An Enhanced Business Model of University Teknologi Malaysia as University of the Future

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Abstract: Higher education enrolment has increased by 70% to 1.2 million students over the last 10 years. The growth rate of research output and quality has been one of the highest in the world, and Malaysian institutions are ranked strongly amongst its Asian peers. Malaysia is also now a top 10 destination for international students. Malaysia's Prime Minister has mentioned that education has been key to the country's national development by 2020 by increasing both access to and quality of higher education. Universiti Teknologi Malaysia (UTM) is taken as a case study, as it is one of the Malaysian top ranking universities in understanding its transformation plan, game changers and key project in transforming digitally the university to the University of the Future. Literature review and business model canvas framework is used in this paper. The key contribution of this paper is an enhanced business model of UTM as the University of the Future.

Keywords: Business model canvas, drivers of change, digital transformation, game changers, higher education, university of the future.

I. INTRODUCTION

Digital transformation is the realignment of, or new investment in technology, business models and processes to drive new value for customers and employers and more effectively compete in an ever-changing digital economy [1].

Ministry of Higher Education (MoHE) of Malaysia has set forth new initiatives as part of its effort to cultivate holistic, entrepreneurial and balanced graduates to be globally competitive and meet the needs of Industry 4.0 [2]. MoHE and Malaysia Digital Economy Corporation (MDEC) are working with private sectors and academia in providing complete digital technology learning opportunities to students who are looking to pursue a tertiary in the sector. This is in line with Malaysia government's approach towards the holistic growth of a digital economy whereby MDEC remains committed in nurturing and developing the digital workforce to meet the current and future demands of the industry.

In order to ensure higher learning institutes graduates continue to flourish and fill future digital job demands locally and globally apart from putting their students through intensive and special training in the digital sector, Premier Digital Tech University is introduced. It is an institute of higher learning recognised by MoHE and MDEC for its qualifications and commitment in offering top-notch digital technology courses in Malaysia. For all intents and purposes, it offers end-to-end talent pipeline development for the digital economy sector. One of the eight local universities, Malaysia Technology University has received the Premier Digital Tech University status [3].

Malaysia Tehcnology University, or formerly known as Institut Teknologi Kebangsaan (ITK) is a leading innovatio-driven entrepreneurial research university in engineering science and technology. ITK went through tremendous changes on 1975 where it is officially declared as Universiti Teknologi Malaysia (UTM). The history of education in UTM has surpassed its one-hundredth year. It has gained international recognition in the field of science and technology even after the challenges and difficulties [4, 5].

II.   PROBLEM STATEMENT

Redesigning higher education for Industry Revolution 4.0 (IR 4.0) is a new initiative introduced by MoHE as an effort to groom students in meeting the demands of the industry and it is to remain relevant and competitive in IR 4.0 [6].

MoHE has found that the IR 4.0 is the continuation of a journey achieved through advances and technology, and that each industrial revolution changes the way human live, work and interact with each other. Its Minister said that there is rapid change in terms of volatility, uncertainty, complexity and ambiguity with IR 4.0. Education has become the key to face challenges of the industry. Thus, in order to address the challenges, process of teaching and learning at higher education institutions must be changed [7].

III.   PAPER METHODOLGY

This paper has adopted Control Objects for Information and Related Technologies 5 (COBIT 5) developed by Information Systems Audit and Control Association (ISACA). ISACA is an independent, nonprofit, global association [8]. It developed COBIT 5 as a leading business framework for governance and management enterprise information technology. It brings together its five principles which allow the enterprise to build an effective governance and framework based on a holistic set of seven enablers that optimizes information and technology investment and use for the benefit of stakeholders.

COBIT 5: Implementation is created to provide guidance on how to implement a good government of enterprise information technology (GEIT) successfully. This implementation covers the positioning GEIT within an enterprise, taking the first steps towards improving GEIT, implementation challenges and success factors, enabling GEIT-related organizational and behavioral changes, implementing continual improvement that includes change enablement and programme management, and using COBIT 5 and its components [9].
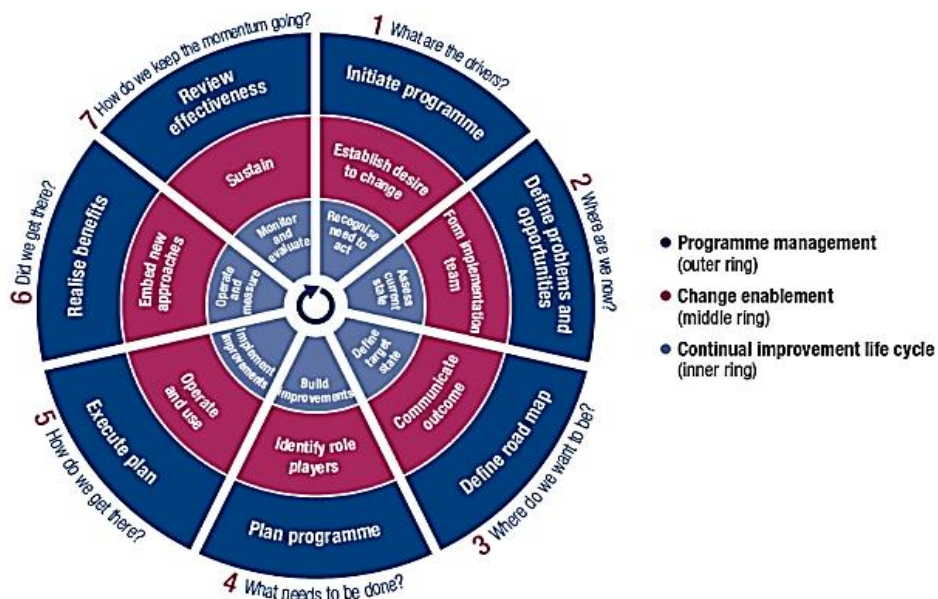

**Fig 1: The seven phases of the implementation life cycle**

IV.   LITERATURE REVIEW

A. Drivers of Change:

Using the current Australian university model – a broad-based teaching and research institution, with a large base of assets and back-office – will prove unviable in all but a few cases. In higher education sector, there are five mega-trends that will give impacts in the decade ahead [10]:

- Democratization of knowledge and access – The massive increase in the availability of 'knowledge' online and the mass expansion of access to university education in developed and developing markets means a fundamental change in the role of universities as originators and keepers of knowledge.

- Contestability of markets and funding – Competition for students, in Australia and abroad, is reaching new levels of intensity, at the same time as governments globally face tight budgetary environments. University will need to compete for students and government funds as never before.

- Digital technologies – Such technologies have transformed media, retail, entertainment and many other industries and higher education is next. Campuses will remain, but digital technologies will transform the way education is delivered and accessed, and the way 'value' is created by higher education providers, public and private alike.

- Global mobility – This will grow for students, academics, and university brands. This will not only intensify competition, but also create opportunities for much deeper global partnerships and broader access to students and academic talents.

- Integration with university – Universities will need to build significantly deeper relationships with industry in the decade ahead in order to differentiate teaching and learning programs, support the funding and application of research, and reinforce the role of universities as drivers of innovation and growth.
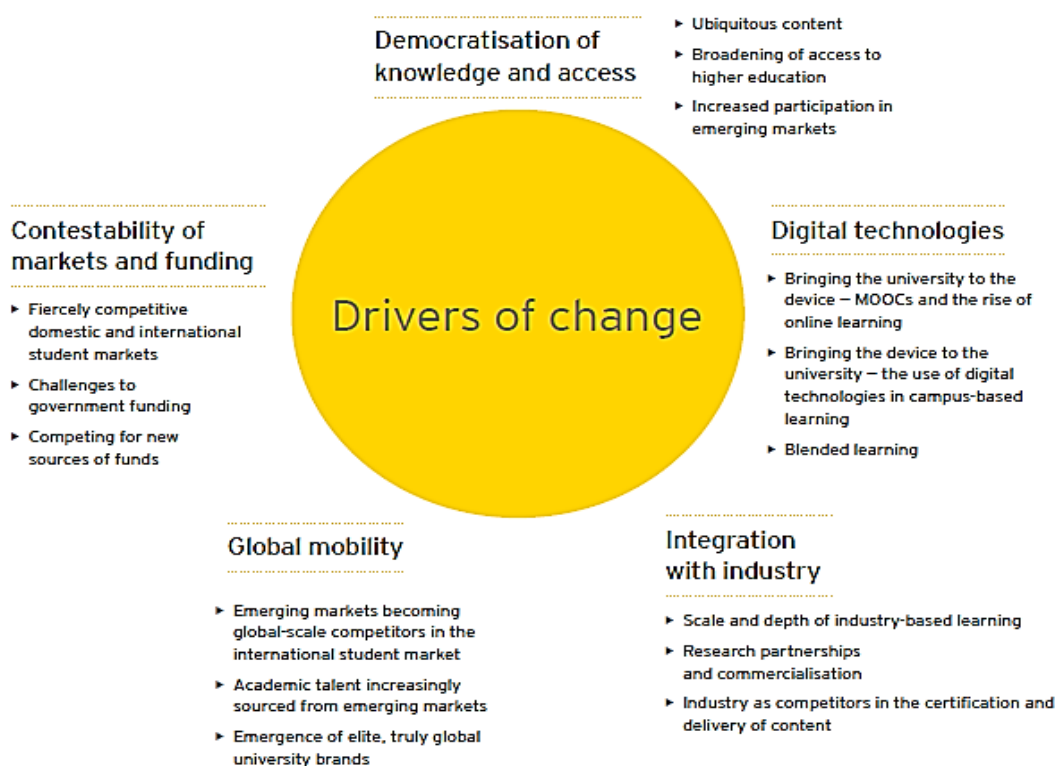
Fig 2: Drivers of change

There are five other drivers of change presented by Senior Director of UTM International during the Seminar on Current Trends and Global Scenario in Higher Education series 2/2014 [11]:

- Access and equity – Information and communication technology enhanced higher education, for example open and distance learning, virtual universities, e-learning, open educational resources. It is likely to become most significant driver of cross-border provision. Digital technologies will transform the access to education and drive new approaches to teaching and learning as well as the way education is delivered and supported. The new delivery systems being introduced are Massive Open Online Courses (MOOCs), Corporate Open Online Courses (COOCs), Small Private Open or Online Courses (SPOCs), mobile learning, and cloud computing.

- Global mobility

- University funding – Three common funding sources of higher education are public funding, tuition fees and endowment. Other sources may include institutional investment, resource generation from a myriad of identified sources.

- Research and innovation – Many global trends bring impact to the research landscape such as researches are more multidisciplinary, high mobility of researchers at the same more competitive, research funding is more competitive and accountability/government policies. Thus, UTM need a suitable "model" to adopt these trends developing an excellence research strategy and research performance.

- Global reputation – It is a new force in national and global higher education created by the many rankings and rating off academic institutions. These rankings are criticized but nonetheless, taken seriously by individuals, public, universities and times governments.

B. Industrial Revolution 4.0:

The Industry Revolution or Fourth Industry Revolution (IR 4.0) is no longer evolving in a linear pace, but it evolves exponentially and disrupts almost every industry in all over the world. This revolution governs the transformation of the whole systems of production, management as well as governance [12]. The wave of innovation that consist of digital consumer, digital enterprise and digital operations wave (explanation). IR 4.0 leads to digitization and digital transformation, digital disruptions and it has its own consequences too.

Education experts has agreed that Education 4.0 will be shaped by innovations and will indeed have to train students to produce innovations [13].

The 2018 mandate from Minister of Higher Education (Malaysia), themed "Higher Education 4.0: Knowledge, Industry and Humanity" is centred on embracing the IR 4.0 as part of the call to revamp the Malaysian higher education system. This is to ensure all higher education institutions will be relevant and remain competitive in the dawning of IR 4.0 [14]

According to UTM, it embraces the IR 4.0 as [2]:

- Digital disruptions are happening every single day and its institution need to preserve its core values, ethical principles and Malaysian identities

- Innovation amongst Malaysian universities is key competitive factor if Digital Transformation in IR 4.0

- Higher education leaders should exploit the potential opportunities brought by the IR 4.0 with much responsibility and wisdom, by providing digital leadership for their institutions.

Senior IT Fellows of Centre of Information and Communication Technology said that the impact of IR 4.0 begins in the manufacturing industry. UTM strategy is to leverage industry 4.0 technologies to support educators and students for the IR 4.0.

UTM 4.0 Digital Nervous System for Fourth Industrial Revolution Task Force is an initiative that is responsive to the impact of digitisation. The initiative is driven by new and innovative technologies that will cater to and meet expectations of future jobs. Such initiative will focus on the exploiting and leveraging the Industry 4.0 cyber physical system technolgies such as artificial intelligence and robotic to change the way the universities educate global future citizens to create a new breed of graduates that are able to excel at IR 4.0, while at the same time still value ethics and spirituality [15].

C. Malaysian Education Blueprint 2015-2025:

Malaysia Education Blueprint (MEB) 2015 – 2025, a 10-year strategy plan has released by the Malaysian Ministry of Higher Education (MoHE) in April 2015. It is to transform Malaysia's higher education system in meeting new challenges.

In order to achieve system and student aspirations, the MEB (Higher Education) outlines 10 Shifts that will spur continued excellence in the higher education system. All 10 Shifts address key performance issues in the system, particularly with regard to quality and efficiency, as well as global trends that are disrupting the higher education landscape.
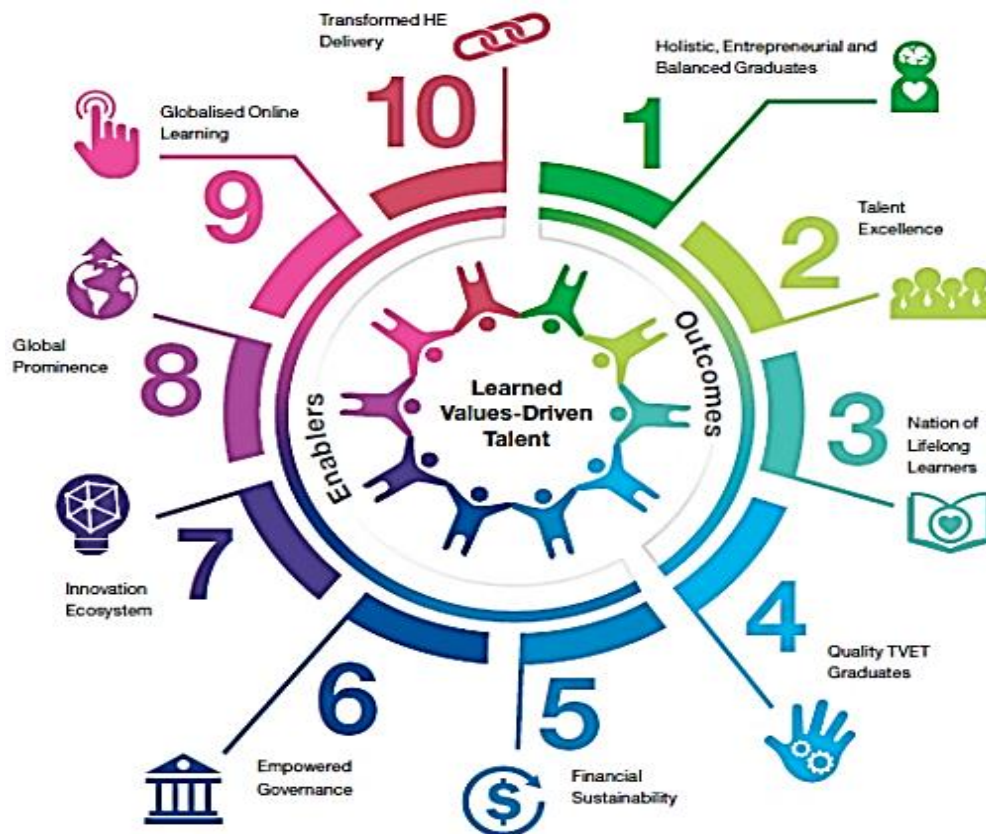
Fig 3: The 10 shifts

The first four Shifts; Hollistic, Enterprenuerial and Balance Graduates, Talent Excellence, Nation of Lifelong Learners, and Quality Technical and Vocational Education and Training (TVET) Graduates focus on outcomes for key stakeholders in the higher education system, including students in academic and TVET pathways, the academic community, as well as all Malaysians participating in lifelong learning. The other six Shifts; Financial Sustainability, Empowered Governance, Innovation Ecosystem, Global Prominence, Globalised Online Learning and Transformed Higher Education Delivery focus on enablers for the higher education ecosystem, covering critical components such as funding, governance, innovation, internationalisation, online learning, and delivery [16].

D. UTM Global Plan:

UTM Global Plan 2012 – 2020 is a long-term strategy designed to strengthen the UTM as a global and renowned institution for 2020. This plan aims UTM among the 50 best universities in engineering and technology [17].

The plan comprises three implementation, namely:

- Phase I: 2012 – 2014 Global University Alignment – In this phase, knowledge strategy, structure, and cultutre in UTM will give focus on preparing ecosystem globaly and develop an internalization process in terms of Key Performance Indicators (KPI) or Key 'Amal' Indicators (KAIs), scholarships, lecturers and students composition, academic facilities and campus infrastructures, academic network, international collaboration, branding and others.

- Phase II: 2015 – 2017 Implementation of High Impact Programmes – The focus of this phase is on implementation of few high impact progammes which requires huge source of income and human capital in terms of field and focus of education, research, cocuriculum, international network , branding, and marketing.

- Phase III: 2018 – 2020 STAR Programme Implementation – Strategic Transformation and Advanced Research, STAR Programme Implementation allows UTM students and staffs to be in best position in competing with well-known global university in academia productivity (research, publishing, intellectual property and others); first class mindset, campus ecosystem, working culture and financial supports from many sources.
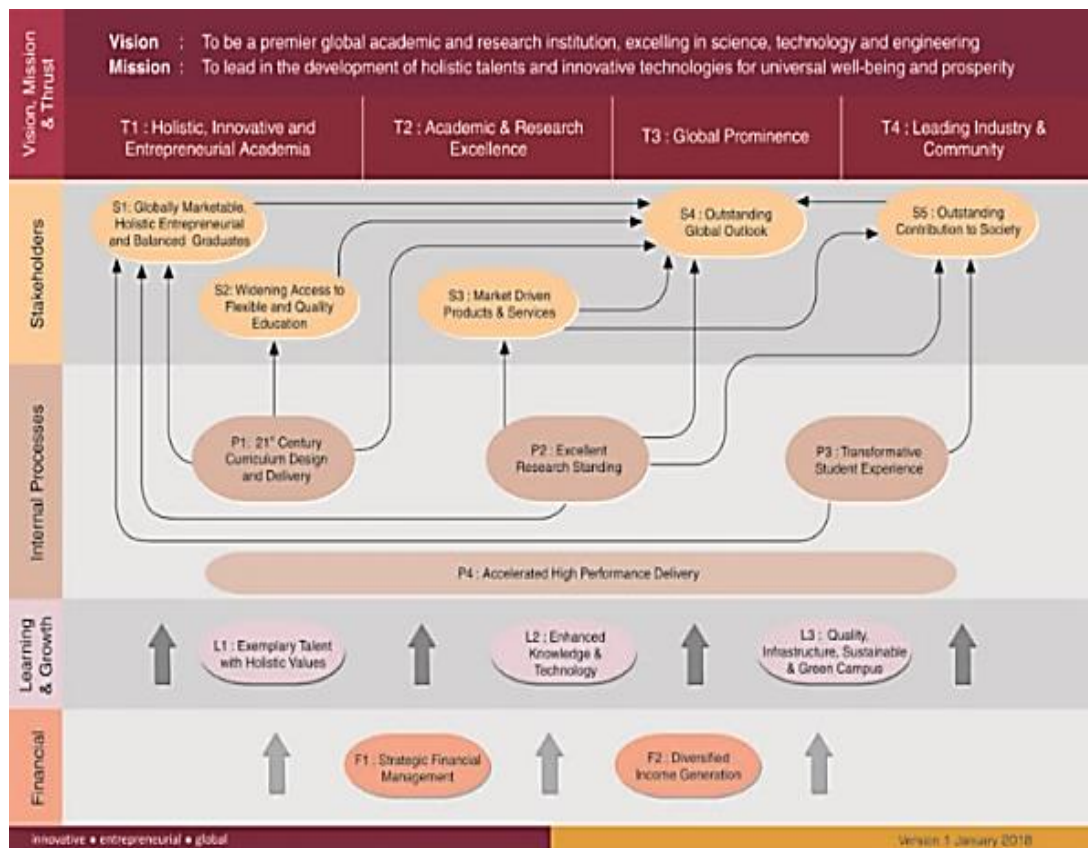
Fig 4: UTM Strategy Map: UTM Global Phase III (2018-2020)

In implementing the UTM Global Plan (2012-2020), the university has identified seven key focus areas (KFAs): (1) Excellence in Learning & Teaching, (2) Excellence in Research, Innovation and Commercialisation, (3) Sustainable Campus, Infrastructure, Information and Communication Technology System, and Community Engagement and Industrial Network, (4) Total Campus Experience, (5) High Performance Delivery, (6) Financial Sustainability, and (7) Global Reputation.

The seven UTM KFAs have been aligned with the 10 shifts of the MEB (Higher Education) since 2015 and will continue to be consolidated andaligned with the aspirations of Phase II and Phase II of UTM Global Plan (2012-2020).

E. IT as a Game Changer:

Information Technology (IT) has been a game changer in other sectors since few years back. Thus, it also can be one of the game changer in higher education [23].

- Convenience - It is the primary value students cite for technology in higher education today. It makes accessing resources administrative tasks like registering for class and paying tuition, and academic work are faster and easier. Students believe that technology makes them more productive and convenience in communication. IT also serves as a delivery channel for information of all kinds, increasing convenience, access and flexibility especially in academic support programs and online courses.

- Improving the College Experience, Learning & Support Services -The university experience has much more than just a classroom, course or campus. However, it is determined by technical, social and intellectual interactions among students, faculty and staff. In terms of learning, a high learning experience will change the game for students. From traditional class experience transformed to augmented reality to give a 360 experience to the students. IT also can change the university experience through its impact in support services which the "experience" of advising is not limited to course selection it is a reflective and integrative experience involving e-portfolios, allowing students to organize learning around themselves rather than just around courses or the curriculum. For instance, use peer-to-peer as an academic support instead of having an expert as the approach.

- Collaboration - Internet connects everything and everyone and provides an architecture for participation and collaboration. IT can create a participatory culture where when an individual is empowered with information, team can be formed with number of individuals around any topic and problem. IT and collaboration form the basis for crowdsourcing, such as when innovation and problem solving come from the global community, not just an internal Research and Development unit. Collaboration are important for higher education as they represent real-world experiences, personal contributions, and opportunities for research as colleges and universities engage in a variety of research and instructional collaborations.

- Shared Infrastructure **-** IT enables sharing, including the sharing of expensive infrastructure – whether those are information, technology, or people. It is increasingly possible for resources to be shared among institutions because digital resources can be shared and are independent of time and location. This aggregate supply/demand or use/curation. Not only that, infrastructure such as networks, processing capability, data storage, and learning tools can be shared as well.

- Informed Decision Making - Higher education uses analytics to inform decisions about admissions, fund raising, learning, student retention, and operational efficiency. With the help of IT, it can make change to a better decisions by example of providing feedback to faculty and course designers, allowing them to make targeted improvements to course material. Analytics can include trend analysis, regression analysis, forecasting, simulation, prediction, data visualization, and optimization. It can be used to spot trends or make choices.

- Unbundling and Rebundling - IT also has the ability to disaggregate and decouple the products and the processes, allow new value propositions to be created, value chains and enterprises. These new models will be able to help higher education and serve new groups of students, in tremendous numbers as well as with improved learning outcomes

F. UTM Game Changers:

UTM has identified five game changers in order to intensify its progress towards its targeted desired state by 2020 [17]:
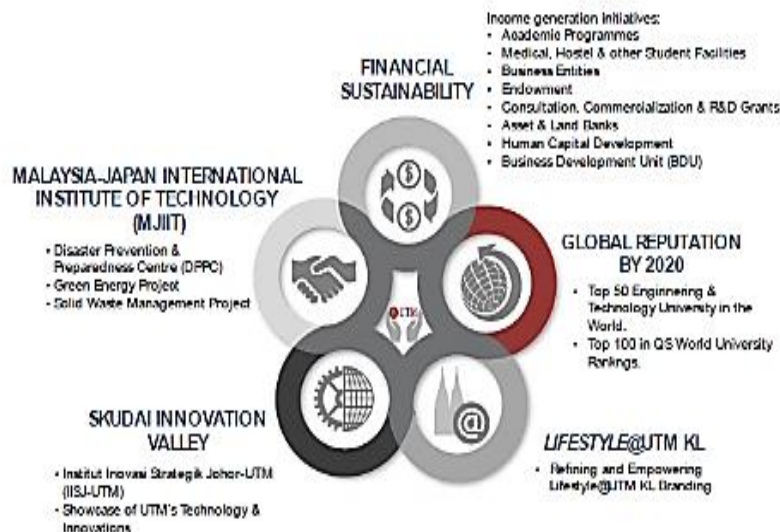

Fig 5: UTM Game Changers

- Financial Sustainability – It is to generate income through initiatives like (1) academic programmes, (2) medical, hostel and other student facilities, (3) business entities, (4) endowment, (5) consultation, commercialization and research and development (R&D) grants, (6) asset and land banks, (7) human capital development and (8) business development unit.

- Global Reputation by 2020 – The aim is to position UTM within the top 50 engineering technology universities in the world, as well as to be within the top 100 universities in Quacquarelli Symonds (QS) World University Rankings. In tandem with this aspiration, UTM also strives to excel in providing competent human capital, innovative products and professional services that benefit the nation, society at large and local communities.

- *Lifestyle*@UTMKL – The concept is to refine and empower *Lifestyle*@UTM KL branding. The attributes are Open Campus, Green and Sustainable, Industry Friendly, Global and Multicultural, Life-long Learning/Professional, and Digital Culture provides accredited and high-end labs, fast and reliable internet connectivity, library, student workspace, comfortable mosque and few choices of café ensuring the campus environment meet the students, staffs and visitors' standard and expectations.

- Skudai Innovation Valley (SIV) – This development plan includes the establishment of Institut Inovasi Strategik Johor-UTM (IISJ-UTM) and initiatives that showcase the latest technology and innovations developed by UTM researchers. The innovation is also to promote great engagement with the local community and industry players, and benefit the locals of the area as it believes that the university can do more for the local community.

- Malaysia-Japan International Institute of Technology (MJIIT) – A high impact project which involves establishment of Disaster Prevention & Preparedness Centre (DPPC) as well as the Green Energy Project and Solid Waste Management Project. MJIIT is a new and vibrant at UTM International Campus.

G. UTM Key Projects:

- Classroom of the Future: MaGICX UTM – Media and Game Innovation Centre of Excellence (MaGICX) is a strategic cooperation between Malaysia (UTM) and Iskandar Regional Development Authority (IRDA) that supports and promotes the development and ecosystem of creative industry that focuses on gamification and enrichment of digital content [18].

- UTM – Huawei iLearning Cloud –UTM-Huawei iLearning Cloud is a project promoting the concept of learning on-demand in collaboration of Huawei Malaysia which involves using computing and big data technologies enabling current teaching and learning processes to become more interactive. Students are able to interact with lecturers or specialists in different locations directly via live video conferencing as this program is integrated into a cloud computing environment with the initiatives of MOOC, eLearning and Lifelong Learning [19] .

H. Other World Class University:

One of the best university in the world according to QS World University Rankings 2016-2018 [20] Massachusetts Institute of Technology (MIT) is reported to launch an online learning initiative called MITx. It is to offer the online learning teaching of MIT courses free of charge to anyone in the world [24].

MITx represents the next logical evolution in business of free online education by giving students an interactive experience as opposed to a simple videotaped lecture. The market of online course content is accessible and free to anyone in the world as such content is delivered from prestigious universities such as Stanford University and Princeton University.

The program is said to be different than online-only students. For instance, it uses to augment on-campus course work by expanding upon what student learn in class, depending on how faculty and students will incorporate the program into their courses. Students will be able to communicate with their peers through student-to-student discussions, allowing them an opportunity to ask questions or simply brainstorm with others. This is not only limited for being able to access online laboratories and self-assessments. At the end, student will receive an official certificate once they exhibit a mastery of the subjects taught on the platform.

Furthermore, MITx is seen to start providing many of the salient virtues of for-profit online colleges, such as a robust learning management systems and real-time virtual interaction.

Next, University of Toronto (UofT) is experiencing mini Massive Open Online Courses (MOOCs). It is four-to eight-week versions of real learning session with no formal credit provided at the end [25]. Researches are attempting to understand the appeal and potential of these new online course formats. They are also examining the range of teaching strategies that MOOCs make possible, such as peer assessment and inverted classroom model.

The university is reported that it received fund for projects that are focusing on "redesigning courses to use more online and multimedia resources to enhance student learning, such as electronic textbooks and mobile-friendly online curriculum" based on its five initiatives.

One of the initiative, Active Learning: Online Redesign seeks to improve the quality of learning by breaking down large classes into smaller learning experiences while maximizing efficiencies through the use of web-based tools. Enhancement to Joorden's Digital Labcoat, as an example is to improve integration with existing UofT learning systems and provide improved faculty and student user support or to develop lab activities that would use online and portable materials which would decrease the demand for dedicated undergraduate laboratory space.

Besides that, Bentley University has recently uncovered a skills gap in its PreparedU study is steadily widening for some time [26].The Making the Match research program is a study of thousands of individuals across five cohorts (early university, pre-graduate, early career entrant, job change, and stabilized career) which also discovered a snowball effect of declining preparation of graduates for a relevant career. The study showed a gap between what competencies employers needed and the competencies that graduates supplied.

I. Entrants of New University:

Alibaba Business College and Nanyang International Business College (NIBC), Singapore National Trades Union Congress (NTUC) LearningHub in collaboration with Employment & Employability Institute (e2i) will launch e-commerce masterclass next year to train local talents and help propel Singapore to be a leading global digital e-commerce hub [21]. Alibaba and NIBC will provide the trainers and curriculum, while e2i and the LearningHub will run the programme in their Singapore centres.

The programme will consist of four masterclass over twelve full days. Participant will learn about e-commerce business models and platforms, online retailing and digital marketing and they will get certification from the college at the end of the course. The business college plans to roll out a digital e-commerce course in countries under China's Belt and Road Initiative and will launch the course first in Singapore. [22].

V. POSSIBLE FUTURE BUSINESS MODEL FOR UNIVERSITY OF THE FUTURE

A possible future business model for UTM is proposed as to give an idea in transforming the university towards a University of the Future [10, 23]. It is also created based and referred on its current UTM Global Plan 2012 – 2020, UTM Game Changers and Key Projects:
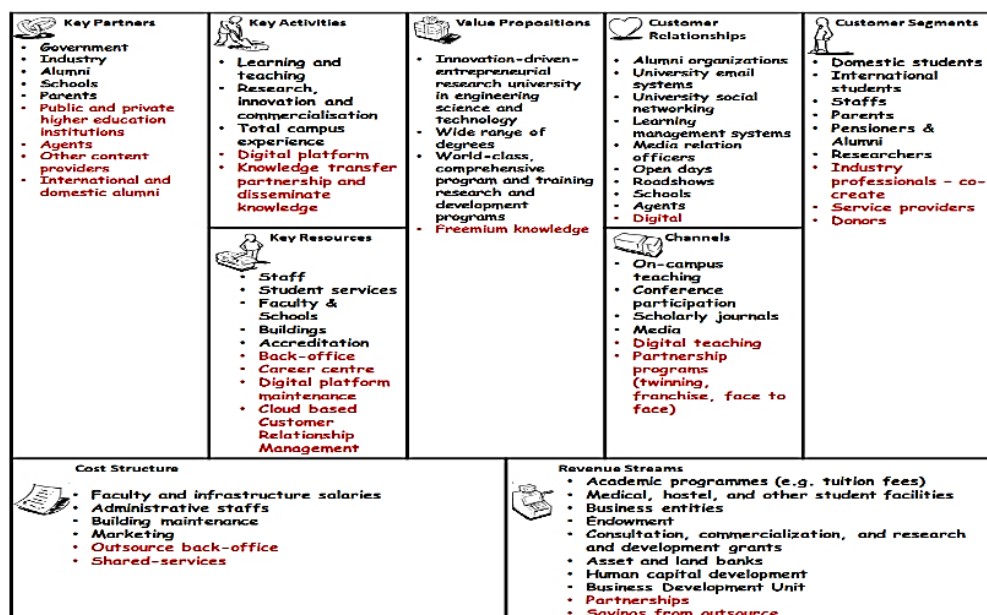

Fig 6: UTM Possible Business Model

- Customer Segments - UTM serves its customers such as domestic and international students, staffs, parents, pensioners and alumni, and researchers. For a future business model, industry professionals, service providers and donors can be added.

- Value Propositions - Freemium knowledge can be adopted in line with the institution's plan transforming the education digitally in turning Customer Segments to choose UTM over other higher education institutions.

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- Key Activities – Initial key activities are fundamental to UTM KFAs in implementing the UTM Global Plan. Digital platform, and knowledge transfer partnership and disseminate knowledge are new ideas to conduct teaching and learning not only in class as well as in virtual.

- Revenue Streams – This has been mentioned in Financial Sustainability, one of the UTM Game Changers. Other revenue streams that can be generated to the institution are partnerships and saving from outcome.

- Channels – Other than on-campus learning, conference participation, scholarly journals and media, digital teaching and partnership programs can be added on how UTM can interact its key customers.

- Key Partners – For future plan, public and private higher education and institutions, agents, other context providers, and international and domestic alumni can be the next UTM partners

- Cost Structure - To be added, outsource back-office and shared-services in cost structure besides its main costs.

- Key Resources – As a new key resources, back-office, career centre, digital platform maintenance, cloud based Customer Relationship Management are proposed as a digital initiative in transforming the university.

- Customer Relationships – In future, via digital platform UTM can build the strength of customer relationships beside its initiative having alumni organizations, university emails systems, social networking and more.

VI. CONCLUSION

Throughout the study, it is found that UTM Business Case is derived by sources such as IR 4.0 and MEB (HE) 2015-2025. What can be perceived from this is UTM Global Plan (2012-2020) is aligned with 10 Shifts stated in MEB (HE) 2015-2025 and the university is ready to accept the challenge of redesigning its institution to remain relevant and competitive in IR 4.0. Its game changers and implemented key projects are driving the institution towards University of the Future.

In future, this study is to be continued with conducting validation by means of setting up an interview with Chief of Information Officer or any Senior IT Personnel of UTM to discuss the idea of the university plan on digital transformation. The business model proposed could be enhanced further and digital transformation plan could be developed as well. The example of MIT Game Changer – free education can be proposed as well for university's future plan.

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