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Digitization Factor in Improving Planning Application System Delivery Between Local Authority in Malaysia

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Abstract. Digitization significantly enhances the efficiency of project delivery in construction by improving decision-making, collaboration, and integrating advanced technologies like Building Information Modelling (BIM), Virtual Reality, Augmented Reality, and Artificial Intelligence. The Malaysian government has been leveraging digital technologies to streamline the planning application process and to reduce approval times. However, challenges remain, as stakeholders have reported negative feedback due to a lack of a holistic approach in critical areas of the planning application system delivery. This study examines the current implementation of planning application process among local authorities in Malaysia and identifying the factors that drive successful digital transformation. The research method, including surveys and interviews, the study identifies four key components crucial for digital planning applications: Leadership and Governance; Administration, Organization, and Management; Human Capacity, Capability, Culture, and Skills; and Infrastructure, Cyber Security, Privacy, and Resilience. Additionally, eight sub-components were identified as essential for improving digital planning application delivery. The findings highlight that while digitization enhances processing times, data accessibility, and stakeholder engagement, challenges like digital literacy and infrastructure gaps persist. This paper suggests a framework to address these challenges and further leverage digital technology in planning application system delivery.

1. Introduction

In the digital era, the adoption of Information and Communication Technologies (ICTs) in public administration has fundamentally transformed the way governments operate and interact with citizens. This shift towards e-government is characterized by the digitization of public services, leading to significant improvements in efficiency, transparency, and accessibility across various sectors. Globally, countries are leveraging digital tools to streamline administrative processes, enhance service delivery, and promote citizen engagement (Heeks, 2006). According to the United Nations E-Government Survey 2022, over 80% of countries have implemented some form of e-government, with many focusing on digitizing critical sectors like construction and urban planning to manage the complexities of modern development (United Nations, 2022). Digitization in public administration has resulted in notable

advancements in handling administrative processes, particularly in sectors that are traditionally complex and document-intensive, such as construction and urban planning. Digital platforms allow for more efficient processing of applications, better tracking of project approvals, and enhanced coordination between various government departments (Janssen & Estevez, 2013). The global trend towards digitization in these areas underscores the need for robust digital infrastructure and systems that can support the growing demands of urbanization and development.

1.2 Digitization in Malaysia's Public Administration for Construction Applications

A significant milestone in Malaysia's journey towards digitization in the construction sector is the introduction of the Construction 4.0 Strategic Plan. This plan, launched by the Construction Industry Development Board (CIDB), seeks to align the Malaysian construction industry with the principles of Industry 4.0, emphasizing the integration of digital technologies, automation, and data analytics into construction processes (CIDB, 2021). The Construction 4.0 Strategic Plan focuses on leveraging technologies such as Building Information Modelling (BIM), Internet of Things (IoT), artificial intelligence (AI), and robotics to drive productivity, sustainability, and safety in the construction industry. The Construction 4.0 Strategic Plan underscores the importance of digitized planning and application systems as a foundational element for the industry's transformation. By digitizing construction application processes, local authorities can ensure that all project submissions comply with the stringent requirements of Construction 4.0, including the integration of smart technologies and data-driven decision-making. The initiative by Ministry of Housing and Local Government (MHLG) with introducing OSC Online platform to expediate the planning application process is a major step towards public services digitization.

1.3 Importance of Planning Application for Construction in the Local Context

In the context of Malaysian local governance, planning application for construction are essential for managing urban development and ensuring that projects comply with regulatory requirements. Planning application approval stage is where the existence of communication and collaboration between developers, contractors, and local authorities, facilitating the submission, review, and approval of construction projects. Effective planning application process are crucial for ensuring that construction projects align with local zoning laws, environmental regulations, and community planning objectives. The digitization of these planning application process, as envisioned under Eleventh Malaysia Plan (MP-11) extended in the Construction 4.0 Strategic Plan. The OSC Online introduced by MHLG a decade ago and the latest improved version in OSC 3 Plus Online, has brought about several benefits, particularly in terms of efficiency and transparency. Digital platforms enable quicker processing of applications, reducing the time required for approvals and minimizing the risk of errors in documentation. This is particularly important in the construction sector, where delays in project approvals can lead to significant financial losses and project overruns. Moreover, digitized systems enhance transparency by allowing applicants to track the status of their applications in real-time, ensuring that the process is fair and accountable.

1.4 Digital technologies adoption in improving Planning Application system delivery

To overcome crucial issues in Planning Application, governments initiated in improving system delivery performance. Literature founds many countries establishing steering committee and special task force to study and conduct enhancement program. Digital technology has been promoted by World Bank to improve system delivery. With the recommendation, there have increase of digital adoption by many countries in recent years. Singapore's construction industry has experienced different stages of growth for IT since the inception of CORENET in 1995 (Hua, 2013). New Zealand on the other hand use MultiProof as a system for building plan submission (M & Hakim, 2020). Finland also among countries that leveraging digital technologies in improve permitting system. In 2011, a joint project between municipalities and companies was started under the SADe initiative, which resulted in the creation of Lupapiste, an electronic service for processes pertaining to the built environment, in 2013 (Procter & America, 2019). Malaysia launch One Stop Centre (OSC) 3.0 Plus Online System in 2022 as part of Malaysian Twelfth Plan (MP-12) in improve planning application services through digitization. OSC 3

Plus Online is an electronic system for submitting applications and processing applications for development control.

1.5 The problems in digital Planning Application process in Malaysia

The problems ranges vary in areas including the stakeholders, documents, process and procedures. The delay is a main issue in the planning application approval. Delay is also caused by the OSC Department counter since the counter runs short on manpower and expertise even though the current officers at the OSC Department are capable in terms of skills and knowledge (Marzukhi, 2019). Human factors are known as among the important factors in planning the application process. With the working experience will impact to the smooth process. Principal Submitting Person "PSP" is still lack of understanding of process requirements and procedures OSC (Bashir, 2018). The respondent also highlights how some local authorities responded to queries pertaining to applications depending on their mood (Ismail et al., 2022). The scholar also discussed the challenges during processing planning application process is due to consistency. The literature highlighted that the planning application process feels challenged by inconsistent comments given by technical agencies which depend on officers that are in charge (Ismail et al., 2022).

Besides that, there are other factors which are related to procedural issues. There are still local authorities that do not yet adopt online submission hence needing more hardcopy submissions than what is stated in the manual OSC 3.0 Plus (Ismail et al., 2022). While the rules and regulations also contribute a major impact towards efficient and fast planning application process. Among the reason which highly debated is the complicated requirement and too many documents a plan required for submission (Firdaus, 2013). Literature found scholar repetitively highlighted the procedural challenges in their discussion. Most of the local government introduce too many procedures or costly in term of getting permits, (M & Hakim, 2020). From the discussion, there are many factors that impact towards successful digital planning application implementation. To identify the key component and critical areas in the planning application is crucial to understand the issues and the challenges at a root level.

2. Aim and Method

The aim of the study is to identify a key component in planning application system delivery. To achieve the objective, field survey has been conducted to collect relevant data to the study. The samples collected from thirty (30) respondents that were involved in the planning application process. The questionnaires survey has been distributed to private consultants and public agencies including OSC secretariate and technical departments officer. The data obtained from the field will be used for the next stage analysis to extract the components, sub-components and super subcomponents. Another critical part of the study is to extract digitization factor from selected E-Government/digital Government framework. Both result from field data and literature review will be crossed examined to finalize the suitable and relevant elements, sub-component and component in digital planning application system delivery framework.

3. Results and Discussion

3.1 Digital Government Framework

The digital or e-government system delivery framework serves as an essential reference for grouping the key components of the Planning Application system delivery. The E-government framework by (Lee et al., 2018), the World Bank DGRA Team framework (DGRA Team, 2020), the E-government challenges framework by(Jermsittiparsert et al., 2022) , and the USAID digital ecosystem framework(Saxton-Fox et al., 2020). The components from each of these frameworks have been analyzed and adapted to fit the context of Planning Application system delivery. It is common for researchers to classify a large set of individuals, tasks, or objects into smaller, mutually exclusive groups based on shared characteristics (Ward et al., 1963). Nine components based on four frameworks have been identified, which are depicted in Table 1:

Table 1. Digital and E-Government framework components and sub-components tabulation

Framework	Components								
Lee (2018)	Data	Technology	Service	People	Governance				
World Bank DGRA (2020)	Leadership & Governance	User centered design	Public Administration & Change Management	Capabilities, Cultures and Skills	Technology Infrastructure	Data Infrastructure, Strategies and Governance	Cyber security, Privacy and Resilence	Legislation and Regulation	Digital ecosystem
Wang et al (2010)	Laws and legislation	Budgeting	Digital culture	Managerial issue	IT Infrastructure	Human Resources			
USAID (2020)	Digital society, rights and governance	Digital economy	Digital infrastructure and adoption						

3.2 Field data collection and analysis

3.2.1 Demographic Information

Section A was built-in multiple-choice questions, and it is concerning on demographic information and the respondents are required to answer based on the items listed. The purpose of this part is to obtain information from respondents regarding on the designation in the organization, working experience in the industry, their level of education and involvement in Planning Application system delivery.

Table 2. Summary of the respondents' demographics

Item	Category	Frequency	Percentage %
Gender	Male	21	70
	Female	9	30
Age	Below 25 Years	2	7
	26 To 35 Years	13	44
	36 To 45 Years	10	33
	46 To 55 Years	4	13
	Above 55 Years	1	3
Academic Qualification	Diploma	2	7
	Bachelor's Degree	23	77
	Master	4	13

	Other	1	3
Job Position	Government Officer	7	23
	Civil Engineer	15	50
	M&E Engineer	3	10
	Quantity Surveyor	1	3
	Project Manager	2	7
	Other	2	7
Working Experience In Construction	Below 1 Year	1	3
	1 To 5 Years	5	17
	6 To 10 Years	10	33
	Above 10 Years	14	47

3.2.2 Digitization Factor in Planning Application System Delivery

This section is very critical part of the data collection which concerning on the factor that affecting digital Planning Application system delivery implementation. This section objectives are to obtain stakeholders point of view towards digitization factor. This section consists of closed end questions and the respondent to choose according to the importance level. The variables have been analysed using SPSS version 26 Rotated Component Matrix analysis to identify the Factor Loading and variables clustering. The analysis result as shown in Table 3, Table 4, Table 5 and Table 6 respectively.

For the component Leadership and Governance (LG) as shown in Table 3.0, the analysis identified that there are three sub-components existed in the key component. The sub-component named as LG1, LG2 and LG3. The sub-component LG1 comprised of variables DF4, DF2, DF1, DF3, DF8 and DF9. In the sub-component LG1, the highest FL is 0.898 and the lowest FL is 0.742. For sub-component LG2, the variable in this group is DF18, DF19, DF20, DF17, DF16 and Df13. The highest FL recorded is 0.907 and the lowest FL is 0.670. Meanwhile, the third sub-component LG3 which is comprised of variables DF15 and DF14 recorded the highest and lowest FL 0.819 and 0.519 respectively.

For the component Administration, Organization and Management (AOM), there are two sub-components identified from Rotated Component Matrix analysis known as AOM1 and AOM2. For the sub-component AOM1, the variables cluster in this group is Df6, DF7, DF10, DF5, DF26 and DF1. The highest FL obtained is 0.866 and the lowest FL is 0.694. For AOM2, the variable in this group is DF38, DF25, DF37 and DF40. The highest FL obtained is 0.914 and the lowest FL is 0.738. The details of the sub-component clustering and Factor Loading as described in Table 4.0 below.

For the third key component Human capacity, Capability, Culture and Skills (HCCS), Rotated Component Matrix analysis identified that there is sub-component lies in this group. Table 5.0 below shows the Factor Loading for all the variables in this group. The variables in this group consist of DF24, DF23, DF22, DF11 and DF12. The highest and lowest FL recorded is 0.897 and 0.828 respectively.

The fourth group Infrastructure, Security, Privacy and Resilience (ICPR), there two sub-components identified through Rotated Component Matrix analysis named as ICPR 1 and ICPR2. For sub-component ICPR1, the variable in this group is DF41, DF29, DF30, DF27, DF28 and DF36. The highest FL value recorded is 0.930 and the lowest FL recorded is 0.619. For ICPR2, the variable in the group is DF34, DF31, DF33, DF35, DF42 and DF32. The highest FL recorded is 0.894 and the lowest FL recorded is 0.568. Table 6.0 below summarized the Factor Loading analysis results for this group.

Table 3. Factor loading for Leadership and Governance in Planning Application process

Item	Variable	1	2	3
DF4	Formation of government entity	0.898		
DF2	Establishment goals	0.888		
DF1	Setting up a vision	0.858		
DF3	Establishment of a clear implementation road map	0.856		
DF8	Sustainable funding	0.830		
DF9	Reformation on modernization strategy	0.742		
DF18	Cyber-crime law enactment		0.907	
DF19	Legislation to open access information		0.905	
DF20	Amendment of legacy legislation and regulations		0.847	
DF17	Legislation to cover e payment		0.837	
DF16	Digital identification legislation		0.670	
DF13	Enactment of data protection law		0.584	
DF15	Digital transactions law			0.819
	Mechanism to check the validity			0.778
DF14	Cyber security strategy and policy documents			0.519

Table 4. Factor Loading for Administration, Organization and Management

Item	Variable	1	2
DF6	Understand and support the vision	0.866	
DF7	Clear communication	0.864	
DF10	Cross government referential data shared	0.833	
DF5	Effective structuring and staffing method	0.807	
DF26	Formation of knowledge-based communities	0.700	
DF21	Clear view on transformation agenda	0.694	
DF38	Sharing protocols agreement		0.914
DF25	Tactic for keeping these trained staff		0.832
DF37	Data management strategy		0.777
DF40	Cyber security unit		0.738

Table 5. Factor Loading for Human Capacity, Capability, Culture and Skills

Item	Variable	1
DF24	Mapping a clear path	0.897
DF23	Education and training program	0.884
DF22	Have necessary skills and qualified	0.857
DF11	Invest in changing management practice	0.836
DF12	Establishment of training institute	0.828

Table 6. Factor Loading for Infrastructure, Security, Privacy and Resilience

Item	Variable	1	2
DF41	Computer emergencies respond team	0.930	
DF29	Participation of stakeholders	0.847	
DF30	Integrated multi-channel approach	0.772	
DF27	User- cantered design	0.730	
DF28	Guiding principles	0.705	
DF36	Guidelines for ICT operations/ good practice	0.619	
DF34	Using disruptive technologies		0.894
DF31	Channel for user feedback		0.849
DF33	Secure government wide digital network		0.840
DF35	Contact centre		0.762
DF42	Infrastructure protection plan		0.603
DF32	Interoperability framework		0.568

3.3. Digital Planning Application System Delivery Framework

From the analysis result that has been discussed in section 3.2.2, the components, sub-components and super subcomponents has been simplified as tabulated in Table 7.0 below.

Table 7. Simplification of key components, sub components and super sub components

Components	Sub-Components	Super-Sub Components
Leadership And Governance	**Leadership and Strategy**	Government entity in-charge Specific goals Setting up a vision Implementation road map and strategy Sustainable funding Reformation on modernization strategy
	Regulations	Cyber-crime law enactment Legislation to open access information Amendment of legacy legislation User protection legislation Digital identification legislation Enactment of data protection law
	Transaction and Services	Enactment of digital transactions law Mechanism to check the validity Mandate a cyber security strategy and policy documents
Administration, Organization And Management	**Operations Improvement**	Support the vision Clear communication Cross government referential data shared Effective structuring and staffing Knowledge-based communities Clear view on transformation
	Public Organization Optimization	Data sharing protocols agreement Tactic for keeping trained staff Data management strategy Cyber security unit

Human Capacity, Capability, Culture and Skills		Mapping a clear path Education and training program Necessary skills and qualifications Invest in changing management practice Training institute
Infrastructure, Cyber security, Privacy And Resilience	**Programming, Connection and Gathering**	Computer emergency respond team Participation of stakeholders Integrated multi-channel approach to promote and deliver Development user- centered design Guiding principles to define the design and implementation Guidelines for ICT operations/ good practice
	Protocols and security	Disruptive technologies Channel for user feedback Secure government wide digital network Contact centre Infrastructure protection plan Interoperability framework

From the simplified digital planning application findings as described in Table 7.0, the framework has been developed as shows in Figure 1.0 below. The framework has been sent to five experts for validation. The validation aspect as described in Table 8.0 and the results as shows in Table 9.0 below.

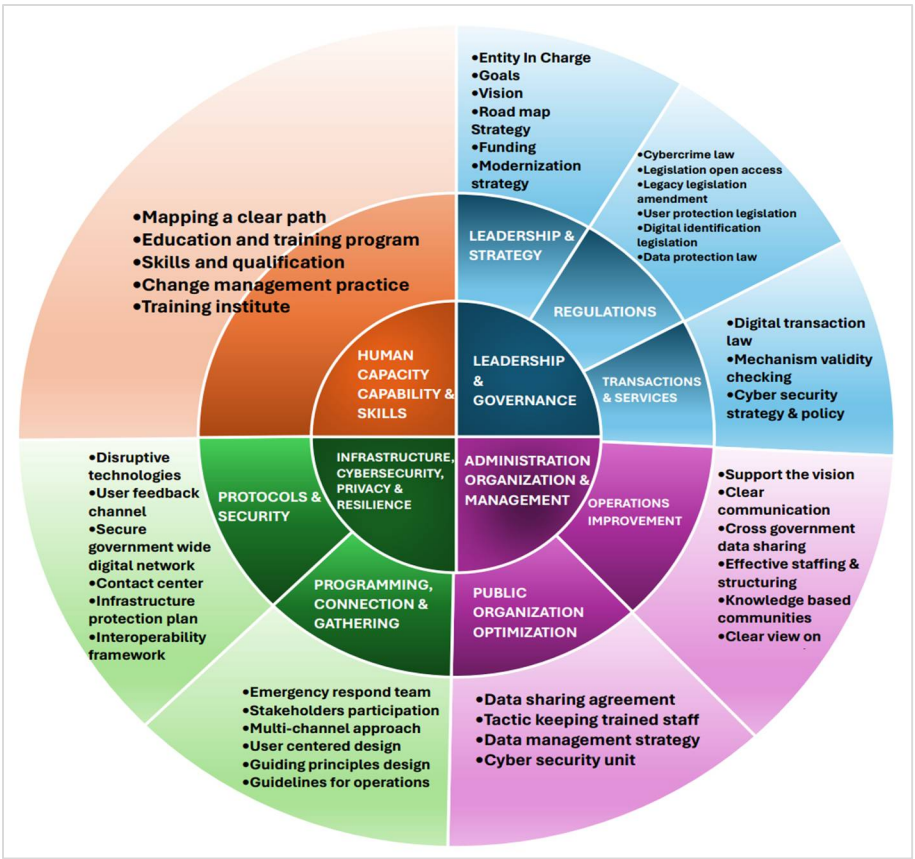

Figure 1. Digital planning application system delivery framework

Table 8. Validation of digital planning application system delivery framework

Aspect	Poor (1)	Satisfactory (2)	Good (3)	Very Good (4)	Excellent (5)
(A1) Degree of readability					
(A2) Degree of choice of word selection					
(A3) Degree of appearance					
(A4) Degree of understanding					
(A5) Degree of message delivery					

Table 9. Respondent validation summary

Respondent	A1	A2	A3	A4	A5
Expert 1	4	4	5	3	3
Expert 2	4	4	3	4	4
Expert 3	3	4	4	3	4
Expert 4	3	4	3	4	3
Expert 5	3	4	4	3	4

4. Conclusion

The result from field data analysis has been used to cross examined with components obtained from E-Government and digital government framework filtration. From the cross-examined stages resulted a cluster of components and subcomponents which use to develop digital planning application framework. The framework consists of four key components which is Leadership and Governance (LG), Administration, Organization and Management (AOM), Infrastructure, Cybersecurity, Privacy and Resilience (ICPR) and Human Capacity, capability, Culture and Skills (HCCS). These frameworks also consist of seven subcomponents and forty-two super subcomponents as described in Figure 1.0.

5. References

[1] Abdullah, A. A., Harun, Z., & Rahman, H. A. (2011). Planning Process of Development Project in the Malaysian Context: A Crucial Brief Overview. In *International Journal of Applied Science and Technology* (Vol. 1, Issue 2).

[2] Ali, S., Rashid, A., & Aziz, A. (2018). AIC 2018: ADVANCES IN MANAGING OPERATIONS AND SUSTAINABILITY Malaysia's Housing Planning Approval: Rent-seeking Behaviours. In *Asia Proceedings of Social Sciences* (Vol. 2, Issue 1). APSS. http://www.utm.my/asia/our team/

[3] Alizadeh, S., & Karrbom, T. (2012). *A study of optimizing the Processing time for Building permits Study Case: Tyresö municipality Master of Science thesis*. *153*.

[4] Anthopoulos, L., Bellos, C., & Vakali, A. (2014a). Building permission smart e-service status: A literature review. *Proceedings of the European Conference on E-Government, ECEG*, *2014 Janua*(July), 15–23.

[5] Bashir. (2018). *Improvement of construction permit process approval at local government in malaysia bashir ahamed bin maideen universiti teknologi malaysia.*

[6] DGRA Team. (2020). *Digital Government Readiness Assessment (DGRA) Toolkit V.31 Guidelines for Task Teams*.

[7] Firdaus, R. (2013). *The Role of One Stop Center (OSC) in Urban Governance in Malaysia : A Case Study of the Approval Process of Planning Permission in Penang Island.* http://www.landentwicklung-muenchen.de/master/master_thesis/Thesis_2011_2013/Firdaus.pdf

[8] Hammah, N. K., & Ibrahim, R. (2014). Analyzing the Effect of Building Permit Issuance on the Housing Delivery System in Ghana. *ALAM CIPTA, International Journal of Sustainable*

Tropical Design Research and Practice, *7*(1), 79–88. http://alamcipta.frsb.upm.edu.my/index.php/alamcipta/article/view/119

[9] Ibrahim, R., & Kweku, H. N. (2018). Streamlining the planning approval process for a sustainable urban development - A case study for unwinding manmade complexities. *Student Architecture Ubran Environment Science Journal*, *1*(1), 1–10. https://doi.org/10.22034/saues.2018.01.01

[10] INSEAD. (2013). *Reforming Construction : Permit Approval in Muscat*.

[11] Ismail, N. N., Abdullah, A., & Ab Rahman, S. S. (2022). Evaluating Quality Delivery and Competency of Planning Permission Submission by Profesional Environment Profesion in Selangor. *ASIAN PEOPLE JOURNAL 2022*, *5*(2), 137–150. https://doi.org/10.37231/apj.2022.5.2.462

[12] Jermsittiparsert, K., Gohwong, S., Harakan, A., Mensah, I. K., & Zeng, G. (2022). *Understanding the drivers of the public value of e-government: Validation of a public value e-government adoption model*.

[13] Johar, F., Yaakup, A., Che'Man, N., Sulaiman, S., & Che Ngah, M. (2007). GIS in development control process : the case of development control system for city hall of Kuala Lumpur. *Jurnal Alam Bina*, *9*(1), 1–20.

[14] Kourakou, G., & Glassey, O. (2015). Digitalize Building Permits Procedure: Canton of Valais, Switzerland. *Electronic Government and Electronic Participation: Joint Proceedings of Ongoing Research and Projects of IFIP WG 8.5 EGOV and EPart 2015*, 169–177. https://doi.org/10.3233/978-1-61499-570-8-169

[15] Lee, J., Kim, B. J., Park, S. J., Park, S., & Oh, K. (2018). Proposing a value-based digital government model: Toward broadening sustainability and public participation. *Sustainability (Switzerland)*, *10*(9). https://doi.org/10.3390/su10093078

[16] M, I. R. B. A., & Hakim, A. (2020). *DELAY IN CONSTRUCTION PERMIT FOR LOCAL GOVERNMENT – A MALAYSIAN EXPERIENCE*. *6*(1), 1–6.

[17] Marzukhi, M. A. (2019). One stop centre (OSC): Lessons on best practices in planning system delivery. *Planning Malaysia*, *17*(1), 104–115. https://doi.org/10.21837/pmjournal.v17.i9.590

[18] Saxton-Fox, R., Davis, N., Baker, M., & Braun-Dorrell, T. (2020). *DIGITAL GOVERNMENT MODEL Background*. https://legalinstruments.oecd.org/en/instruments/OECDLEGAL-0406.