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Innovation Co-operation Impact on Operations of Small, Medium and Large (SML) Firms: A Malaysia Perspective

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Abstract: Nowadays innovation co-operations have contributed to the success and improvement of firm businesses globally. This study sought to examine how innovation co-operation influences the activities of small, medium and large (SML) firms to become innovative and perform effectively. Using a dataset of a survey study based on Malaysian Innovation Survey (NIS) and European community innovation survey (CIS) reports, a total of 1178 firms cutting across small, medium and large (SML) companies for manufacturing and service firms were examined using an open innovation paradigm in practice to understand the extent of co-operation and collaboration in performing innovation activities. The study data were analysed using descriptive statistics and logic regression model estimation for ease of comprehension. The findings showed that almost all the companies survey were involved in performing one innovation or the other. Furthermore, it reveals that different partnership was sought for co-operation and collaboration in performing their innovations.

Keywords: Innovation co-operation, small, medium, large (SML) firms, dataset

JEL Classification: O30, O31
Paper Type: Research

1. INTRODUCTION

In today's dynamic and competitive business world, it is a well-known fact that innovation cooperation among and within partners in all forms of businesses constitutes a fundamental part towards the success and improvement of business globally (Arranz & de Arroyabe, 2009). Thus, the need and choice for a partner to cooperative with are therefore crucial for innovations to be sustainable. The importance of innovation and co-operation

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towards socio-economic life has highlighted the growing need to encourage and develop the interactions among those participating in the innovation process. To this effect, policies relating to innovation and the necessary cooperation are increasingly becoming emphasised to develop cooperation mechanisms as a means of enabling effective interaction to take place among the different and diverse innovation activities that will result into the production and marketing of products and services. Prior studies, has been increasingly observed that innovativeness of firms depends not only on skills possessed by firms or can exploit but also on the combinations of resources, ideas, and technologies with an innovative environment (Fey & Birkinshaw, 2005; Sanchez & Ricart, 2010).

This again shows that even the most innovative firms cannot only rely on their internal sources alone. While, this has created many arguments in the field of open innovation with most of the studies pointing at its benefits in providing external know-how, ideas and suggestions in combining both internal and external information towards increasing productivity (Cassiman & Veugelers, 2006). Based on these, the National Innovation Survey (NIS-6) of Malaysia was carried out with the aim of identifying the innovation co-operation activities of small, medium and large companies in the country. This study, therefore, extends past researches on the effect of innovation cooperation among firm's external partners in Malaysia by analysing how the partners significantly impact on the firm's performance.

The choice of a firm for a suitable partner is crucial. However, the significant difference in the type of partners selected can determine how the collaboration is managed and what kind of innovation can be achieved (Whitley, 2002). The specific characteristics and objectives of each type of partner lead to expectant difference partners will bring as well. This in mind, also enable decisions to be made to pool resources together with other organisations considering the risks level against results expected (Nietoa & Santamarı´a, 2007).

Thus, since firms engage in collaboration activities with external partners because it allows utilisation of external resources for their purposes either in direct form or in a systematic way (Becker & Dietz, 2004). This is why the collaboration is sought to be more efficient and fruitful having partners with resources to complement important innovation sought. Similarly, the ills in lack of cooperation can be caused by transaction costs deficiencies especially in coordinating, managing and controlling the activities of the different parties involved.

The impact cooperation has on different types of innovation output in either a product, process, services and marketing innovations has thus, not been analysed yet. This makes it even more interesting to go further and analyse the relationship between the type of partner and different types of innovations (product, service, process, and marketing). This seems plausibly reasonable to hypothesise that firms that collaborate and have access to information from partners will be in a better position to achieve more different types of innovations.

The main contributions of this paper lie in three areas. First, is in the use of different measures to determine innovation cooperation of the firms in contrast to previous work that mostly emphasised only differentiating between product and service innovation (Fitjara & Rodríguez-Pose, 2013). Extending it, this paper distinguishes between four types of innovation i.e. product, service, process and marketing innovation introduced over the last three years. This explains the classification of four types of innovation that affect different patterns of collaboration at the level of the firm in Malaysia. The classification in turn allows for ma uch greater explanation of how different forms of firm partnerships may affect different types of innovation. Secondly, attention was paid to ma ost neglected dimension of the different partner cooperation and how their activities influence innovation.

The impact of partner's interaction is frequently conducted though at different scales and geography which also significantly affect the capacity of firms to produce innovation. Our study, therefore, therefore distinguishes between interactions considering their locality or region and those that are conducted with partners located in abroad. Thirdly, this study also applies the analysis to ba road sample of firms across different industries in Malaysia. Specifically, using a tailored survey designed for this research. By contrast, prior studies that have been conducted in developed countries in this direction will enhance the understanding of cooperation and collaboration with external partners developing and emerging nations.

The rest part of this paper is structured into five further sections. Starting with this part which is the introduction, the theoretical section follows this introduction examining the role and sources of knowledge for innovation briefly, focusing on innovation cooperation with different partners. Next, we present the method describing the study data in the third section. Following this section is the results of empirical analysis linking types of a partner with innovation outcomes. The next section deals with the discussion on the dimensions of the kind of partnership as related to innovation. Conclusions and some indications for future research were presented at last concluding this study.

2. LITERATURE REVIEW

2.1 Innovation Co-operation

In the past, studies have explained co-operation to be e an important strategic tool for their success (Hoang & Rothaermel, 2005). Innovation activities, networks and alliances are the primary sources through which these can be attained (Von Hippel, 1988). The consensus among explanation to this indicates that joint R&D effort with well-organised networks enhances the innovation activities of co-operation among partner's, which also ultimately increases the creation of new products (Vonortas, 1997). Consequently, firms' innovation inputs depend on partners providing resources and technological capabilities they lack to maximise firm value by combining partners' resources to exploit difficulties faced (Kogut, 1988). This also concurs with what several studies also found in independent researches related to the relationship between collaboration and innovation performance (Miotti & Sachwald, 2003; Faems et al., 2005; Nietoa & Santamarı´a, 2010).

Most resources provided through R&D collaborations indicates positive effect support on innovation performance (Becker & Dietz, 2004; Un et al., 2010). As such, making alliances using partner's supply of knowledge to the firm helps to increase the chance of innovation success (Wassmer & Dussauge, 2011). Research has thus, provide evidence to indicates collaboration showing positive influence innovation outcomes in both incremental and radical form (Miotti & Sachwald, 2003; Belderbos et al, 2004b; Faems et al., 2005; Un et al, 2010) with specific partner exerting different impacts on firm's innovation performance (Nieto & Santamarı´a, 2010).

Further studies have also indicated that vertical collaboration does influence timing, novelty and innovation types. With regards to innovation types, Fritsch & Lukas (2001) studies conducted in Germany observed collaboration with suppliers was found more likely to improve firm processes emphasising that customer's co-operation actively leads to product innovation. Extending this to a similar study, Miotti & Sachwald (2003) found how customers and suppliers significant impact both on product and process innovations considering firms in French-speaking countries.

Generally, the establishment of network relationships offer important mutual learning not just to the internal sources but relates to other types of relationships firm has established with other organisational actors. This because network relationships breed

mutual understanding among partners to ease the generation of new ideas and their absorption (Harryson, 2008). Increasing network and co-development among partners also offer firms the access to other complementary innovation, assets and operational activities of manufacturing, marketing and channels sources needed (Christensen et al., 2005; van de Meer, 2007; Teece, 2006; Vanhaverbeke & Cloodt, 2006). Supporting the previous arguments, ideas created through a collaborative innovation setting can be more exploited easily to access needed knowledge to build network partners in facilitating the generation of new valuable ideas and for absorption.

2.2 Co-operation with suppliers

Usually, supplier management practices are built on governance models which focus mostly on outsourcing and cost reduction (Dyer et al., 1998). The main essence of the model was to reduce dependency on suppliers. However, recently have indicated that suppliers are seen as an important innovation partner that should be actively involved when searching for new ideas (Enkel & Gassmann, 2007). While, this implies that supplier interaction effort requires interactions that go beyond traditional based supplier management (Dyer & Nobeoka, 2000), it results into bringing benefits of specialised expertise to be involved in new product development.

Tsai, (2009) further asserts that these can provide ideas for improved technological solutions or process innovations. Thus, ideas are usually somewhat exploitative and close to the technological trajectory of the firm's industry rather than explorative. Based on these, supplier's main area of concentration is on solutions and commercial value in the short-term (Chesbrough & Prencipe, 2008). This ideal situation based on ideas might help firms to positively impact their success in launching several forms of innovations.

Studies have no doubt affirm that suppliers are valuable sources of information to develop or improve products particular, considering collaboration with suppliers to enable firms to reduce the risks and lead times in the product development process, enhancing flexibility, improvement on product quality, and enhancing market adaptability (Chung & Kim, 2003; Nietoa & Santamarı´a, 2010). The need to manage relationships of suppliers for innovation purposes thus becomes challenging, which requires firms to motivate suppliers in other to prevent them from poor management risk and hostile moves (Dyer et al., 1998).

H1: There is positive significant relationship of co-operation with suppliers concerning types of innovation to enhance SML performance.

2.3 Co-operation with clients or customers

The need for effective cooperation with clients and customers allows a firm to gain considerable knowledge of new and existing technology, markets and process improvements made (Whitley, 2002). The impact of these has a very much significant impact on both products/services in process innovation (Miotti & Sachwald, 2003). As such, the more customers at early stages of product development, more novel the design, and the more critical such linkages become and necessary (Liker et al., 1999; Meyers & Athaide, 1991).

Recent studies have also claimed that interaction with customers will ultimately increase how they fit the market in helping firms to become better and to understand the value to create for the customer (Bilgram, Brem & Voigt, 2008; von Hippel & von Krogh, 2006). For example, a significant benefit associated with this kind of interactions enable ease of access to important information on user needs, user context and user experiences.

Additionally, the benefits provided by customers and users as sources of information suggest that firms could use them more frequently when the innovations that are under development presents some higher form or degree of novelty (Amara & Landry, 2005). Similarly, Tether (2002) underscoring these, concludes that collaboration with customers could be beneficial when aim to develop novel or complex innovations.

H2: There is a significant positive relationship of co-operation with client and customers concerning types of innovation to enhance SML performance.

2.4 Co-operation with competitors

Studies have affirmed that the need for collaboration with competitors mostly based on the necessity to carry out basic research and establish standards (Tether, 2002; Bayona et al., 2001). With this, firms are likely perceived to engage with competitors when the need to share common problems usually emanates outside the competitor's area of influence (Tether, 2002). Also, studies have shown that competitive research programs have also provided grounds for working with competitors (Tidd & Trewhella, 1997; Dussauge & Garrette, 1998). This tendency has made (Bayona et al., 2003) argued, saying this type of collaboration does not seem to be most appropriate a mechanism to use in achieving product innovation. Here, we must reminisce over problems caused based on information leakage and the risk of proffering greater competitive solutions.

Notwithstanding these limitations, collaboration in this form is still and mostly leave some advantages. This usually is in the form of firm cooperation with its competitors in jointly proffering solution to common problems (Tether, 2002). Partnerships, therefore, become the fuel that also enables firm's to ascertain its competitors' technological strength to improve its technological and other strategy to innovate (Tsai, 2009). Thus, the benefits collaboration accords in terms of basic research and standards provides helps in solving solving of common problems that are marginal in relation to the costs of disseminating information to competitors (Miotti & Sachwald, 2003; Monjon & Waelbroeck, 2003; Belderbos *et al*., 2004b; Nieto & Santamarı́a, 2010).

H3: - There is positive significant relationship of co-operation with competitors and other companies in the industry concerning types of innovation to enhance SML performance

2.5 Co-operation with universities or research institutions

In recent time, industrial firms have started to take more active role getting to involve in scientific activities which recognised them in the form of industry-university collaboration (Harryson et al., 2008; Leydesdorff & Meyer, 2006). This, while very important increase learning of small and most high-tech firms to often get their ideas commercialised (Fabrizio, 2006; Laursen & Salter, 2004; Harryson et al., 2008).

Many universities and research institutes do not only traditionally focus on filling out the innovation processes of firms, but also provide new scientific and technological knowledge (Drejer & Jørgensen, 2005). This new wave of thinking has changed, and improved universities and research institute collaborations that before operating some worth differently and under considerable pressure. Amidst all these, governments encouragement of institutions to undertake more research directed at boosting the competitiveness of industry has also paved way more for this kind of collaboration to exist (Tether, 2002).

Similarly, funding needs and pressure also further exacerbate the pushed encouraging

more collaboration with industry (Gibbons et al., 1994). Achieving sought objective requires scientific knowledge rather than local and exploitative search. This indicates a high need for a theoretical understanding of the underlying properties of technological components may facilitate effective search (Fleming & Sorenson, 2004). With this, universities and research organisations are to be known for providing support to develop new technological knowledge, and the search for breakthrough ideas.

Studies have documented the important role universities, and other research institutions play on innovation (Bozeman, 2000; Vuola & Hameri, 2006). Most of them, however, is consistent with what (Belderbos et al., 2004b) highlighted interpreting that collaboration with research organisations as the most effective way to achieve innovations intended towards open new markets and segments. Mentioning however, that there some form of barriers associated with collaboration with university-industry relationships such as lack of resources, cultural differences, long-term oriented scientific research versus exploitation oriented research of industrial organizations, incompatible rewards systems, and risk related issues to obtaining control over university inventions through intellectual property rights (Harryson et al., 2008). Considering above, arrogating financial value to ideas does not seem feasible in the short-term or mid-term because firms need to build up internal knowledge with their partners to understand and learn more (Fabrizio, 2006;).

H4: - There is a positive significant relationship of co-operation with universities and research institutions concerning types of innovation to enhance SML performance.

2.6 Co-operation with professionals or specialists

The need for specialised knowledge in the form of knowledge providers such as consultancies, private research institutes and government research laboratories are becoming enormously important. Most firms engaged in this form of co-operative arrangement to obtain informal information sources. Tethera and Tajar (2008) studies found that amongst other factors yield specialised information from knowledge providers is mostly by engaging firms with more open approaches to innovations.

Overall, it is a belief that the use of specialist knowledge can be seen to only complement firms own internal innovation activities and also to complement external sources of knowledge acquisitions. Some prior studies in these area that have attracted considerable interest to industry-university linkages such as studies by (Santoro and Chakrabarti, 2002; Lambert, 2003; Mowery and Sampat, 2005) indicates the extent of interest these links have based on some number of reasons including the growing concern of academic research to become relevant and accessible to industry.

Analysing the industry-university links show that they complement other sources of specialist knowledge, such as consultancies and private research institutes studies (Muller and Zenker, 2001; Bettencourt et al., 2002; Czarnitzki and Speilkamp, 2003). Upon all these, little appears to be known about firm's sources of knowledge, and whether the sources sought are fundamentally similar or different from those of universities and research institution form of knowledge for innovation (Tethera & Tajar, 2008). This also indicates an unclear position of professional having impact on different types of innovation output of the firms.

H5: - There is a positive significant relationship of co-operation with professionals or specialists concerning types of innovation to enhance SML performance.

3. METHODOLOGY

This study uses the National Innovation Survey (NIS-6) data set in addition to reports from European Community Innovation Survey (CIS) to explore innovation cooperation. The survey was performed based on the OECD and Oslo Manual of 2005 guidelines for collecting and interpreting technological innovation data. The survey relates to innovation activities providing data for measuring participation in commercialising innovations for a broad range of industries in Malaysia.

The reliability and validity of the NIS survey were established by extensive piloting and pre-testing before implementation within different states in Malaysia and amongst firms cutting across small, medium and large (SML) from manufacturing and services industrial sectors. Based on the total population covered in the survey, the response rate is 38% (N=2,006) which consist of 84% (N=1,682) usable data responses collected and 16% (N=324) non-usable data which were collected using methods such as: postal; fax; email; telephone interview; seminar; online; and interview methods. Furthermore, the data was subjected to meeting inclusion criteria, and around 30% amounting to 828 of the firms report no innovation activities (non-innovative) performed at all. This leaves us with about 70% which indicates one form or the other innovation activities they performed in 1178 and which met the criteria for inclusion and data analysed in this study.

To test identified hypotheses, the study examined the impact of each hypothesis on the firms' innovative performance as the dependent variable of the study. The measurement of innovation performance employed was based on the four different innovation types according to the Oslo Manual, 2005 (product innovation, services innovation, process innovation, and marketing innovation). The responses were coded into dichotomous variables with a value of zero (0) if no such innovation had occurred, and one (1) if it had happened. Similarly, co-operation of partners was used as an independent variable in the study.

Furthermore, the control variable was used in this study to determine the effects of firm age, size and industry sector for each business covered. The age of the firm was employed amidst its common usage in empirical research to measure firm experience and learning based on the number of years' the firm was founded. Firm size (Size) was also measured by the number of persons working for the business. The responses to this question were coded as categorical variable as one, two, and three scales based on the small, medium, and large (SML) companies covered. Finally, the industry sector was denoted using a dummy variable with the value of one 1 if the business is in the manufacturing industry and zero (0) if in the services sector.

4. RESULTS & DISCUSSIONS

Table 1 presents the characteristics of the dataset based on the industry sector, size, and ownership types. Among the industry examined, the services sector shows the highest representation from the dataset having a total of 733 companies while manufacturing has a total of 445 companies. On the examination of the size of firms, 38% of the sample were small companies followed by medium and large companies with 36% and 26%, respectively. For ownership type, 90% of the sample is fully Malaysian owned, and only 35% of the companies are fully foreign-owned, and the rest of companies' majority or minority have local or foreign ownership representations.

Finally, on the issue of the highest innovative companies based on types of ownership, private limited (Sdn. Bhd.) companies recorded 63.6% while, sole proprietorship firms with 23.6% and public limited (Sdn. Bhd.) companies with 7%. On the other hand, the companies that have the lowest forms of innovative companies were

partnership businesses with 5.8% as presented below.

Table 1. Descriptive data on the firms included in the sample

SECTOR	N	% of the sample	% of population	**SIZE**	N	% of the sample	% of population
Manufacturing	445	38	8.5	Large	308	26	6
Services	733	62	14	Medium	420	36	8
				Small	450	38	9
OWNERSHIP				**TYPE OF OWNERSHIP**			
Fully foreign-owned	35	3		Sole Proprietorship	278	23.6	
Majority foreign owned	18	1.6		Private Limited (Sdn Bhd)	749	63.6	
Majority Malaysian owned	63	6.4		Public Limited (Bhd.)	83	7	
Fully Malaysian owned	1062	90		Partnership	68	5.8	
Majority Malaysian owned	60	5					
Partly regionally owned	21	2					

Table 2 shows the percentage of share of firm's innovations surveyed. The findings show that majority of various types of innovation developed by the companies which represent most of the developed innovations were in either closed or traditional ecosystem of innovation with product innovation 39% of the total, service innovation with 44% while, process and marketing with 57% and 89% respectively. Similarly, for innovations developed by the innovative companies, Malaysian companies' hit 48% in product innovation with nil for service innovation. However, for process and marketing innovations, the datasets show 41% and 35% respectively.

Further examination on the cooperation with other companies shows how moderately important they are for the development of new products, processes and marketing in Malaysian. On this, 12% of innovative firms reported having cooperation with others in the development of new products, 16% in the development of new or significantly improved processes and 10% regarding marketing. Furthermore, for an innovation developed by other companies, 4% had introduced products developed mainly by others (open innovation ecosystem), with the equivalent figure for process and marketing innovation being 6% and 3% respectively.

Table 2: Innovations developed in the last 3 years based on % of surveyed companies

	Product	Service	Process	Marketing
Type of innovation: (% of all companies)				
Total innovation	39(0.01)	44(0.01)	57(0.01)	89(0.09)
N	1178	1178	1178	1178
Innovations were developed. . . (% of innovative companies)				
Mainly by our company	48(0.14)	_	41(0.01)	35(0.01)
In cooperation with other companies or organisations	12(0.09)	_	16(0.01)	10(0.08)
Mainly by other companies or organisations	4(0.05)	_	6(0.06)	3(0.05)

The first number in each cell denotes the percentage share, with the standard error listed in parentheses.

Table 3 of the study also examines whether cooperation with the partner could improve the likelihood of developing innovations and whether different types of partners are conducive to different types of innovations. In addressing this, we fit logistic regression models for each of the four types of innovation outcomes. The results of the logistic regression analyses for each of the four innovation outcomes models have been tested for multicollinearity and non-linearity of the linear predictor for significant outliers. Findings

show no significant violation of assumptions was found. The findings show that different types of partnerships are related to different types of innovation in different ways, but not always necessarily in the direction predicted by prevailing theories.

Table 3: Logic regression estimation of an empirical model for cooperation with partners within and outside the region

	Product innovation		**Services innovation**		**Process innovation**		**Marketing innovation**	
	Regional	Non-Regional	Regional	Non-Regional	Regional	Non-Regional	Regional	Non-Regional
Partner Types								
Suppliers	0.641*	0.382	-0.054	0.121	0.394	0.28	-0.536	-0.355
	(0.26)	(0.27)	(0.26)	(0.27)	(0.31)	(0.31)	(0.36)	(0.40)
Customers	-0.563*	0.385	0.612*	0.222	0.274	1.837***	-0.428	-0.45
	(0.28)	(0.28)	(0.26)	(0.27)	(0.30)	(0.37)	(0.35)	(0.42)
Competitors	-0.35	-0.555	-0.144	0.747*	0.868*	0.055	0.447	1.2**
	(0.34)	(0.33)	(0.31)	(0.32)	(0.39)	(0.41)	(0.50)	(0.59)
Consultants	0.069	0.905*	0.606	0.771*	0.253	1.588**	0.281*	1.513***
	(0.34)	(0.32)	(0.32)	(0.31)	(0.39)	(0.45)	(0.50)	(0.40)
Commercial	0.832**	1.147*	0.115	-0.133	-0.772*	0.434	1.227*	0.639
laboratories	(0.31)	(0.42)	(0.30)	(0.40)	(0.37)	(0.56)	(0.43)	(0.74)
Universities	1.095***	-0.469	-0.295	0.151	1.056*	-0.022	1.268*	-0.704
	(0.29)	(0.47)	(0.29)	(0.46)	(0.36)	(0.66)	(0.37)	(0.70)
Public research	-0.125	0.458	0.233	1.062*	0.476	0.209	0.296	-0.25
institutes	(0.27)	(0.53)	(0.25)	(0.52)	(0.32)	(0.71)	(0.37)	(0.71)
Constant	-0.57	-0.635	-0.321	-0.391	0.008	0.025	2.229	2.066
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.10)	(0.10)
Pseudo R2	0.049	0.054	0.02	0.034	0.079	0.096	0.03	0.023
Control Variable								
Age	-0.124 (0.06)		-0.055 (0.06)		-0.086 (0.06)		-0.061 (0.09)	
Size	-0.135 (0.08)		-0.164* (0.07)		-0.044 (0.08)		0.17 (0.12)	
Sector	-1.547 (0.136)		-0.062 (0.12)		-1.364*** (0.14)		0.614** (0.19)	
N	1178		1178		1178		1178	

Note: The first number in each cell denotes the coefficient, with the standard error listed in parentheses.
* P < 0.05.
** P < 0.01.
*** P < 0.001.

5. CONCLUSION & RECOMMENDATIONS

The study shows that for innovations to ever succeed, there is need to co-operate and collaborate to gain competitive advantage. The survey indicates an active co-operation and collaborations presence of innovations with and among partners in the SML sectors. However, the most engaged co-operation observed in this study was in the form of client/customer's co-operation relationships. Following this, is the suppliers of equipment for innovation, materials, and other necessary component which is often needed by manufacturing firms. In the same vein, the service firms as well show that in the form of software which was ranked most importantly in addition to inducing co-operation and collaborations. Conclusively, the study shows that emphasis is placed on co-operation during the performance of innovation thus indicates different focus and needs across the sectors of the companies with manufacturing companies' requiring more importance attached to them than the service sector.

The study recommends that the government should devise a means to encourage more co-operation and collaboration in R&D between the SML business sector with a view of linking them to research institutions/agencies and universities. This kind of co-operation will synergise scientific and technological knowledge of research institutions specifically with universities and industries that are enterprising and innovative in business. It will ultimately mean more innovative, relevant and user-friendly products that will meet users'

requirements and also enhance the successful commercialisation of innovative products. The study draws the following recommendations for future action and plan: -

1. The government should be at the forefront taking the initiative in leading collaborations with industries and research institutions across all sectors, and sizes of (SML).
2. To make co-operation and collaboration as a condition for SML to be granted loans, research grants and other aids.
3. To create innovative and enterprise awards for innovations that were the output of effective co-operation and collaborations.
4. To encouraged industries, public research institutions and universities to proactively seek collaboration with SML across all sector; and
5. To provide financial incentives including tax holidays/relief for SML companies involved in co-operation and collaboration.

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