INFLUENCING FACTORS OF DECISION-MAKING FOR EMERGING TECHNOLOGIES ADOPTION IN THE CONSTRUCTION INDUSTRY

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SUPERVISOR'S DECLARATION

We hereby declare that We have checked this thesis and in our opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Science
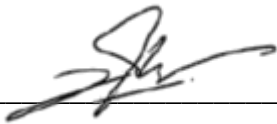
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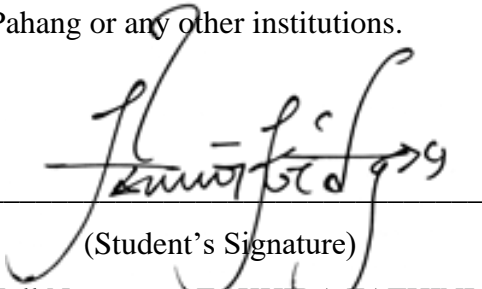Full Name   : Dr. Ahmad Tarmizi Bin Haron

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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Ah, we find ourselves at the curious intersection where sunshine meets shadow, the very climate in which this thesis came to life. Welcome, dear reader, to the paradoxical land of Gratitude—a realm both cheerful and contemplative, like a summer picnic held in a graveyard.

First in the spotlight, yet comfortable in the shadows is, Assoc. Prof. Ts. Dr. Abdul Rahimi Abdul Rahman. Sir, you have been the Gandalf to my Frodo, guiding me through the Middle Earth of academia, minus the Orcs and with far less walking. Like a dependable umbrella, you offered shelter during academic downpours and poked me when I veered off-course. Your guidance was akin to a double-edged sword—sharp, effective, and occasionally a cause for stitches. Dr, my hat is off to you; please check it for rabbits.

Now, let us traverse the emotional spectrum to my father, affectionately known as Ayah. You were the proverbial silver lining in my cloud of thesis woes, always there to assure me that every scholarly rainstorm was but a prelude to a rainbow of success. You claimed nothing is impossible, which is technically untrue—teleporting, for example, remains quite elusive. Nevertheless, your words served as a shovel, aiding me in digging myself out of scholarly holes.

As for my mother, Ibu, you are akin to a comforting cup of tea that I suspect has been brewed using the wisdom of ancient sages—or perhaps just Earl Grey. You taught me to trust divine plans and in the effort of the homo sapiens, a blend as odd yet as wonderful as pineapple on pizza. Ibu, you are the Yin to my Yang, the cup to my saucer.

Lastly, to the unspecified souls, known and unknown, who lent a hand or merely a pinkie in the vexing venture of this thesis—I cannot specify what you have done, mostly because I am not entirely sure. Yet, I send you a thank you that is as heartfelt as a mystery novel without its final chapter; something is missing, but the emotion remains.

So here we are, my dear reader, at the epilogue of this gratitude. Like an explorer marking the X on a treasure map, each of you has added immense value to this journey. Should you leave this page with anything, let it be the knowledge that my gratitude is as genuine as a pirate's love for the sea. Thank you!

ABSTRAK

Era kontemporari ditandai dengan perkembangan teknologi pada kadar yang belum pernah terjadi sebelum ini, memaksa industri di seluruh dunia untuk menyesuaikan diri atau berisiko menjadi usang. Terutamanya di kawasan seperti Malaysia, dengan lanskap ekonomi yang dinamik dan aspirasi infrastruktur yang tinggi, keperluan untuk kekal selari dengan teknologi menjadi semakin ketara. Di tengah-tengah transformasi digital yang mempercepat di pelbagai industri, sektor pembinaan Malaysia menghadapi keperluan untuk mengadopsi teknologi baru yang muncul. Kajian ini berhasrat dan bertujuan untuk mengenal pasti faktor-faktor kunci yang mempengaruhi adopsi teknologi baru (ETC) dengan metodikal dan membangunkan model persamaan struktural yang komprehensif untuk menganalisis hubungan mereka, memberikan pemahaman yang lebih mendalam tentang dinamik ETC dalam bidang arkitek, kejuruteraan, dan pembinaan (AEC). Didorong oleh tujuan ini, tiga objektif utama diidentifikasi iaitu mengenal pasti faktor-faktor pengaruh, menyelidik faktor-faktor pengaruh utama untuk mengadopsi ETC dalam Industri Pembinaan Malaysia dan menubuhkan hubungan antara faktor-faktor pengaruh utama untuk mengadopsi teknologi baru dengan memodelkan konstruksi asas. Menggunakan pendekatan campuran, fasa kualitatif awal melibatkan temu bual separa berstruktur dengan pengurus projek dari entiti pembinaan Malaysia yang dinilai G7. Wawasan dari interaksi ini, digabungkan dengan ulasan literatur sistematik 211 artikel, membentuk asas untuk fasa kuantitatif seterusnya, yang melibatkan pengedaran soal selidik kepada spektrum profesional pembinaan yang lebih luas. Soal selidik ini mendestil 35 faktor pengaruh dari kedua-dua literatur dan dialog praktisi. Melalui teknik analisis data yang ketat termasuk Average Score Ranking, Agreement Analysis, Exploratory Factor Analysis (EFA), dan Structural Equation Modelling (SEM), faktor-faktor ini berkumpul di sekitar tiga tema utama: sumber organisasi, matlamat, dan strategi, dengan strategi menjadi faktor pengaruh utama dalam keputusan adopsi ETC. Kesimpulannya, eksplorasi ini memperkaya pemahaman kita mengenai faktor-faktor yang memperkuat atau menghalang adopsi ETC, menawarkan wawasan berharga kepada kedua-dua dunia akademik dan industri untuk mengoptimumkan integrasi teknologi baru dalam lanskap pembinaan.

ABSTRACT

The contemporary era is marked by an unprecedented pace of technological evolution, compelling industries globally to adapt or risk obsolescence. Particularly in regions like Malaysia, with a dynamic economic landscape and ambitious infrastructural aspirations, the urgency to stay abreast with technology becomes even more palpable. Amidst the accelerating digital transformation across various industries, the Malaysian construction sector confronts the imperative to adopt emerging technologies. This study aspires and aims to methodically identify the key factors influencing emerging technologies (ETC) adoption and to develop a comprehensive structural equation model to analyze their relationships, providing a deeper understanding of the ETC dynamics within architectural, engineering, and construction (AEC) arenas. Driven by these aims, the triad of objectives are identified influential factors and scrutinize its most influential factors to adopt ETC in Malaysian Construction Industry and establish the relationship between the most influential factors to adopt emerging technologies in the Malaysian Construction Industry by modelling the underlying construct. Embracing a mixed-method approach, the initial qualitative phase involved semi-structured interviews with project managers from G7-rated Malaysian construction entities. The insights from these interactions, combined with a systematic literature review of 211 articles, laid the groundwork for the subsequent quantitative phase, which entailed disseminating questionnaires to a broader spectrum of construction professionals. The questionnaire survey distilled 35 influencing factors from both the literature and the practitioner dialogues. Through rigorous data analysis techniques including Average Score Ranking, Agreement Analysis, Exploratory Factor Analysis (EFA), and Structural Equation Modelling (SEM), these factors gravitated around three primary themes: organizational resources, goals, and strategies, with the strategies presenting as a decisive influencing factor in ETC adoption decisions. Conclusively, this exploration amplifies our grasp of the influencing factors that either bolster or inhibit ETC adoption, offering invaluable insights to both academia and industry to optimize the integration of emerging technologies within the construction landscape.

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