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Designing Interventions in Dealing with Issues Confronting the Cultivation of Research Culture in Malaysian Universities

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ABSTRACT

Higher Education sector is one of key contributors for a country's advancement, mandated to play strategic roles in training workforce, generate new knowledge and nurture innovation. Higher learning institutions or universities are instrumental in solving societal problems, and driving transformation in the society. Despite the available resources for academics to conduct research, there exist various challenges that disrupt the research culture in universities. This paper discusses issues confronting Malaysian academics on research and development (R&D) activities, and recommends specific interventions to improve R&D activities in Malaysian universities. The discussion is expected to enlighten higher education authority of issues that require attention, and in turn steer the direction of universities on R&D agenda.

Introduction

In many countries, higher education (HE) sector has been mandated to play significant roles to help the society in responding to the increasingly challenging economic and social milieus. In this regard, universities are entrusted to play a number of roles in developing individuals to become competent workforce (IUPsyc & United Nations, 1998; Ministry of Education, 2015); and producing good citizen (Govt. of Botswana, 2007). The other core role of HE is to drive the advancement of social growth and economic prosperity through research and development (R&D) activities. Such direction would substantiate the mandate of becoming an agent of growth for a country.

R&D refers to the effort that involve researchers' expertise to solve problems, obtain new knowledge, develop new skills, create new technology, invent new products, design new services, or formulate new systems that support economic progress or substantiate social advancement. R&D blends both basic and applied research in virtually all discipline of knowledge including science and technology; social sciences; as well as humanities (Djellal, Francoz, Gallouj, Gallouj, Jacquin, 2003). It also involves research agencies, funding bodies, and universities to coordinate systematic effort to support the activities.

The country's R&D system could be strengthened with the support of research-intensive universities which are frontliners in the efforts to produce, reproduce, preserve, systematise, organise and transmit knowledge for the society (Lucchesi, 2004). Academics must serve the community by conducting research which would develop and improve their quality of life (Nowotny, 2003). This is the case because most of scientists and researchers who are capable of generating knowledge, or creating innovation are employed in HE sector (Regel, Salmi, Watkins, Tan, Dawkins, Saroyan, & Vestergaard, 2007).

In Malaysia, Education system has been designed to support the attainment of Government's aspirations, like the 10th Malaysia Plan. The Government of Malaysia has introduced essential measures under the New Economic Model, Economic Transformation Plan and Government Transformation Plan to position Malaysia as a developed country. The Government has, since the Eighth Malaysia Plan, emphasised the development of innovation as well as market-driven R&D projects. It also stresses the need for multi-disciplinary and multi-institutional R&D efforts.

The initiatives in R&D agenda entails fundamental or basic research; applied research, product research or product development. These initiative warrant for the involvement of academics who could contribute their expertise to develop scientific breakthrough, apply knowledge on specific purposes. They could also develop long-term solutions that contribute to social well-being and economic growth (Wan, 2015).

This paper discusses the R&D agenda in Malaysia; and highlights issues confronting academics in Malaysian universities. The information is deemed essential so as to highlight the strengths, weaknesses, opportunities, and threats confronting the efforts to cultivate research culture in Malaysian universities. The information gathered in this report has been sourced from existing literature (reports, and past research) which documents data on research-related matters in Malaysia. The findings would be used to inform the development of interventions that address the identified issues. The findings and suggested interventions are expected to provide HE policy makers a better understanding of the issues; and possible interventions to change, improve, and develop strong R&D agenda at universities in Malaysia.

Source of Information

The information provided in this section is sourced from secondary data. The information and data reported in this article utilizes available literature and policy documents on higher education plans with regard to research activities at higher learning institutions in Malaysia.

Research and Development Agenda in Malaysia

Malaysia envisions becoming a high-income nation, characterized by an inclusive and sustainable economy; supported by a progressive and forward-looking society; and sustained by scientific and innovative workforce (Olsson, 2012). The importance of strong R&D agenda in Malaysia is justified based on, but not limited to, the following conditions:

- a. The need for fundamental scientific research which can contribute to the development of new knowledge; address or solve issues concerning social, economic, environmental, technological and other areas. There are also needs for more applied and multidisciplinary research, including social science aspects the findings of which are important to inform policy-makers in various areas (Padfield, Waldron, Drew, Papargyropoulou, Kumaran, Page, & Zakaria, 2015). Research findings could provide justified direction to policy makers or professionals on the proper ways to do innovation and intervention.
- b. The need to get rid of, or minimize, the disconnect between research and its application. Research output needs to be better communicated to relevant stakeholders so that the investment made on research are not wasted, and that the findings could be used for the benefit of the society.
- c. The call to empower universities and make them more financially independent through R&D activities, through which universities can generate their own income (Ahmad & Farley, 2014). New innovative products produced by universities could be commercialized and in turn contribute to additional sources of revenue income.

In substantiating the national development agenda, the Government of Malaysia has introduced

various strategic plans since late 1980s. The main aim of the plans is to enhance the national capacities for research and innovation (Olsson, 2012). Among the strategies in the plans include

- a. Harnessing and advancing research in science and technology in order to increase innovations that support knowledge-based economy (Ramli et al, 2013). This also involves strategies to increase the quantity and quality of researchers; research; and postgraduate students.
- b. Valorizing universities' function in order to achieve higher-ranking position among established universities in the world (Rahman, 2016). The efforts include the establishment of five research universities (RU), emulating the initiatives in South Korea and Singapore; and acculturation of R&D activities among academics in all universities including comprehensive universities (CU) and focused universities (FU). Various schemes have been introduced to drive them to conduct breakthrough research, create impactful innovation, and commercialize their research output.
- a. Increasing the number of Researchers, Scientists, and Engineers (RSE) by increasing the intake of postgraduate and postdoctoral students, from local and international community (Ramli, 2013); recruiting international scholars to join Malaysian universities; and training local talents to join academia, or retaining existing academics in the academia after their retirement. Agencies or Schemes which support the University-Industry Collaboration has been set up, such as the Malaysian Technology Development Corporation, the Government High Technology, and the Intensification of Research in Priority Areas Grant (Salleh & Omar, 2013).
- c. Increasing the capacity for research, development, innovations, and commercialization activities by establishing solid centers of excellence. The National Policies on R&D has set a policy to harvest traditional knowledge, enhance natural endowments and promote inclusive innovations as strategies and mechanism to promote research and innovation (Olsson, 2012). It also encourages industries to collaborate with HE institutions in conducting R&D projects (Wan, 2015).
- d. Allocating adequate fund to research activities for R&D. The National Policies on Research and Innovation (R&I) has made it a priority to provide adequate funding for R&D in science and technology (Olsson, 2012). The Government has allocated certain percentage of the country's annual budget for R&D, such as in the case of allocating RM600 million in the Budget 2013 to Research Universities (Amran, Rahman, Salleh, Ahmad & Haron, 2014). The governments adopts performance-based funding, in that the allocation of fund for university is based on its R&D performance (Ahmad & Farley 2014).
- e. Mobilizing financial support from public and private sectors to assist universities in funding research projects (to carry out research-related daily operations, hire academic and non-academic staff, acquire advanced technology equipment and infrastructure). The National Science and Research Council (NSRC) has been tasked to coordinate publicly funded R&D schemes so that research efforts are aligned with national priorities. There are various schemes which have driven R&D excellence in Malaysia, provided by various agencies which include; Ministry of International Trade; Ministry of Agriculture; Ministry of Communication and Multi Media; Ministry or Education; Ministry of Higher Education; and other ministries (Wan, 2015; Mohd Nor, 2012). Among the grants are
 - i. The Science Fund by the Ministry of Science, Technology and Innovation (MOSTI), aims at supporting R&D projects (applied research) which have the potential for the discovery of new ideas and advancement of knowledge in applied sciences. It also

supports the innovation of products or processes for further development and commercialisation. The grant is open to academics in public or private universities; and research institutes (Wan, 2015).

- ii. The Technofund by MOSTI aims at stimulating the growth of Malaysian R&D and its commercialisation. It provides funding for technology development, up to pre-commercialisation stage which in turn, creates new businesses and generates economic wealth for the nation (Wan, 2015). The grant is open to academics in public and private universities; research institutes; and any Science, Technology and Innovation (STI) Agencies.
- iii. The Fundamental Research Grant Scheme (FRGS) aims to promote basic research which could generate knowledge that can contribute to the development of scholarship among academics, development of theories, and creation of new technologies in universities.
- iv. The Exploratory Research Grant Scheme (ERGS) aims at supporting research which would lead to the innovation of products or work processes as well as their commercialization.
- v. The Long Term Research Grant Scheme (LTRGS) drives researchers to participate in multi-disciplinary and multi-institutional projects. The output are expected to boost the publication of findings in reputable journal; increase the registration of intellectual properties; and extend collaborations among prominent research groups all over the world.
- vi. The Knowledge Transfer Partnership (KTP) grant aims at facilitating the transfer of expertise and research findings to the community and industries. This is accomplished through innovative projects jointly undertaken by academics and their business partners from industries.
- vii. The Prototype Research Grant Scheme (PRGS) facilitates the commercialization of research discoveries so as to produce new technological invention. This fund supports product generation prior to commercialization, giving ample resources for researchers to conduct follow up or longitudinal study (Navaratnam, 2102).

Issues on Research and Development Activities at Universities in Malaysia.

Although there are various opportunities for academics to participate in the R&D activities, there are several challenges confronting Malaysian public universities. A review of literature on research activities in Malaysia leads to the identification of the following issues.

Multiple Foci of University Commitment

A university has a number of functions to play in a society. The functions are cascaded to university's community especially academic members whose job description consists of several core activities (e.g. teaching and learning; research; publication; consultancy/community services). Teaching and learning are regarded as university's main function as it is linked to the development of workforce. R&D are regarded as critical functions as findings generated by research will be used to support innovation or solve societal problems. Academics too are required to disseminate knowledge through publications

of journal articles, books, etc. They too are expected to conduct community services for the society outside the university. It has been found that the activities are not supportive of each other. For instance, academics' research and their community services are most of the time disconnected. An academic who conducts research in engineering might not apply the knowledge of engineering in the community service projects he/she participates. He/She might not share the research findings in his lecture .

While the focus of universities are multi-folds, academics feel that they are being bogged down with the teaching-related tasks. Ramli, Zainol, Aziz, Ali, Hassim, Hussein, and Yaakob (2013) reported that academics are being burdened much by massive teaching workload due to the high intake of undergraduate students. Besides, they have to undertake certain pedagogical approaches which require them to deal with time-consuming preparation and documentation. At the same time, they face the pressure to undertake research and publication tasks. The heavy workload caused by the teaching-related tasks has been regarded as a challenge that hinders their involvement in R&D activities (Altbach, 2003). Academics reported much time has been spent on lecturing, supervising students, and marking assignments, leaving them with less time to participate in research and publication. The passion towards research has not been high among many academics for many of them do not regard research as responsibility toward knowledge but a job requirement (Shukran, Haniza, & Danial, 2017).

It was found that some public universities have not aligned their function according to their classification. For instance, in line with the research-intensive orientation, RUs are expected to offer more places for postgraduate students compared to FUs and CUs. The presence of huge number of postgraduate students in RUs is expected to contribute in enhancing their achievement in R&D activities. Nevertheless, instead of focusing on postgraduate programmes, some RUs continue to increase the number of undergraduate intake, impacting their own mission to admit more research students and thwarting the effort in intensifying R&D activities (Shukran et al., 2017). It also disrupts the pattern of undergraduate student intake in FUs and CUs for many university-going students prefer admission into the RUs due to the fame they carry in the society.

One of university function is to support the development of the nation. It has been reported by many that university play the roles of research and innovation to be taken up by a country in which it is located. Many academics tend to conduct research which are in tandem with their subject specialization. Focussing on discipline-centric research rather than society-based research only research output which contribute to knowledge expansion but might not be applicable to the context in that it does not address specific local issues or solve certain problems.

Despite the different institutional focus, academics in the three types of universities are required to conduct cutting-edge research though the funding provided to those in CUs and FUs are less than that of the RUs (Ahmad & Farley, 2013). Academics found that their research performance is determined by their institutions due to certain institutional time frame instead of the academics' own pace. They are to apply for research grant which will be rewarded with certain weightage of score, depending on the amount of fund received by researchers. In this regard, academics are pressured to spend more time or give all of their resource to complete and write research report in journal. At the same time, academics are required to teach, publish, do community services, and generate income for the university. Despite the much time spent on accomplishing teaching-related tasks, the main focus of academics' performance appraisal has been placed on their R&D and publication activities. This scenario reflects the disparity between the main job performance of academics and their performance criteria, causing low level of job satisfaction among many academics.

It is also reported that despite their readiness to be active in R&D, many academics lament that they

have to sideline or abandon writing research report or journal article due to other work demands such as attending meetings, working on paper work (to prepare course outlines, report of curriculum development/revision), and becoming participants to university programmes. Many claim to heavily juggle between family commitment and taxing academic activities. The latter require them to be reading up-to-date literature, writing research reports/book or referred journals, supervising research students, managing research grant, teaching/ supervising huge number of students and accomplishing other non-academic related activities. The enormity of their academic responsibilities has made most of them accomplishing these tasks outside their official work hours, at the expenses of their quality and family time at home.

Issues with Research Funding

The Government of Malaysia allocates huge amount of fund to promote R&D-related activities especially in the five RUs. Though it was reported that the government expenditure on R&D has been steadily increasing since the year 2000, the latest record of spending was only 1.13% of GDP (MASTIC, 2015). The economic downturn suffered by the country has caused the Government to cut university operating budgets, hence affecting the performance of RUs which have to introduce drastic curtailment in R&D activities. Given the non-RUs too need more funding to develop R&D infrastructure, the budget slash has made it difficult for many academics to secure government research grants. This circumstance has affected the performance of R&D in science and medical areas; or reduced funding for social science research. It also impedes universities' R&D related expenditure (research seminars, conferences, purchase of books and journals for libraries). Academics who receive inadequate funding found it difficult to carry out research, produce new innovations or commercialise their R&D output (Shukran et al., 2017). Another critical implication of the budget cut is the non-renewal of contracted research professors (Else, 2017), causing good academics to leave the country despite the fact that their talents and abilities are still needed in the effort to making Malaysian universities competitive institutions.

Shortfall of Competent Academics

Few years back, Malaysia has proven to house a good extent of academic output as evidenced by the publication of 47,000 articles on Elsevier in 2014, a number which has surpassed Singapore and Thailand in publication output (Augustin, 2017). In the years 2014-2015, six university professors from UM, USM and UKM were recognized by Thomson Reuters as World's Most Influential Scientific Minds (Augustin, 2017). Despite this achievement, the country is still behind in having adequate number of RSEs to match Singapore in terms of GERD (Gross Expenditure on Research and Development). The huge volume of scientific journal articles has not directly shown its impact on the advancement of the country. It was reported that the country has managed to commercialize only 3.5% of total research outcome (international average 10%) (Ramli et al., 2013). This suggests that Malaysia's innovation hotspot is still lacking, and its local universities; research institutes and start-ups are still weak (Ramli et al., 2013). This scenario has posed significant challenges which resulted in low productivity, limited technological capabilities, and limited institutional capabilities for R&D (Olsson, 2012).

For one, the success of R&D initiatives is contingent upon the presence of competent academics. Nevertheless, it has been reported that Malaysia, like other Asian countries, is suffering from shortage of high-quality academics; doctoral students; and the increasing number of ageing professors (ADB, 2012). It was also reported that there is inadequate supply of competent scholars, and weak strategies in human resources development for R&D agenda (e.g. poor succession planning). Though one way to overcome this issue is by bringing academics from other countries, it is difficult for Malaysian universities to provide competitive compensation packages to attract them due to the current economic downturn. It is also not easy to hire overseas academics due to certain civil service regulations and financial framework practiced by the public universities (Salmi, 2009). The presence of experienced academics is critical to spearhead impactful research and transfer of knowledge to junior academics or postgraduate students who work as research assistants. The absence of adequate

research fund will not only impede the conduct of research but the effort to train new researchers and scientists.

Although the quality of universities is indicated by the presence of academics with doctoral qualification, many of them lack latest technology, updated knowledge and industry-relevant expertise (Shukran et al., 2017). In this regard, it is imperative for universities to provide the opportunities for academics to undergo training or retraining so that they are apt with the current needs of university, society or industries, and in turn be able to undertake timely R&D initiatives. The HLI-Industry collaboration has been reported to be less dynamic or inadequate due the lack of entrepreneurial mindset among academics. They do not reach out to industry in order to market their innovation and products. Likewise, the industry also failed to leverage on the capabilities, expertise and research resources available in universities.

Another challenge faced is related to the brain drain issue, caused by the decision of experienced researchers to leave for overseas universities or newer local universities. They sought employment; or have been offered for higher perquisites in the new organisations. If this persists, the target to achieve 50 RSEs per 10,000 workforce will not be achieved.

Less-synergistic Ecosystem

The insufficient funding in universities causes disadvantages to the ecosystem for R&D, characterized by lack of good research infrastructure, the absence of experienced academics, lack of up-to-date publication; inadequate fund to purchase and maintain required research equipment; and other conditions which in turn lead to the lack of research excellence. This disrupts the effort to cultivate positive research culture; and causes difficulties to carry out high impact research output (Aziz, Kamarulzaman Ab, Harris, Hezlin, & Norhashim, Mariati, 2011).

There exist a number of impediments for the cultivation of research culture. In terms of support from university leadership, academics report that many university leaders are unaware of research trends, policy settings and funding options. They have not been trained to take up academic leadership, potentially attributed to the fact that their training has not included the R&D management component. It is also reported that training in R&D is not a prerequisite for top leadership posts in public universities; and that university appears to focus more on teaching rather than research (Olsson, 2012).

For a university to be advanced in research agenda, the supports and commitment by various stakeholders is crucial. It has been found that there is limited involvement of stakeholders, including at the policy formulation level. Many have yet to show recognition on universities as key agencies that spearhead a country's progress (Augustin, 2017). Research findings have not been regarded as fundamentals for innovation or policy decisions, contrary to the commitment shown by the community of researchers. Some of them were of the view that policy-makers only use their research findings to support or justify the policies that they wish to promote (Sirat, & Azman, 2014).

The ecosystem of research appears to be less motivating for some academics for they are not conducted for the appropriate reasons. For instance, research activities are more linked to the demand for more publications, intellectual properties, or commercialization of research products while, to many of them, research activities should be conducted to make genuine and direct socio-economic impacts (Mohd Nor, 2012). Academics are of the view that they should feel free to search for truth and exposition of their findings, for the benefit of relevant stakeholders. The conflicts of interest between institutional direction and academics' interest on certain issues would have bearing on the availability of research funding.

Shukran et al. (2017) raised their concern on the fragmented nature of R&D ecosystem in universities. Researchers face various inhibiting rules, and disconnection between the ideation of research to product commercialization, resulting in the loss of interest in R&D and its commercialization, prolonging duration of R&D and cost overrun. They also reported that some universities do not have strong collaboration with industries or outside agencies. Cheong and Lee (2016) stated that there exist an absence of public-private sector synergy in research and innovation agenda, and the research performance of universities in Malaysia is monitored and 'steered' using certain administrative goals rather than been driven by the need for genuine impacts to the societies. For instance, the publication and citation rates have been made the key measures for international university rankings as used in the QS World University Rankings. This has, to a huge extent, demotivated academics who reported them being pressured to publish in certain type and quantity of publication.

Low Return of Investment in R&D

Academics in Malaysia are of the view that their research activities do not adequately result in significant return of investment to both the academe and community (Shukran et al., 2017). Universities are not focusing on the utilization of R&D output, but more keen to support the strategies in publicising the success completion of certain research output (journal publications, intellectual property and graduation of postgraduates). This condition has not brought much benefit to the real community of stakeholders such as those who are involved in small and medium enterprise (SMEs). Wan (2015) has outlined several concerns registered by the Government of Malaysia with regard to the R&D return of investment. Firstly, the R&D output has not reached good commercialization level attributed to the lack of effort to commercialize R&D output, and lack of entrepreneurship and commercialization expertise. Secondly, there are lack of linkages between researchers and industry, or poor smart partnership between supplier of innovation and demand for R&D output. Thirdly, there is limited market place for researchers to sell; and industry to buy R&D output.

Way Forward: Interventions in Dealing with the Issues Confronting the Cultivation of Research Culture in Malaysian Universities.

The above issues warrant for a thoughtful effort in designing the future of R&D agenda that substantiate the roles of universities in advancing the country's progress. The above discussion outlines various strengths, weakness, opportunities and threats, which can be used to formulate four set of informed interventions that would support the strategies to increase the performance of R&D at universities; as well as their sustainability. By leveraging on the four types of interventions suggested by Cummings and Worley (2009), the author suggests four sets of interventions which include (a) wise development of academics' competencies which befits the human process intervention; (b) judicious approach in academic talent management (human resources intervention); (c) systematic institutional development (techno-structural intervention); and (d) strategic organizational synergy (strategic interventions). The interventions would provide a set of planned actions which are intended to help university in enhancing its effectiveness in R&D agenda. Using the above findings, the researchers outlined some strategies for each type of interventions that universities may adopt in the efforts to improve the R&D agenda.

Development of Academics' Competencies

This intervention focuses on developing the scholarship of academics by enhancing their competencies in conducting and managing R&D. This intervention is expected to create an environment which equips academics to collectively identify issues; resolve conflicts; solve problems and in turn increase their readiness to conduct research and integrate expertise in embarking on R&D initiatives. Through the good interpersonal, intragroup and intergroup relations academics would develop their knowledge and skills in research management (e.g adhering to procedure for grant application, and dealing with logistical requirements); and in turn enhance their performance and achievement on R&D activities.

The intervention, which is interpersonal in nature has the aim to nurture collective team performance (Cumming, 2008). It involves interpersonal and social relation-based relationship among academic members. This interventions support the development of R&D competencies among academics by

- a. Developing their interpersonal, intragroup and intergroup relation among academics of different backgrounds so as to forge good working relationship among them (DeSimone & Werner, 2011). This is expected to empower them in mobilising resources from various levels, from personal backing to institutional supports.
- b. Using formal university communication channels (letter, emails or websites) to make academics aware of policy, practice, opportunities, and other matters on research related activities. This is expected to enhance academics awareness on R&D related development and opportunities.
- c. Providing avenues for academics to have informal consultation, or discussion/brainstorming sessions with colleagues of various disciplines. University can organise activities that inspire academics to embark on relevant R&D activities. Seminar or sharing session (e.g brown-bag-meeting) for academics to present their R&D proposal or findings can create good R&D culture among academics.
- d. Adopting personal coaching approach to enhance researchers' competencies, e.g to update latest invention in research methodology and research management system. Head of Department or Dean of Faculty could formulate a buddy system for senior academics to mentor their juniors in R&D activities.

Academic Talent Management

The presence of highly competent talent is fundamental to explore new areas of research; trigger new innovation; support industrial development; hence in turn promote economic growth and help sustain a nation's competitive advantage. Therefore, sound strategies should be designed to develop and improve the competencies of academics, researchers and scientists so as to create a productive R&D environment. Universities should provide or develop adequate number of top-notch workforce for R&D agenda; develop support for academics in carrying out their activities; or to change the attitudes among academics towards R&D activities. This warrants for university leadership to integrate good human resource practices in order to help universities getting, managing, and retaining academics who will carry out R&D activities (Cummings & Worley, 2009), accomplishable by

- a. Recruiting suitably competent academics who have the desired level of knowledge (e.g doctoral degree), relevant skills, strong academic abilities and desirable characteristics.
- b. Designing and implementing appropriate training and development programs to develop R&D related competencies that would enable academics to become sagacious researchers.
- c. Putting in place motivating goals for academics. This includes having objective job assignment; setting attainable work targets; and implementing attractive reward systems for breakthrough research and exemplary researchers.
- d. Adopting good performance management system. Universities should adopt performance appraisal system/exercise for academics' involvement in R&D activities. Proper weightage should be given to both research output and throughput, being aware that the latter involves much investment of time, energy and other resources made by academics

- e. Having attractive talent-management scheme. Universities must arrange for judicious career planning for academics; and set clear career path for them. Academic career scheme must be revised to include the recruitment of excellent bachelor's and master's degree graduates to join the tutor and lecturer schemes. The absence of such scheme has created vacuum in the academic job scheme at universities.

Institutional Development

This intervention focuses on leveraging on technological innovation and structural changes in order to enhance R&D activities; ensure their effectiveness; develop comfortable and conducive working environment for academics, researchers and scientists; change and improve university structure with regards to the management of R&D agenda. The intervention also aims to put in place a cost-effective R&D process; as well as to address issues that pertain to group activities and structural design which have bearing on the quality of products or efficiency of services.

The intervention could be adopted to develop, change, or revise work design, work procedures, technology, operations, structures and roles of academics/ researchers. It is also to disseminate academic work or research findings to stakeholders (academic, learning and professional community). This could be accomplished by

- a. Providing conducive work environment which nurture academics' well-being and improve their job satisfaction, being aware of their taxing demands which may affect wellbeing and health.
- b. Emphasising the actual job description of academics in that it is not a teaching-only job but consists many work components with knowledge generation being the fundamental. Stated another way, universities must provide a clear job description for academics so that they are fully aware of what are expected of them.
- c. Training of research management officers in order to develop their capacity in managing the logistical or commercialization aspects of R&D activities, giving ways for academics to fully focus on research conceptualisation, data collection, data analyses, interpretation as well as formulating the data-driven interventions on the researched issues. The officers can also be trained to be in charge of the dissemination of research findings, i.e. to communicate the research output through various media for the benefit of many.
- d. Using advanced information-communication technology (ICT) systems to disseminate information on the availability of research funds; facilitate research grant application to funding agencies; monitor research progress and performance; submit budget requisition; and other related activities.
- e. Engaging scholars and experts from various places and disciplines for research collaboration through the use of ICT platform. There are many electronic-media which could be leveraged to connect researchers working on similar area and topics. This intervention promotes the sharing of findings with other scientists through the submission of research articles for peer evaluation and subsequently be published in journal/books.
- f. Setting up a dedicated office structure in the institution to oversee all R&D related issues that involves research conceptualisation, grant application, management, and finding dissemination.

Strategic Organizational Synergy

Operating in an environment which is characterised by increasingly challenging problems and diverse demands, universities are expected to address arising issues or invent products that improve human life. This intervention focuses on the ways a university relates herself with its environment, and integrate the identified issues with relevant knowledge which would eventually be used to design solutions. It also involves the efforts to gather information on the areas that requires the contribution or expertise of academics; and to engage others from other institutions and disciplines in order to offer holistic intervention solutions that would enable a university to be active in playing her roles.

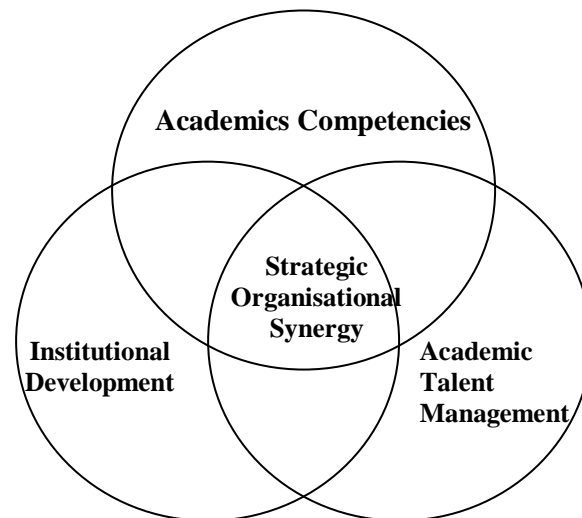
The attainment of thoughtful solutions, creative innovation, or breakthrough knowledge through university R&D activities is achievable through strategic organisational synergy. This intervention requires academics in one institutions or discipline of knowledge to engage others when embarking on R&D activities. Besides, it also aims to develop the culture of knowledge-sharing and promote collaboration among universities so as to form alliances with others from various backgrounds. This intervention necessitates academics in universities to

- a. link their knowledge and expertise to work on available research opportunities especially with agencies which would fund specific R&D activities, such as the Government's research institutions and companies (TechnoFund, InnoFund, NanoFund, ScienceFund)
- b. create the awareness on the challenging life scenario that necessitates them to conduct research, and in turn offer informed solutions. The link between the academic community and the context can help the former to gather information on the areas that requires their contribution (Cummings & Worley, 2001).
- c. moderate the relationship between academics and their environment, in the near and far. The intervention emphasizes the need to connect well with the context where academics operate, i.e. individuals, organizations, community, or professionals in their community.
- d. conduct multi-disciplinary research, multi-contextual projects which befit the concept of translational research. To focus only on pure and applied research is insufficient as the goal of creative, innovative and artistic endeavour is to improve the quality of life among individuals and society.
- e. attract, retain and nurture distinguished and promising scholars to work in the country for their presence would contribute to the creation of a vibrant scholarly eco-system which would be able to yield excellent discovery or state-of-the-art inventions.
- f. create awareness among academics on the preferred scenario for research which should be linked to teaching and learning; publication, or consultancy. They should blend in, or introduce research findings in the teaching and learning materials to support the development of broad-based thinking amongst students. This is to make research, development and innovation responding to the needs and aspiration of the local context.
- g. develop the culture of knowledge-sharing (e.g. Student and academic mobility), thus promoting collaboration among Universities; and collaborate with non-academic institutions. University should perform alliances with others from various background who pursue similar goals and mission.
- h. orientate researchers to embark on cross-disciplinary research so as to make it a means to solve complex societal problems. They should adopt multi-faceted approach of resolving challenges and unintended consequences; use of resources in wise manner, and reduce redundancy to conduct research or innovation in one same area.
- i. leverage on the current higher education agenda to substantiate internationalization agenda especially in turning Malaysia to benefit from the presence of international community at universities.
- j. bringing together academics of different disciplinary and personal background to increase understanding
- k. forming smart relationship with leaders from industries who are potential research funders; officials from government agencies with research grants; or academic from various institutions and disciplinary background.

This intervention involves synergetic approaches that involve an integrated process that fosters collaboration and encourages academics or universities to expand connections beyond typical boundaries and achieve innovative outcomes (Salmons & Wilson, 2008). This intervention could create synergistic result and yield desirable outcomes for the collaborative effort made by various parties. The synergy would produce better and greater outcome than the ones produced by individual

academic or single institution (Wimsatt, 1974). It enables all members and divisions in an organization to optimally use resources and efficiently enhance their competencies.

Figure 1: Organizational Synergy for the Cultivation of Research Culture in Malaysian Universities



The above figure shows the connection between the four interventions, forming a synergy that would link the essential core businesses that support R&D agenda. Each intervention could be successfully implemented with the supports of other interventions, hence contributive of the development of universities with strong research culture. This is sine qua non in order to substantiate the country's transformation and advancement through R&D initiatives. The ultimate aim of the synergy is the development of university capacity that could become an engine of national growth and its productivity.

Conclusion

A number of issues have been identified based on the five theme. An emphasis to be underscored is that the roles of HE is beyond producing workforce, but to help the country in shaping the advancement of social growth and economic prosperity through various academic activities, especially R&D activities. Specifically, this paper addresses the importance of R&D in Malaysia; identifies key concerns in research agenda; and formulates some interventions which would be able to improve research agenda in the country. Strategies and action plans must be judiciously orchestrated and implemented so as to ensure genuine benefit of R&D to the country, to be reflected by the production of useful research output; or commercial innovation which could be benefited by many. The success of an effort depends on synergetic efforts put by a number of parties which cooperate to achieve the set objectives. At university level, various interventions should be put in place by engaging several divisions and levels. Appropriate human process, human resource, technostructural and strategic interventions should be designed so as to come up with coordinated efforts to enhance the interest, motivation, passion and dedication among academics and students towards R&D activities.

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