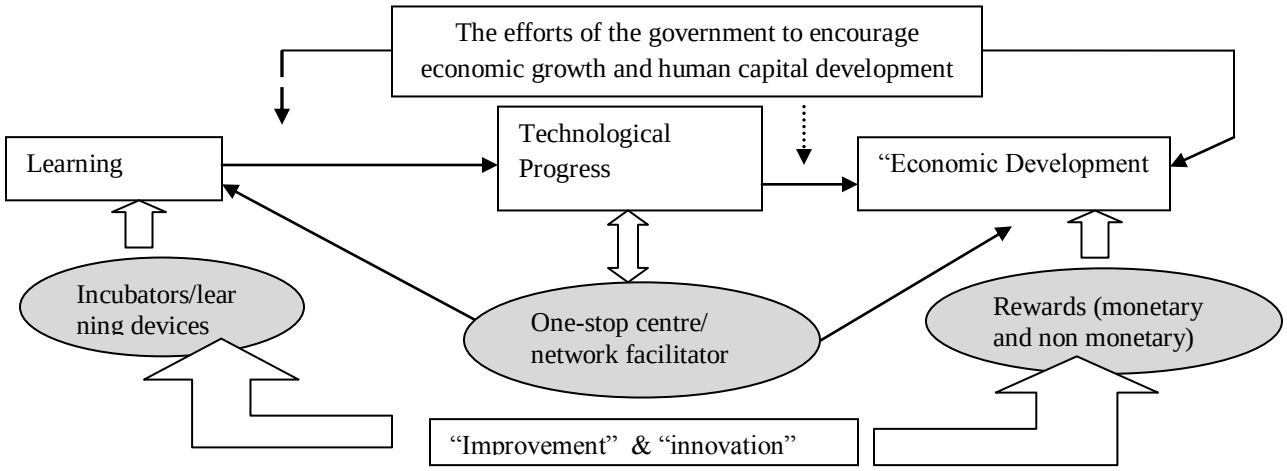

Fig 2. Modified Sweeney (1996)'s model of human capital development under the influence of "macro" level stickiness

5. Limitations of the study

The study used the personal interview technique to obtain the feedback from policy makers, government officers and executives of ICT firms. Such a technique was useful to give rich information, but it was unable to get feedback from more informants. Moreover, the study used note taking technique to transcribe the interviews which were later analyzed manually. Nevertheless, the study was aware of the disadvantages of such technique, but owing to the nature of the study, it was considered adequate to obtain some insights for the study although they may be inconclusive.

6. Future research

For future research, this study recommends such plan allocate more time to ensure more conclusive results. In fact, future studies could obtain medium to long-term research grants, and report their findings periodically for the benefit of the sponsors. Alternatively, future studies could collaborate with the government and the ICT industry. The reason for using such approach is that both the government and the ICT firms can work together to identify their weaknesses and strengths. This is important for them to come out with more sustainable solutions to address both social and economic problems.

7. Conclusion

The study has examined the influence of macro level stickiness on scientific and technical human capital development among technology-based firms in Malaysian technology parks. The informants had concluded that the influence of macro level stickiness is vital because it has misguided public innovation and economic policies. The findings from twenty (20) informants, who included two (2) policy makers, three (3) government officers, and fifteen (15) executives of technology-based firms in Malaysian technology parks suggest that policy makers and government confirmed that the government cannot exclude three major elements: national unity, foreign direct investment and sound economic growth via innovation and economic policies. The industry informants argued that the ambiguity roles and skeptical about profitability have motivated them to do less. This study suggests that the government and technology-based firms should work closely and strategically to facilitate scientific and technical human capital development.

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