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EMERGENCE OF ADVANCED DIGITAL TECHNOLOGY TO INCREASE PRODUCTIVITY IN CIVIL AND INFRASTRUCTURE INDUSTRY IN MALAYSIA

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ABSTRACT

Advanced Digital Technology is an automated instrument and resource that collects, stores, or processes data from every organisation's current infrastructure. Advanced Digital Technology uses in Malaysia are growing every day as part of the policies of the ruling government and the Malaysian construction industry is projected to experience a Compound Annual Growth Rate of 4.7% over the prediction period from 2019 to 2024. The construction was funded by the 10th Malaysian Initiative, in which the Government spent heavily in highways, industrial parks, and residential buildings. Within the transportation and development sector, there are range of categories, spanning from homebuilders to businesses who sponsor large government-funded programs. Forecasted that embracing the Advanced Digital Technologies by numbers of major Civil and Infrastructure Industry in Malaysia will increase the productivity. Through a technical standpoint, the Civil and Infrastructure business are continuously innovating. By factual, there is productivity stagnant in Malaysian Civil and Infrastructure Industry. Organisations must combine proper adoption methods, which is why it may be one of the fastest sectors to implement modern adoption and to up the current productivity stagnant. Many of the leading players in the civil and infrastructure building industry in Malaysia, backed by an excellent track record of executing large-scale projects on schedule and powered by creative technological technologies that reshape the building market and the decision to integrate Advanced Digital Technology into their

operating system. This paperwork will study in detail regarding these factors and provide suggestions as well for better adoption models of Advanced Digital Technology.

INTRODUCTION

Advanced digital technologies have enabled entirely new digital products and business models, or enhanced traditional ones as exemplified by smart moves. Innovations in automotive production processes allow for new modes of human-to-machine interactions [1] Digital technologies provide incentives to improve the cycles of production, effectively rising the costs of Research and Development (R&D) and market penetration [2]

The Malaysian Government also emphasizes the construction of infrastructure; as necessary for the country's economic development by growing infrastructure facilities to keep up-to-date with the need for economic growth and transition-related programs aimed at developing socio-economic infrastructure. In the Malaysia Development Plans, Civil Infrastructure has provided the highest share of public-sector growth spending. The volume of money available for infrastructure growth has progressively risen, and sometimes by quite large amounts, from the first Malaysia Strategy until present [3].

Similarly, in the following Figure 1, [4]depicts the result from a study conducted to determine the most limiting factor for the new technology adoption. The findings suggest that most respondents agreed the factors such as budget, lack of staff supports, the seriousness of the application and knowledge lacking, are the restrictive factors in new technology adoption.

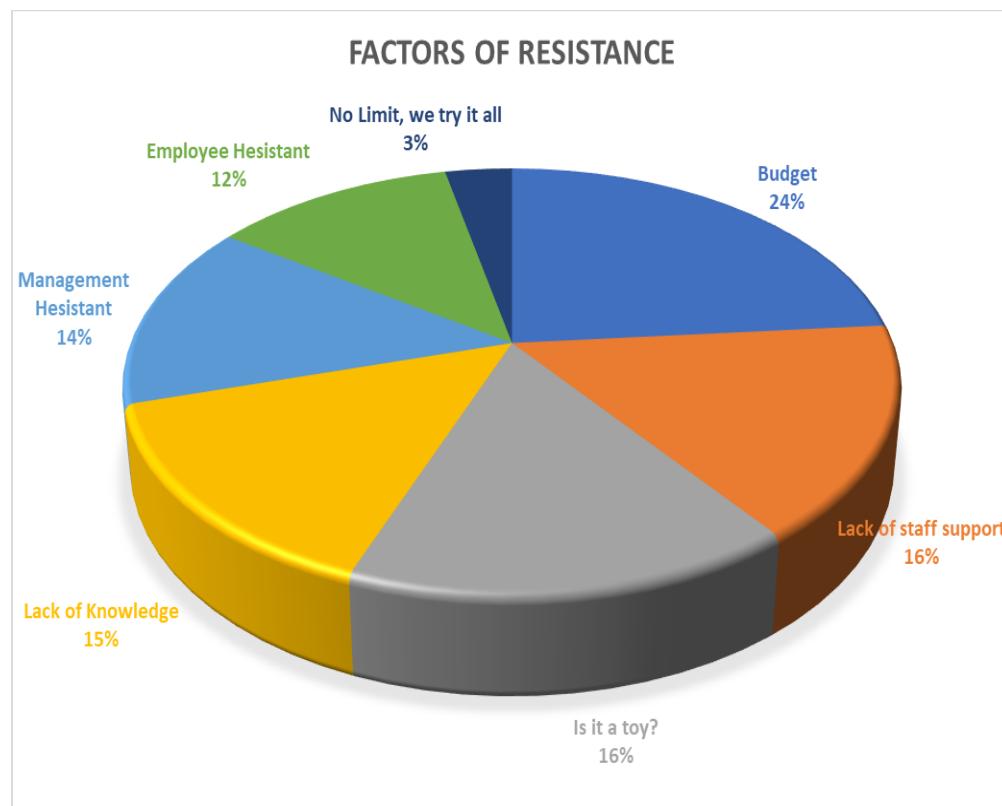


Figure 1.Key Restrictive Factor in Technologies Adoption[4]

Industries differ in their products, processes and how they engage in innovation. Similarly, while the automotive sector has automated important parts of its production processes, others such as agriculture are less advanced. Understanding differences is critical to inform policy aimed at supporting those innovation systems, yet there is currently little systematic evidence about the sector-specific impacts of digital technologies on innovation [1]. Technology has simplified the development process but this innovation has not yet achieved the possible benefits of efficiency due to the lack of synergy between applications [4].

Coordinated institutional changes would be required to implement the economic gains required to attain nation status at high revenue. Areas where reforms can provide the greatest boost the productivity include enhancing the quality of education and skills preparation, encouraging innovation, leveraging emerging technologies, facilitating a well-functionality competition policy mechanism, improving labor market functionality and the regulatory framework for Small and Medium-sized Enterprises (SMEs), supporting regional integration [5].

Figure 2 displays the adoption factors among the Malaysian companies and factor of independent and dependent variable. Musa states that the adoption among Malaysian companies can be divided by two variables, the Malaysian Standards (regulations) and SME Performance (productivity).As Malaysian authorities (e.g. CIDB, SIRIM, SSM, etc.) have requirements to be followed, factors such as regulation and companies characteristics and also the external factors, will affect the adoption of SMEs.

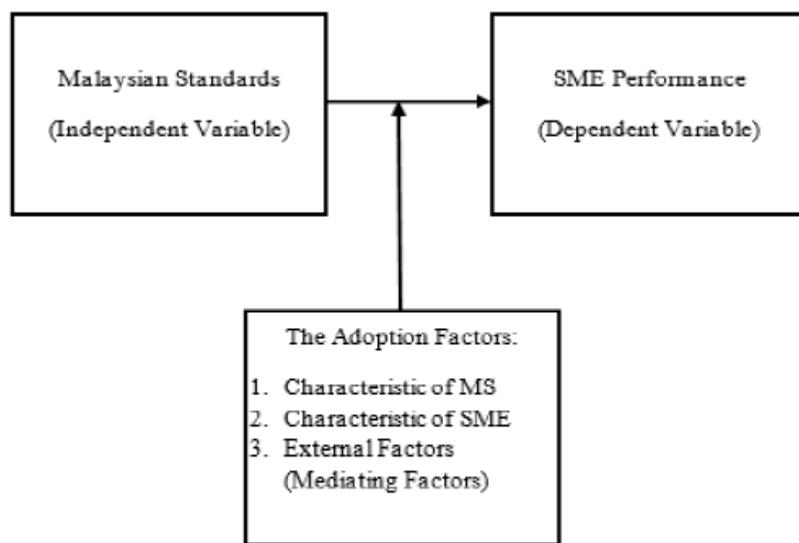


Figure 2.The Adoption Factors among Malaysian Companies[3]

The external factors that highlighted above can be varied by type of companies, no. of workers, level of workers, education background, skills and semi-skills, compensations and other factors. Figure 3 displays the fear factors among the employees, for digital transformation. Any of the key resistance

causes, such as overlapping interests, lack of experience with technology, aversion to modern strategies, among others[2].

CULTURE CLASH

Entrenched attitudes of fear and ignorance beat down digital transformation within many corporate cultures.

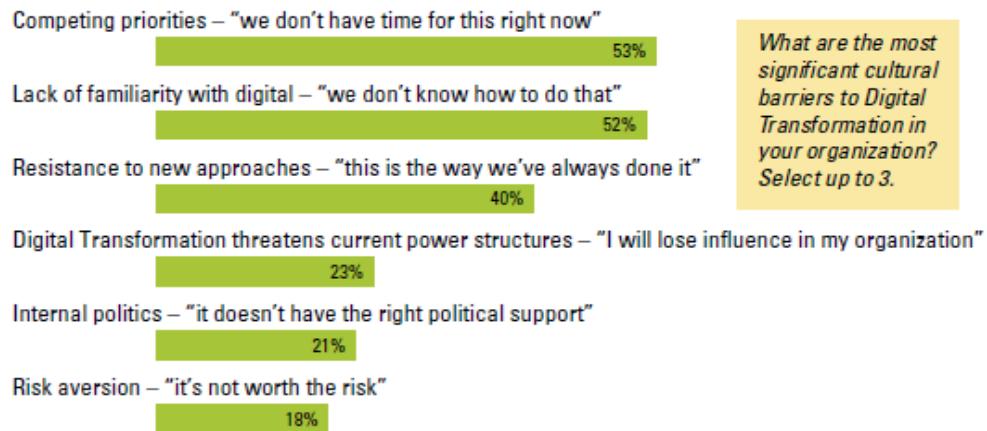


Figure 3.The Fear Factors for New Technology Adoption[2]

EMERGING TECHNOLOGY TO ENHANCE PRODUCTIVITY

There are quite number of emerging technologies in Civil and Infrastructure Industry in Malaysia. For example, Building Information Modelling (BIM) is one of the latest advanced technologies in this industry. BIM is an emerging strategy in the building sector, while the principles of BIM have been around for several years [6]. Figure 4 demonstrates the advantages of BIM, and the concept is to create the building remotely, meaning that all facets of the building can be planned before site construction begins.

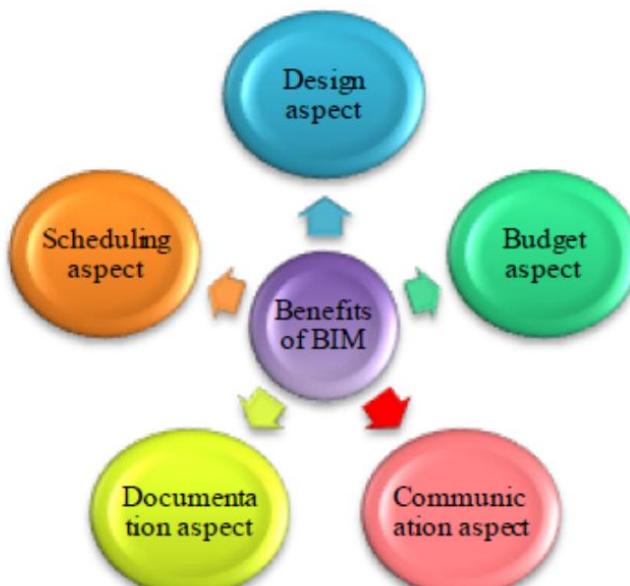


Figure 4. Benefits of BIM[6]

The benefits of BIM can be considered in five key aspects such as design, budget, communication, documentation and Scheduling. These five aspects are the pillars of BIM and create the base of the BIM [7]. The government invites construction players to apply BIM, for its enormous potential to promote problem-solving building projects. For example, BIM may prevent disputes between building parties, monitor the sum necessary for each structure, reduce construction costs and remove project delays [6]. There are many other emerging technologies and most of it are scientific advancement, including social life. In the modern era people concentrate on producing and selling goods and services through digital data, content, and knowledge[7]. As highlighted in [8], there are at seven innovations which have major positive impacts on productivity.

- i. Artificial Intelligence (AI): A computer science area dedicated to the development of computer systems that perform tasks similar to human ones, especially those involving learning and decision-making.
- ii. The Internet of Things (IoT): The notion of the Internet is no only just a social network on which individuals interact with each other through devices, it is instead a mobile medium for remotely interacting with the environment around them.
- iii. Blockchain: Digital-ledger infrastructure in which permanent transactions are publicly registered and rendered accessible via a database network, thus allowing for decentralized collection, storing and knowledge transmission.
- iv. Autonomous Devices: The most widely known autonomous device is the self-driving vehicle which has the ability to partially or completely navigate its surroundings without human intervention.
- v. Robotics: The number of various technologies enabling the automation of manufacturing processes continues to increase, so does the role of robotics in both services and in the development of products.
- vi. New Materials: A catchall word, relating to physical material inventions. With breakthroughs in chemistry and advances in nanotechnology (the capacity to control matter at the atomic or molecular level), developing and mass-production of products with increasingly advanced properties is becoming simpler for engineers.
- vii. Convergence: Technologies are not only discreetly established but are often converging in their application.

To add on, according to [9] highlighted that it seeks to implement many sector-wide enhancements, such as higher levels of efficiency and greater quality construction goods. Reports and case studies from various areas of the world have shown that prefabrication and assembly is becoming standard procedure at the site.

PRODUCTIVITY STAGNANT IN CIVIL AND INFRASTRUCTURE INDUSTRY IN MALAYSIA

To achieve a high-income nation rating for Malaysia, improvements in efficiency must accelerate growth rather than pure accumulation of capital and labor inputs. As in other emerging economies in East Asia, productivity gains during the early industrialization period in Malaysia stemmed from the

reallocation of underused rural labor from the agricultural and mining sectors to the labour- manufacturing sector, backed by capital accumulation and imported technology from increased Foreign Direct Investment (FDI) [5].

Figure 5 below is showing the declining numbers of average of growth of labor productivity (of some nations, including Malaysia), since year 2001.

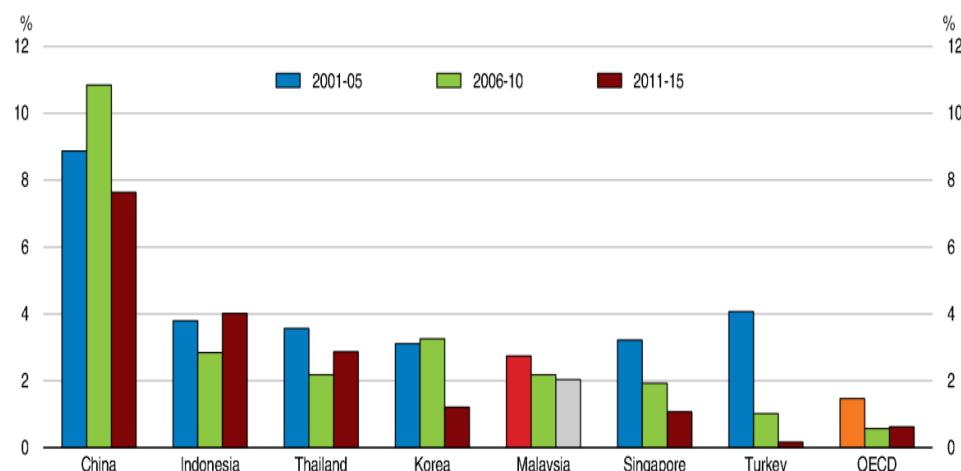


Figure 5.Labor Productivity Growth[5]

The underlying causes included poor potential for innovation due to insufficient funding, underdevelopment of systemic structures to facilitate innovation commercialisation and insufficient development of technical infrastructure [5].

Improving the efficiency of the building industry and solving the inherent challenges such as competitiveness and workmanship results, productive design and production procedures, better quality materials and goods, good management of the enterprise and supply chain also driven the need for creativity and the introduction of modern construction methods and technology in the industry[10].

Many problems presented by the project's services. The concerns include delay, polluted building sites, difficult and hazardous site conditions, inadequate job practices and construction site accidents. These concerns negatively impacted the company. They are indicators of flaws in the Malaysian building sector. However, approaches to these issues can be addressed by Information and Communication Technology (ICT)[9].

Disparities in capability and expertise for taking on new digital technologies lead to growing the differences in efficiency across businesses and industries. This may contribute to mid- to long-term "dual economy" circumstances in which creative, technologically advanced and highly competitive industries or businesses coexist with older, low-performing industries that do little to benefit from emerging technology[1].

Conversely in [11] stated that in the construction industry, performance will have to include more than just contractors. Architects and engineers will also

need to be concerned, as 50% of the errors can be traced to structural faults for the three contributing factors to production defects (material faults, layout faults and design faults), whereas 40% can be attributed to construction faults and only 10% to technical faults. The project-based design of the building sector, the increasingly dynamic coordination system on contracts, and the vast volume of data usually managed by general contractors all demonstrate the need for flexibility in handling the building cycle. Technology has simplified the construction cycle, but due to the lack of synergy between applications this technology has not yet achieved the anticipated productivity gains [4].

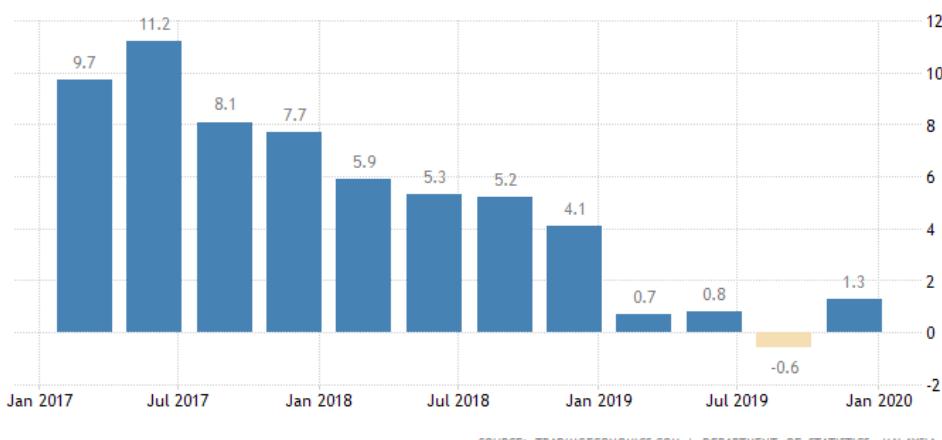


Figure 6.Malaysia Construction Output, 2017-2020 Data [12]

Figure 6 above indicates Malaysia's Construction Production falling numbers (year 2017 – 2020). The graph reveals that development saw a decrease before the end of 2019 and saw just a modest rise for the first quarter of 2020[12].

ADOPTION OF PRODUCTIVITY MODELS RELATED TO TECHNOLOGY

By research, [13] note the importance of method (theory) for application deployment and how more theory can be applied to relevant business and ecosystem for the introduction of emerging technologies. Throughout the current world, these two considerations are main variables that cannot be ignored as considerations such as desire to use and use actions. As reported, the Technology Adoption Model 2 (TAM2) model is capable of performing well in both voluntary and mandatory contexts, which can be strongly correlated with the current Malaysian civil infrastructure market. Figure 7 indicates interlinkages between the TAM2 model and factors relevant to the product adoption cycle.

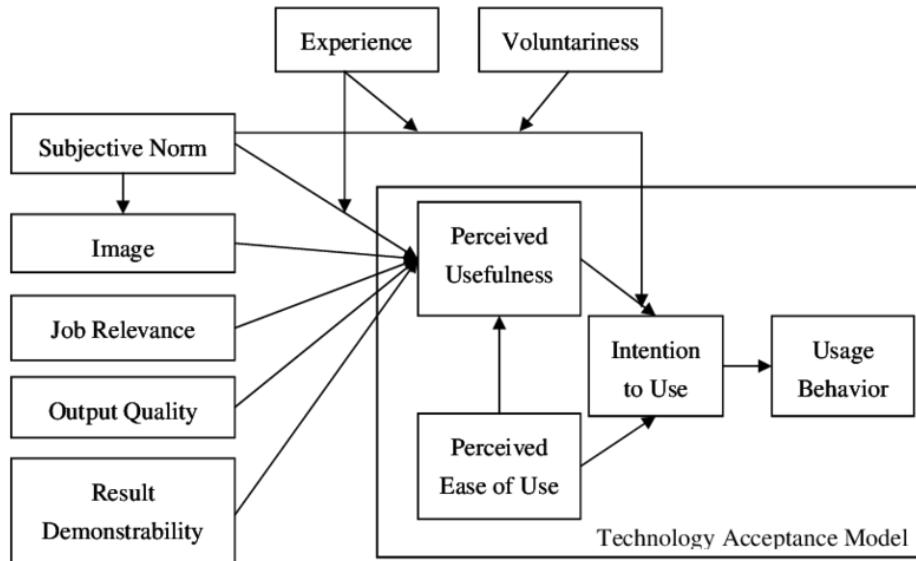


Figure 7.Technology Acceptance Model 2 (TAM 2)[13]

There is no one thing stopping the digital transition. Most organizations were afflicted with loss of ambition or sense of urgency, society at some and issues with corporate limitations at even some. Lack of urgency Complacency impacts more companies than every other organizational challenge found in our report, with approximately 40 percent of respondents believing that lack of urgency or no sense of burning the internet is the single biggest barrier to digital transformation[2].

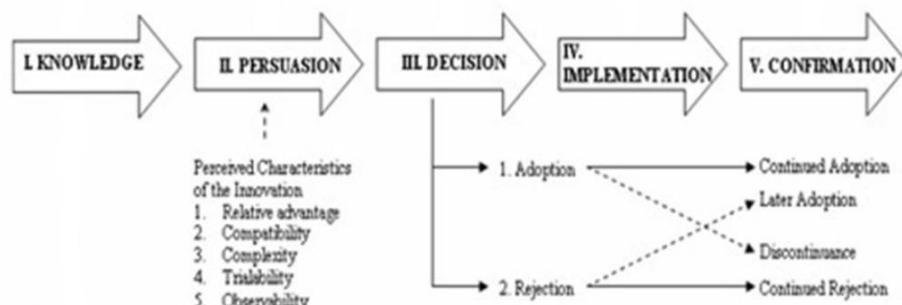


Figure 8.A Model of Innovation Decision-Process[3]

As some earlier adoption methods, diffusion process by which social network users express a concept over time through various networks. Figure 8 above is a model showing the Innovation Decision-Process that considers that the decision to implement (an invention) is definitive or voluntary, a decision on invention by representatives of a social network is taken in four stages. Knowledge is the first step, in which social network participants tend to get an understanding of the invention and how it functions. Persuasion is the second level, in which they develop an attitude towards creativity (favorable or not). The third step, 'choice,' is the choice to adopt or not to adopt. The introduction of the innovation takes place in the fourth level, 'confirmation,' in which consumers often test the innovation on the basis of their decision [3].

CONCLUSIONS

Depending on the study's shortcomings, it is strongly advised in the future projects, to have more businesses and industry histories taken as a sample for the same report. While the Civil and Infrastructure Industry listing is not a poor choice, it may also be skewed and not reflect the overall picture of all Malaysian industries. The report also centered on some of the big players in the Civil and Infrastructure sector, and problems of technological acceptance may not be the same as those affecting other Small and Medium-sized Enterprises (SMEs). This may also contribute to the study's diversified result, as more SMEs are interested in the testing. The respondents should even be expanded by having additional details beyond a single agency would offer the system's broader image and its implementation much more.

For potential studies, primary data will be used to provide some of the new knowledge and reviews than secondary data. The secondary data issue is the 'not-to-date' which may also offer a misleading picture than the actual real scenario. The drawbacks for this research existed are those as the survey unit used, as the analysis was performed on just one entity. This may contribute to skewed facts and misinterpretation of business as a whole. The data used is secondary and not the new, as the main data is often best for having the scenario's real picture. Access to knowledge is constrained and sensitive considerations are influenced by the industry's truthful condition.

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