# SUPPORTING TRANSFORMATION OF ARCHITECTURAL EDUCATION FOR GLOBAL WEALTH GENERATION

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## ABSTRACT

*The natural reflex to any threat is retreating into a defensible mode. In anticipation of the WTO (World Trade Organization) Liberalisation 2012, the Faculty of Design and Architecture, Universiti Putra Malaysia (UPM) has, instead, taken on establishing its sustainable design informatics niche in the education, research and innovation of design-based disciplines for supporting sustainable products development. The goal is to produce competent design-based graduates for global deployment while engaging local practitioners in indirect dissemination discourses about emerging trans-disciplinary theories and available collaborative technologies for enhancing current interdisciplinary collaborations—the very core for professional practitioners operating at global platforms. This paper is proposing a two-tier professional competency approach to architectural education: 1) bachelor degree for technical competency and 2) master degree for professional competency. However, their successes require the architectural education to resolve several critical issues. Among them include career development of professional architects in a research-oriented education system; and equivalency and acceptance of scientific design research outputs for annual performance evaluation. After outlining how UPM's Strategic Transformation Plan 2011-2013 was translated into the faculty's Transformation Vision Strategy 2011-2014, the paper describes the challenges faced by design-based programs and highlights critical initiatives proposed at university level by the faculty. Recommendations include establishing the arts and design cluster, development of master program for professional competency, and establishment of necessary ecosystem to support such programs. This paper supports an international quality architectural education which could be extended to various disciplines in the creative and innovative human capacity development since Malaysia is moving towards knowledge-based economic transformation development.*

*Keywords: design informatics, architectural education, design education policy, economic transformation program*

## 1 INTRODUCTION

The natural reflex to any threat is retreating into a defensible mode. In anticipation of the WTO Liberalisation 2012, the country saw many professional organizations taking defensible actions to curb, if not, delaying the opening up of the professional services to potential foreign competitors. Such a contrary move when the Malaysian Government had purposely launched the Economic Transformation Programme (ETP) for the country on September 21, 2010 (Government of Malaysia2, 2012). The programme aims to turn Malaysia into a high income economy by the year 2020. It will

lift Malaysia's gross national income (GNI) per capita from USD6,700 or RM23,700 in 2009 to more than USD15,000 or RM48,000 in 2020 thus allowing the country to propel to the level of other high income nations. The government expects that a GNI growth of six per cent per annum will allow the country to achieve the targets set under Vision 2020. Hence, the successful implementation of the ETP will need to see Malaysia's economy undergoing significant changes to resemble other developed nations.

The country foresees a continuous shift towards a service-based economy, with the services sector contribution growing from 58 per cent to 65 per cent until year 2020. The programme estimated more than 3.3 million new jobs to be created by 2020 and spreading across the country in urban and rural areas. Twelve national key economic areas or NKEA (Government of Malaysia1, 2012) were underlined which include the Greater Kuala Lumpur/ Klang Valley to be transformed into a world-class city. Other eleven NKEAs are Oil, Gas and Energy; Palm Oil & Rubber; Financial Services; Tourism; Business Services; Electronics and Electrical; Wholesale and Retail; Education; Healthcare; Communications Content and Infrastructure; and Agriculture. Accordingly, the government had the growth set to be achieved in a sustainable manner, without cost to future generations, through initiatives such as building alternative energy generation capacity and conserving the environment to promote eco-tourism.

In response to such national initiative, Universiti Putra Malaysia's (UPM) Strategic Transformation Plan 2011-2013 had outlined six missions and their respective objectives for an overall university's transformation while upholding its status as a Research University. The first mission is attracting excellent students and producing graduates who are knowledgeable and competitive. The second mission is improving the level of research outputs and innovations to international level. The third mission is empowering community involvement for generation and sharing of knowledge. The fourth mission is empowering UPM as the excellent centre for education, research and services for agriculture and tropical bio-resources. The fifth mission is streamlining administration and management of resources based on best practices while the final mission is empowering the School of Business Management as a Top Business School.

Against the above background, the Faculty of Design and Architecture planned its Strategic Planning Workshop in July 2011 in order to review and realign its vision and mission to support the university's missions. This paper presents the challenges faced by design-based programs and highlights critical initiatives proposed at university level by the faculty. The paper concludes with recommendations to support the faculty's vision and mission thus ensuring the sustainability of the architectural programme it has established. It also recommends how these recommendations could be implemented in other design-based programmes.

## 2    AGAINST TRADITIONAL RESEARCH UNIVERSITY

The challenges for any design school are typical across the globe. Since Universiti Putra Malaysia was declared one of the founding four Research Universities, academic staff at UPM has been benchmarked to meet high level research-related outputs for sustaining the Research University status. On top of the list are top quality journal publications and awards for research grants and innovations from research activities. Almost every academic staff from the Faculty of Design and Architecture struggled to satisfactorily meet their research outputs to match with the university's key performances as research academicians. Ibrahim and Osman (2009) found the emphasis on sciences and technologies by the university's management had imposed similar science and engineering performances across the Serdang campus onto design academicians.

The design-based faculty struggled hard to keep up meeting the targeted achievements but to no avail. After three years undergoing the research university's performance reviews, Ibrahim and Osman (2009) highlighted the need for the faculty to change and redirect their existential efforts towards meeting those research outputs but at much possible at minimal cost to the academic staff. Hence, the establishment of the Sustainable Tropical Environmental Design Exhibition—STEdex—where instead of publishing in indexed journals, the outputs from all the faculty's design studios could

be published in an indexed exhibition and be counted similar to other citation-indexed journal articles. Two thirds of the inaugural exhibited artifacts in 2009 were contributed by the architectural design studios.

During its inception, Ibrahim and Osman (2009) argued that a registered exhibition to an authority body would convey similar weightage to a journal issue. The faculty had received UPM Management's support that the ultimate place for its design output were in an exhibition when UPM applied to be a member of the International Council of Museums (ICOM), an international organisation for museums, through its local regional office in Malaysia. The Faculty of Design and Architecture is the secretary for the university's participation in this membership. UPM's membership under the Research University category is the first in the country since other members were galleries or museums then.

Ibrahim and Osman (2009) further explained that the level and place of exhibition determines the significance and impact factor of the design output. They described the different levels of exhibition where an artifact could be exhibited that could range from department, faculty and university with extension to national and international levels. These different levels of exhibition were synonym to seminar, conference, refereed journal, citation-indexed journal and impact factor journal for a written article. Each registered exhibition would have its own checklist of things to do to meet the necessary quality. One key criterion was developing the indexing database at each exhibition level. The faculty had started developing its own design index with the assistance and support of UPM's library since 2009. The database is expected to expand yearly as more exhibitions would be organized in the future. Moreover, the authors noted the efforts of the Office of the Deputy Vice Chancellor (Research and Innovations) to include design-based and exhibition-based publications as quality measures for design academicians' annual performance criteria.

Ibrahim and Osman (2009) describe the museum being the ultimate "impact factor journal" for a design artifact especially if it is among the established ones. When a call for artifacts is made for a registered exhibition, artisans will submit their works to be reviewed by independent members of the design communities. The curator of an exhibition plays similar role as the editor for a special journal issue (ibid.). A review will be made by several layers of review panels as the organiser selects the best artifacts that would represent the theme of the exhibition. Accordingly, these reviews published in the form of exhibition catalogues would be very important and are indexed in various arts and humanities databases. Eventually, the artifacts are also catalogued and indexed but the biggest challenge is storing them safely during and after the exhibition. Hence, the need for a well-designed gallery or museum with properly controlled indoor environment for their protection is vital. The faculty opened STEdex'10 exhibition in the early month of 2011 in its own gallery called Galeri Serdang.

## 3    TRANSFORMING DESIGN EDUCATION FOR ENCULTURING INNOVATION

The triumph of STEdex's achievements in year 2009 has now become the pillar of encouragement for the Faculty of Design and Architecture for its efforts to be counted differently among the university's scholarly brotherhood of scientists and engineering researchers. It recorded a jump from a 0.25 citation article per staff in 2008 to 2.65 articles per staff in 2009. The design academics at the faculty celebrated the co-existence of professional academics and design researchers specifically in the professional programmes such as architecture and landscape architecture. Although the university's benchmark kept rising each year afterwards, the faculty only saw incremental changes to its productivity in the first three years after STEdex 2009. It was time to redefine and refine its efforts to reposition the faculty's concerted efforts as an integral player albeit in selected missions of the university's Strategic Transformation Plan.

In year 2011, the university's scenario changed with the operational budget allocation was based on certain formula that saw inclusion of performances by students and research contributions by staff. Therefore, as much as the need for change in outperforming its previous achievements, the faculty then faced the reality to have the capability for creating and generating its own wealth for operational purposes. After much deliberation, the

Transformation Vision Strategy (Ibrahim 2011 & 2012) for the Faculty of Design and Architecture in the coming years would see the faculty striving on developing new or enhanced processes, together with new or enhanced applications that, utilize newfound or newly developed sustainable resources. The synergy between the three components is expected to invigorate exciting novel sustainable products thus is expected to create a new playing field. The faculty described this niche field as the Sustainable Design Informatics field.

The new playing field in the built environment covers the three main components of sustainability—social, economic and environment. The field strives on manipulating knowledge gained from understanding all three components through trans-disciplinary design thinking and design research processes that would in turned further create new knowledge and new applications for the betterment of the global population. Additionally, intelligent integration and collaboration with industries and communities are integrated in the teaching and learning hence facilitating wealth creation that would now push Research and Development (R&D) together with commercialisation efforts of designed and researched products. This paper explains the foundation for the new niche in the following section.

## 4    FOUNDATION FOR SUSTAINABLE DESIGN INFORMATICS NICHE

Sustainable Design Informatics is defined as a design discipline combining design concepts and practices with information technology (IT)—or informatics—for achieving sustainable living. It focuses on the arts and sciences of design relating to collection, creation, storage, retrieval, processing, display and dissemination of knowledge throughout the designed product development lifecycle impacted by information technology. It is a trans-disciplinary field in design focusing on the development lifecycle of innovative solutions using indigenous resources while addressing socio-cultural needs that meet economical aims. Among its research targets would include content, methods, technologies and systems besides development of

tools, techniques and applications specific and practical for cradle-to-cradle product innovation in certain context.

Translation of this sustainable design informatics niche into the education, research and innovation of design-based disciplines at the faculty is expected to support sustainable products development in the faculty's Transformation Vision Strategic Plan. The goal is to produce competent design-based graduates for global deployment while engaging local practitioners in indirect disseminations and discourses. As much as possible, opportunities to include emerging trans-disciplinary theories and available collaborative technologies became priorities in order for faculty to enhance interdisciplinary collaborations—the very core for professional practitioners operating at global platforms. Simultaneously, enabling factors against successful deployment of organisation (Ibrahim & Nissen, 2007; Ibrahim & Paulson, 2008; and Shumate et. al, 2010) and product development lifecycle would now become highly conscious  efforts towards mitigating potential failures. Although Ibrahim and Paulson (2008) defined them as operating environmental characteristics, this paper agrees that there are many similarities in other product development lifecycles. They are having complex workflows; having multiple interdependent tasks; having different stakeholders' involvement at different lifecycle stages; and displaying regressive tacit-dominant knowledge base exchanges as the product development lifecycle progresses.

## 5    CHALLENGES FOR TRANSFORMATIONAL CHANGES

The extension of a professional education in the architectural field at graduate level brings up several challenges for implementation. This is mainly stemmed from the need to retain professional architects as educators since the career advancement for qualified professionals without doctoral qualifications is not similar compared to one towards academic staff who have doctoral qualifications. In most top research universities in the world, professional programmes such as architecture and engineering would give preference to hire professionals with doctoral qualifications to overcome this

problem. This option is far from feasible in Malaysia as there is a limited supply of potential applicants who have both qualifications. Currently, the Malaysian Architectural Education Council and followed by the Malaysian Qualification Agency require a minimum of 30% professionally qualified architects teaching in an architectural program for accreditation. The authors are recommending alternative career advancement options that the Ministry of Higher Education (MOHE) and the Public Services Department (PSD) could consider for enriching and sustaining the architectural professional programmes at public universities in Malaysia. The aims are 1) improving academic career development for both professional and academic architects specifically in research-oriented education system and 2) development of mechanism and measures equivalent to scientific research outputs for their individual annual performance evaluation. More details of the proposal are described below.

# 6   TRANSFORMATIONAL INITIATIVES FOR DESIGN SCHOOLS

The success of organising STEdex 2009 and the subsequent achievements for the Faculty of Design and Architecture in meeting and supporting the publication goals for a research university have motivated the faculty to review and improve current career advancement path for academic staff in its professional programmes such as architecture. Among the initiatives conducted by the faculty entail establishing the Arts and Design cluster, development of master programmes for professional competency, and the necessary ecosystem to support such programs. We rationalize the initiatives as follow:

### 6.1   Establishing the Arts and Design Cluster at Research University

The Faculty of Design and Architecture claims that design research tend to involve more complex research approach that transcends both the qualitative (constructivist) and quantitative (positivist) realms. Design researches, which tend to be founded by human-based problems, require affirmation of the subjective understanding about aspects related to the human beings

before any technical or procedural design solutions could be put forth. The faculty has justified its different stand when the annual performance review for 2011 and 2012 saw the university documented the highest achievements for innovation by the faculty against the established faculties in sciences and engineering. This is against the fact it had the least number of doctoral staffing (less than 60% PhD staff in both years compared to 90% campus average) and was among the lowest three for research grants awards.

It was not surprising that the faculty failed miserably in publishing articles in impact factored journals. On contrary, the faculty had earlier established an alternative publication outlet where artefacts from the design studios would successfully be considered as citation-indexed articles. Thus, meeting the research output qualification by all the design academic staff. Detailed explanation about the alternative publication outlet has been discussed in Section 2. In lieu of these different but significant achievements, the Faculty of Design and Architecture has been instructed by the University's Management to establish another branch of academic cluster called the Arts and Design with different weightage for each qualification criteria specifically publication, supervision, research grants and research leadership for promotion purposes. Furthermore, the Sustainable Design Informatics approach where enhanced process when integrated with an enhanced product has so far produced three inventions that have been filed internationally. Ibrahim (2013) pointed out that fusing enhanced product's knowledge and resources with enhanced processes has shown great promises for three successful interventions namely SABSystem (Ibrahim & Jaganathan, 2009); RASPER (Ibrahim, Abdullah & GhaffarianHoseini, 2008); and IBS Interface (Ibrahim, Abdullah, Jaafar & Mamdooh, 2012).

### 6.2   Development of Professional Master of Architecture Program
While other sciences and social sciences programmes had clearly charted an educational pathway ending with a Master degree should the student chose to undergo a direct 5-year educational experience, the architectural programme at UPM saw a total minimum of 120 credits for the first bachelor degree and an additional 60 credits for the second professional bachelor degree. The faculty supports the establishment of the Master of

Architecture degree to replace the Bachelor of Architecture degree at the termination of the second professional education programme. The initial bachelor degree will focus on the technical competency in the architectural profession including architectural design studios, graphic communications, building services, structures and construction materials, history and theory, environmental sciences and basic professional practice. At the professional Master' degree programme, students will be trained towards professional competency. The Master of Architecture degree is proposed to focus on advanced architectural design studios, sustainable building technologies, architectural research and professional practice. Graduates from the UPM's programme are expected to possess architectural design skills, competency in building performance simulations and in-depth knowledge in project delivery in Malaysia.

### 6.3    Development of Architectural Academic Ecosystem

#### Institutionalising professional academic career path in the design fields
The authors acknowledge the dilemma in attracting professional architects into academia while at the same time providing a constructive environment to advance towards professorship during their tenure once they are in the academic system. It is a challenge to meet the industry's financial compensation scheme to academicians who are professionally trained. On the other hand, the challenge to produce research publications and obtain research grants comparable to scientists and engineers means the chance for professional academics to advance towards professorship seems too farfetched. As mentioned above, the faculty's approach in creating and developing equivalent performance measurements under the Arts and Design cluster would compensate the professionals and other designers accordingly.  The Faculty of Design and Architecture has long been known to consistently argue and champion different performance criteria for its professional and design academics. The instruction to propose a new Arts and Design Cluster at Universiti Putra Malaysia for 2012/2013 is yet to happen to date. Despite the delay, the authors note some earlier efforts at the national level further institutionalised the differences between the STE (Science, Technologies and Engineering) which included the "Humanities"

in the earlier cluster of SS (Social Science). The Social Science cluser has been extended into SSH (Social Science and Humanities) cluster which was announced by MOHE in 2012.

#### Institutionalising Galeri Serdang Programme
Since 2009, Universiti Putra Malaysia had accepted the publication of artefacts from design studios which had been exhibited in STEDEX as equivalent to any citation indexed article published in a peer reviewed journal. In fact, the faculty has established its own indexed exhibition called STEDEX which published articles have similar weightage as any citation indexed journal articles resulting from research projects. The faculty had also proven that it was successful in producing all intellectual property rights (IPR)—except three patents—without any research grants. The indexed exhibition is now formally known as the Galeri Serdang Programme and becomes a university-supported programme since 2011. The whole of UPM is a registered member of the International Council of Museums based in UNESCO, Paris under the Research Institution category. The secretary for ICOM membership at UPM is the Faculty of Design and Architecture. The faculty has started to extend the indexed exhibition service to other faculties and research institutes in 2012. The exercise is further supported when the Ministry of Tourism and Culture declared UPM as an edu-tourism product starting 2013 and Galeri Serdang is listed as one of the tourism highlights.

#### Institutionalising industry and community linkages in design studios
In lieu of improving the commercialisation of innovations from the design studios, the faculty started inviting industry partners to actively participate in formulating and improving designed solutions based on their actual industry problems or issues. The faculty won a university bid in 2012 for a programme funding involving industry and community activities to take place through student-centred learning processes specifically using project-oriented problem-based learning in all its design studios. The extra funding had helped defray the costs of studying architecture and other design fields at the faculty since it subsidized students' materials and travelling costs. In return, more industry partners would be comfortable experimenting new solutions in the safety of the design studios. Should the solutions become

feasible for potential commercialisation, the participating industry partner would have the first right of refusal thus expediting further innovation and commercialisation process between university and that industry partner. The faculty has started seeking local and international education, governmental agencies and industry partners who have similar interests toward visionary endeavours and wishes to embark on the exciting journey of design R&D in the built environment. For examples, UPM signed Memorandums of Understanding with Perbadanan Putrajaya (a government agency) and AECOM (a multi-national consultant firm) for academic and R&D activities in the area of sustainable development in year 2012.

*Institutionalizing design and design research*
This on-going initiative is integral to position architecture and other design fields to a significant contributing factor to the nation's economy. At a British Columbia Forum on forest economics and policy, researchers acknowledge that "knowledge and technology are fast becoming commodities, and the creative use of knowledge and technology available through the use of design, offers the remaining competitive advantage" (Bell, 2006). Bell noted how those countries or regions which have invested heavily into the promotion of design are now reaping the economic rewards through competitive advantage. Included under the "design" fields, but not limited to, are graphic design, interior design, architecture and industrial design. These countries have instilled national policies where industries, educators and researchers play a crucial role in planning and implementation (ibid.). In the education system, there is a need to showcase the added value when design thinking is integrated in the problem solving decisions. The Faculty of Design and Architecture is the custodian of the Innovation Methodology course for undergraduate and postgraduate students on behalf of the university for MOHE. It has formalized an integrated product design studio which allows multi-disciplinary students to come together in a design studio. The faculty also has established its own design research and services centre for the university and public where academic staff could offer niche services where design applications entail.

## 7 CONCLUSION

In summary, the Faculty of Design and Architecture is driving towards an international quality architectural education which could be extended to various disciplines in the creative and innovative human capacity development. The small transformation strategy at the faculty could become a role model for facilitating Malaysia in moving towards knowledge-based economic transformation development. The Faculty of Design and Architecture is proud to introduce the Sustainable Design Informatics programme which it is expecting would be expanded and broken off into emerging niche design areas when individual design researchers successfully developed their areas of sustainable product development. The paper describes on-going initiatives that would formalize the faculty's efforts to be counted differently by non-design research clusters. They are establishing the Arts and Design cluster, development of a Master of Architecture program and development of the necessary ecosystem within the university's environment.

For the ecosystem to be sustainable, the faculty has made huge efforts in institutionalizing the professional academic career path in the design fields, institutionalizing the Galeri Serdang Programme, and institutionalizing industry and community linkages in all its design studios. In the process of institutionalizing the above-mentioned initiatives, the faculty indirectly has started to institutionalize design and design research into the everyday of the common people's lives. In conclusion, the authors believe that the faculty needs to make a concerted effort focused on translating the sustainable design informatics in the education, research and innovation of design-based disciplines for supporting sustainable products development. The initiatives are expected to produce competent design-based graduates for global deployment while engaging local practitioners in indirect dissemination discourses about emerging trans-disciplinary theories and available collaborative technologies. In due time, the authors could see the need for instilling the capability and capacity for its graduates to work in interdisciplinary collaborations—the very core for professional practitioners operating at global platforms. In due time too, the authors are expecting the

Faculty of Design and Architecture, Universiti Putra Malaysia to gain more in-depth rooting for design and design research into the nation's innovation agenda as more and more design researchers take root in establishing their own emerging design interests.

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