The Dynamics of Continuance Mandatory Usage: Availability, Level of Security and Accuracy in the Ever-Changing Landscape of Maritime Technology

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ARTICLE INFO	ABSTRACT
	This article investigates the relationship between technology continuance mandatory usage and managers? performance within Malaysia's maritime industry. Analysis of survey data collected from 357 managers reveals that various factors, including availability, accuracy, and level of security, significantly influence continuance mandatory usage. Moreover, continuance mandatory usage has a discernible impact on the performance of managers. Notably, this study stands out for its focus on continuance usage, particularly its mandatory aspect among managers in Malaysia. These findings offer valuable insights into strategic technology investment within the maritime sector, emphasizing the crucial role of technological advancement in enhancing managers' performance.

1. Introduction.

For their daily operations, almost all significant players in the Malaysian marine industry, such as port authorities, immigration and customs offices, and terminal operators, mostly rely on technology. For example, Malaysia makes extensive use of the Automatic Identification System (AIS) to detect and monitor vessel movements in real time, which helps with traffic management, collision avoidance, and search and rescue operations. Similar to this, electronic charts—which give navigators access to the most recent data, route planning, and trip optimization—are taking the place of traditional paper nautical charts thanks to the Electronic Chart Display and Information System (ECDIS). Moreover, environmental monitoring, marine domain awareness, illicit fishing identification, and maritime surveillance all make use of remote sensing and satellite imagery (RSSI) (Norzaidi, 2023a; Norzaidi et al., 2022a; 2022b, Norzaidi et al., 2007).

Furthermore, in order to optimize port operations, boost productivity, and increase security, port management systems integrate a variety of technologies, including automated cargo handling systems, closed-circuit television, and radio-frequency identification (RFID). In an effort to increase productivity and save personnel expenses, maritime autonomous surface ships, or MASS, are being used more frequently for hydrographic surveying, oceanographic research, and freight transportation.

The maritime department is also using these technologies as part of a nationwide digitalization project that aims to connect all of its offices via the department's intranet system, called JALIN. This effort streamlines operations and improves efficiency by enabling seamless information access for marine officers and clients, irrespective of their location. Moreover, JALIN increases the capability of document processing by allowing shipping agents and seafarers to request and submit different kinds of documents (Norzaidi 2023a, 2023b).

In a similar vein, in order to improve efficiency, the immigration department, a crucial government body in charge of immigration matters, has embraced technology-based applications. Most notably, the department launched the i-Visa system, which allows candidates to apply online via an extranet plat-

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form. Immigration officials may process applications quickly after receiving passports and cash at specified counters thanks to this system, which seamlessly integrates application data into the department's database.

The information provided highlights the widespread adoption of technology within selected organizations in the maritime industry. However, as the transition from manual to digitalized-based systems progresses over the years, a new challenge emerges: understanding how technology continuance usage contributes to enhancing officers' performance. While the integration of technology undoubtedly brings value to organizations, particularly in developing countries like Malaysia, questions arise regarding its effectiveness and efficiency.

In essence, implementing maritime technologies entails significant costs, prompting organizations to carefully evaluate their necessity and functionality. Therefore, the decision-making process regarding technology installation necessitates the utilization of appropriate mechanisms to assess whether an Information System (IS) is warranted and, once deployed, whether it operates optimally. Consequently, the evaluation of continuance usage mechanisms falls within the realm of the IS discipline and warrants substantial attention from researchers as a critical surrogate measure of IS success (Norzaidi et al., 2023; Pham, et al., 2020; Davis et al., 1989).

Regretfully, there is still a dearth of research on these problems, especially concerning marine managers. As a result, there is a significant research vacuum concerning the determination of a definitive correlation between the manager's performance and the antecedents of continuing mandatory usage. In addition, a great deal of the research that has already been done is out of date, which emphasizes the need for fresher studies that might produce different conclusions in light of the quick development of technology and the advent of additional uses (Hidayat, et al., 2021; Bukhari, 2005).

Furthermore, few studies have examined the connections between managerial success and technological availability, accuracy, security level and continuous mandatory usage. This shortcoming indicates a sizable knowledge gap and can be linked to the few studies that have attempted to investigate every possible aspect of technology's continuing mandatory usage in a single environment. Furthermore, the current body of research is often dispersed, which hinders the development of definitive conclusions.

The absence of comprehensive research has compounded the challenges associated with technology implementation in practice, particularly concerning user acceptance. Hence, in light of these circumstances, the current study aims to address the following research questions:

1. Does availability influence continuance mandatory usage?
2. Does the level of security influence continuance mandatory usage?
3. Does accuracy influence continuance mandatory usage?
4. Does continuance mandatory usage influence the manager's performance?

This study attempts to answer the research questions through the development of a research framework after investigating prior kinds of literature in this context. The next section presents the literature, and propositions are then formulated to be tested in this study.

2. Review of Literature.

2.1. Availability and Continuance Mandatory Usage.

There is a little study that focuses on technology availability and technology security in maritime industry; which most of the studies concentrate on internet banking. Availability refers to the extent to which maritime technologies, such as maritime systems or other digital tools, are accessible and operational for users within an organization. Continuance usage, on the other hand, pertains to the continued utilization of these technologies by maritime officers over time (Norzaidi, 2023a; Davis et al., 1989).

The hypothesis suggests that increased availability of maritime technologies positively influences continuance usage among maritime officers. When technologies are readily available and easily accessible to users, they are more likely to integrate them into their daily work routines. This integration fosters familiarity and comfort with the technologies, leading to a higher likelihood of continued usage (Norzaidi et al., 2022b; Bukhari, 2005). For instance, if a maritime organization invests in robust infrastructure to ensure uninterrupted access to its maritime system, officers are more likely to rely on it for communication, information retrieval, and task management. As a result, they become accustomed to the system's functionalities and may develop a sense of dependency on it to perform their duties efficiently. Therefore, a positive relationship exists between the availability of maritime technologies and the continuance usage thereof, whereby higher availability leads to increased usage over time. This relationship underscores the importance of ensuring consistent access to technological resources to promote their sustained utilization within maritime organizations (Norzaidi, 2023a). Thus, the following hypothesis is suggested:

H1: Availability is a predictor of continuance usage.

2.2. Level of Security and Continuance Mandatory Usage.

Furthermore, among the factors that can affect marine officers' continued use is security. This means that in order to keep information safe from outsiders, high-security controls must be maintained on the computing systems that are used to store and process data. For example, sensitive information such as crew manifests, cargo details, and vessel routes are exchanged during maritime operations, which raises privacy and data protection concerns. To protect this data from illegal access or interception, security measures like encryption, access limits, and secure communication protocols are crucial. The maintenance of data integrity and privacy is essential for the continued use of digital systems, which in turn builds trust among maritime workers and promotes their continued dependence on technological solutions (Norzaidi, et al., 2022a; Goodhue and Thomson, 1995).

Also, ransomware assaults, phishing schemes, and malware infections are just a few of the cybersecurity dangers that pose serious concerns to the marine sector. Sustaining technology use requires strong cybersecurity defenses to identify, stop, and lessen these risks. To safeguard digital assets and preserve operational continuity in the face of changing cyber threats, organizations need to make investments in threat intelligence, incident response procedures, and cybersecurity training (Joshi, 1995; Davis et al., 1989).

Additionally, as security incidents like system failures, data breaches, or cyberattacks can interrupt maritime operations and jeopardize safety, efficiency, and compliance, operational resilience is essential to sustaining ongoing technology usage. Resilience against these dangers is necessary for continuous technology use, and it can be done by redundant systems, backup methods, and disaster recovery plans. Maritime companies can guarantee continuous access to vital technological infrastructure and lessen the effect of security incidents on regular operations by placing a high priority on operational resilience (Norzaidi et al., 2022b).

Further, as the marine sector is bound by a number of regulations pertaining to information management, cybersecurity, and data protection, regulatory compliance is crucial for ongoing use. In order to prevent fines, penalties, and reputational harm, compliance with these standards is required. It is imperative for organizations to establish security controls, audit trails, and governance frameworks in order to exhibit compliance and uphold the confidence of stakeholders regarding their digital activities (Dishaw, and Strong, 1998).

Moreover, because worldwide marine supply networks are interrelated, there are security issues with cargo tracking, port operations, and logistics management. For this reason, supply chain security is essential for continuous utilization. Using technology continuously means enforcing safe supply chain procedures to stop theft, tampering, and illegal activity in port facilities and at sea. By improving supply chain visibility and security, technologies like blockchain, the Internet of Things, and satellite monitoring systems help maritime enterprises preserve the integrity of goods and commodities throughout their voyage. As a result, this hypothesis is proposed:

H2: Level of security is a predictor of continuance mandatory usage.

2.3. Accuracy and Continuance Mandatory Usage.

According to DeLone and McLean (1992) accuracy refers to precision or exactness, thus, information accuracy means the precision or exactness of information. The issue of accuracy of information have become an interactive issue because the inaccurate information is a problem and more obvious, people use the information that they have to make practical decisions, and it can cause harm to their finances (Segar, 1998). Hence, Torkzadeh and Doll (1999), proposed accuracy of the systems as one of the important factors in end-user computing satisfaction measurement. In their study, they tested this attribute with 44 firms, which contained different levels of positions. They found that accuracy is reliable and valid to be one of the attributes for measuring end-user computer satisfaction.

Besides, accurate information from maritime systems is paramount for ensuring the safety of both shippers and vessels. Real-time data, such as vessel location, is invaluable for navigation in the vast ocean. Moreover, precise weather forecasts are essential for determining whether it's safe for vessels to embark on their journeys. This accuracy in maritime technology information is indispensable for various stakeholders, including port authorities, shipping liners, terminal operators, marine departments, shipping agents, and haulers. Thus, the following hypothesis is suggested:

H3: Accuracy is a predictor of continuance mandatory usage.

2.4. Continuance Mandatory Usage and Manager's Performance.

Many studies have signified the relationship between IS usages, to some extent affected by IS variables, and is one of the many variables, which ultimately affect managerial performance. In short, usage is a main caused that influence managers' performance (Norzaidi, 2023a; 2023b; Norzaidi et al., 2022a; 2022b, Markus, 1993). These findings suggest that people ought to utilize system in order to improve their job performance. In other words, the low degree of system usage would reduce performance. In addition, in one-time condition, increase of usage can actually degrade performance. For instance, when there is a fixed task to perform and the system is designed ineffectively thus, it takes more attempts to complete the task than is necessary, or the system is so personally desirable to users that they expend considerable effort using the system in non-productive ways (Torkzadeh and Doll, 1999). In the case of this study, it is postulated that if the officers utilize the systems, this might lead them to achieving better performance. Thus, the following hypothesis is suggested:

*H4: Continuance mandatory usage predicts manager's performance.*

As summary, Figure 1 show the propositions proposed to be tested in this study.

3. Research Methodology.

3.1. Sampling.

The target audience comprised managers working for terminal operators, marine departments, port authorities, and customs in Malaysia. After determining the number of managers, approximately 500 self-report questionnaires were distributed to the relevant corporate and public entities' human resources (HR) departments. The researcher provided clear guidelines for completing the questionnaires. In line with standards outlined in the literature, managers were defined as those holding first- or middle-level management positions. A total of 357 responses were received, yielding a 71% response rate, which is both significantly high and representative of the target population (Sekaran, 2000). This high response rate supports the generalizability of the study's findings. The substantial participation was attributed to recommendation letters issued by

Figure 1: Research Framework and Hypotheses of the Study.
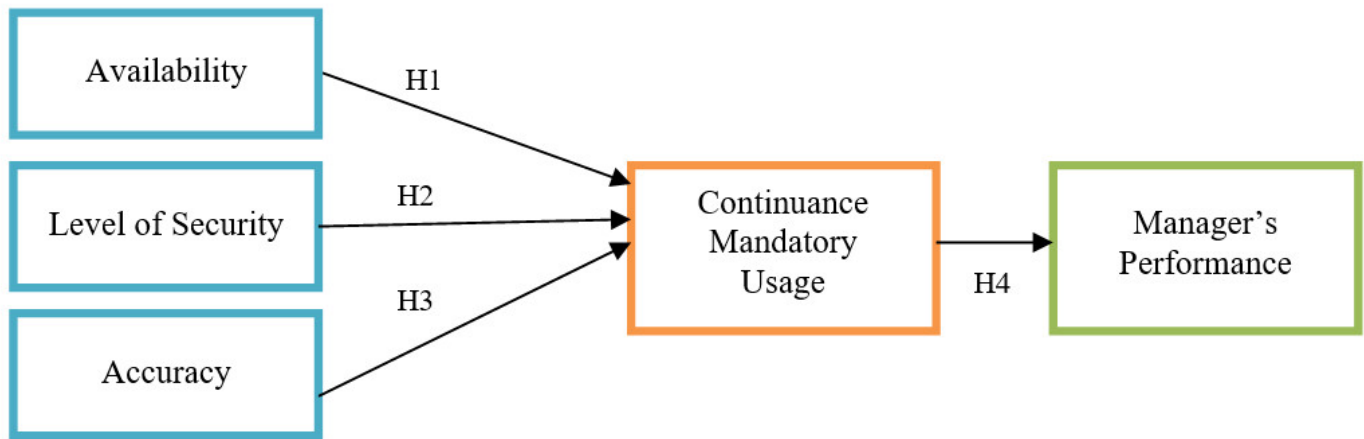
Source: Author.

the Ministry of Transport and the Ministry of Science, Technology, and Innovation, which underscored the authorities' endorsement of the research.

3.2. The Instrument.

To precisely address the four hypotheses proposed in the study, the questionnaire is broken into five pieces. Six questions in the first portion gather demographic data from the respondents, including age, gender, department, greatest level of education attained, and positions. The remaining portions include three measures that gauge respondents' availability perceptions, three security, three accuracy, three trust (delete), and three performance-based items that gauge manager?s work. From 1 = strongly disagree to 7 = strongly agree, a 7-point Likert scale was used to rate each item (except from the demographic section).

4. Analysis of Data.

4.1. Sample characteristics.

Seventy percent of them are men. The majority of them are in the age range of 40 to 49 years old (38%), followed by those in the 30 to 39 age range (29.3%) and those in the 21 to 29 age range (22%). Sixty percent of them hold a bachelor's degree and the majority (77.3%) work in non-IT departments. Following this are respondents with master's degrees (10.7%) and diplomas (16%), showing that the majority of respondents had postsecondary education, with a tiny proportion holding a PhD or DBA. Given that tertiary education is a prerequisite for executive positions, this is not surprising. Furthermore, the respondents' educational backgrounds and ages match. Senior executives make up the majority of them in terms of position.

4.2. Assessing Validity and Reliability.

Indicators with a Cronbach's alpha of 0.6 or higher are generally considered reliable indicators of the instrument. We may infer that the questionnaire is valid and that the data can be used

for analysis based on the range of Alpha scores (0.67 to 0.96) that were obtained in this study (see Table 1).

Table 1: Descriptive Analysis and Model Fit Test.

Construct	Mean	Standard Deviation	Cronbach's Alpha
Availability	5.21	0.77	0.74
Level of Security	5.55	0.92	0.86
Accuracy	5.22	0.78	0.92
Continuance mandatory usage	6.21	0.93	0.77
Manager's performance	6.77	0.84	0.95

Source: Author.

The mean and standard deviation scores for each item are displayed in Table 1. According to this study, the majority of maritime officers felt that technology may increase their productivity and make their work easier and more beneficial. This study takes into account construct validation in addition to content validity, as recommended by Miles (2000), to validate the instrument. Principal component analysis was used as the extraction methodology and Varimax as the rotation method to assess the data in order to attain construct validity. None of the attributes were discarded with a cut-off loading of 0.40 and eigenvalues larger than 1.0. Additionally, a useful degree of common variance was revealed by the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy (see Table 2).

Table 2: Confirmatory Factor Analysis (CFA) Results.

Construct	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Eigenvalue	Percent of total variance explained
Availability	0.64	1.12	53.78
Level of Security	0.88	3.24	65.93
Accuracy	0.81	3.01	75.32
Continuance mandatory usage	0.68	2.78	69.21
Manager's performance	0.96	5.06	77.78

Source: Author.

In addition, the construct validity of the model's scales was also evaluated using Analysis of Moment Structures (AMOS) with maximum likelihood to analyse the data. AMOS is used because of its simplicity and technically advanced nature (Browne

and Cudek, 1993). More importantly, it provides more precise assessment of discriminant validity of an instrument than exploratory analysis. While there is no single recommended fit measurement for the structural equation model, varieties of measures are proposed in numerous research reports (Sekaran, 2000; Miles, 2000).

Table 3: Goodness-of-Fit Measures of the Research Model.

Goodness-of-fit-measure	Recommended value	Approximate boundary as a good fit
Relative chi-square	<3.000	1.360
Ratio of chi-square	p>0.050	p=0.592
GFI	Close to 1.000 is better	0.913
IFI Delta 2	Close to 1.000 is better	0.966
TLI rho2	Close to 1.000 is better	0.929
CFI	Close to 1.000 is better	0.931
RMSEA	<0.080	0.042

Source: Author.

According to Table 3's chi-square test results (chi-square = 330.06; p > 0.050; p = 0.592), the model fits the collected data. Different multiple fit criteria, like model chi-square (χ^2/DF), relative chi-square, comparative fit index (CFI), goodness of fit index (GFI), incremental fit index (IFI Delta2), TLI rho2, and root mean square error of approximation (RMSEA), were also used as alternatives to measure the model. Less than the ideal cut-off value of 3.000 proposed by Segars and Grover, the value of χ^2/DF is 1.360. Furthermore, it was determined that the values of the GFI (0.913), IFI Delta 2 (0.966), TLI Rho2 (0.929), and CFI (0.931) were in close proximity to the suggested value. However, the model meets a respectable error of approximation with a cut-off of 0.080, as indicated by the RMSEA score of 0.042. Thus, it can be said that the suggested model applied in this research is legitimate (Miles, 2000, Nunnally, 1978). The findings have verified that, for the most part, the officers' responses align with the theoretical and conceptual differentiations of every variable put out in this research. The information can therefore be used for additional analysis. The outcomes of the five hypotheses this study evaluated are displayed in the following section.

5. Results.

Table 4 presents the findings about the four conjectures that were formulated. Because availability has a significant impact on continued usage, according to the structural equation modeling (SEM) study, hypothesis 1 is not rejected (p = 0.015). Furthermore, security is a strong predictor of continuous usage, therefore hypothesis 2 is not rejected (p = 0.001). Furthermore, accuracy affects continuous usage (p value = 0.041); hence, hypothesis 3 should not be rejected. Ultimately, it is determined that continuous consumption is significant, meaning that hypothesis 4 is not rejected (p value = 0.000).

Table 4: Hypotheses testing.

Hypothesis	Causal Relationship		Factor	β	Sig.	Result
H1	Availability	→	Continuance mandatory usage	0.753	0.015	Supported
H2	Level of Security	→	Continuance mandatory usage	0.814	0.001	Supported
H3	Accuracy	→	Continuance mandatory usage	0.677	0.041	Supported
H4	Continuance mandatory usage	→	Manager's Performance	0.843	0.000	Supported

Source: Author.

6. Discussion and practical implementations.

This paper makes a significant contribution to existing knowledge by addressing the research gap through an examination of the causal connections between continuance usage and officers' performance. Its novelty lies in offering a comprehensive view of the pivotal factors influencing continuance usage within the realm of maritime technology. The study employs a unified framework that integrates theories of technology adoption with considerations of availability, security, and accuracy, meticulously derived from an extensive literature review. Furthermore, the model is designed to assist decision-makers in grasping the relationships among these variables, which have received scant research attention thus far. By amalgamating these variables and subjecting them to testing within a singular context, the study endeavors to provide a more precise understanding of the causal links between them.

Figure 2 indicates that all antecedents of continuance mandatory usage serve as predictors not only of continuance mandatory usage but also indirectly influence manager's performance. The perpetual utilization of technology by manager's hinges on the availability and security of data and information. Furthermore, it is underscored that security and emerge as among the most influential dimensions shaping continuance mandatory usage.

Maritime managers demonstrate attentiveness to the latest information/data, enabling them to compile comprehensive reports and devise effective business strategies. Accuracy emerges as another crucial dimension advocated by maritime managers, as reliance on technology hinges on the precision of information. Conversely, inaccuracies in data may lead to flawed business planning and subsequently jeopardize expected returns. Additionally, availability, and level of security, directly influence continuance usage and indirectly impact manager's performance. Therefore, it is imperative for administrations to establish specialized teams tasked with organizing and managing system data to ensure its accuracy and timeliness. These teams could facilitate the dissemination of information through modern devices like mobile phones or computer tablets, enabling officers to access real-time data.

Overall, the proposed antecedents significantly predict continuance usage, suggesting that maritime officers persist with system usage even when satisfaction is not guaranteed, akin to findings in previous studies. By prioritizing information security, all maritime agencies can bolster user confidence and foster frequent technology usage. Collaboration among all stakeholders is essential for the efficacy of the security system, ensuring the integrity of transactions.

Therefore, this study holds potential benefits for administrators within both public and private maritime sectors. To foster continued usage of maritime technologies, administrators must prioritize factors such as information accuracy, system security, technology and availability. This entails ensuring timely access to technologies and keeping them updated, as failure to do so could lead to accidents or jeopardize shipper safety and logistics operations. Adequate training is essential to equip officers with proficiency in utilizing the latest technology relevant to

Figure 2: Final research model.
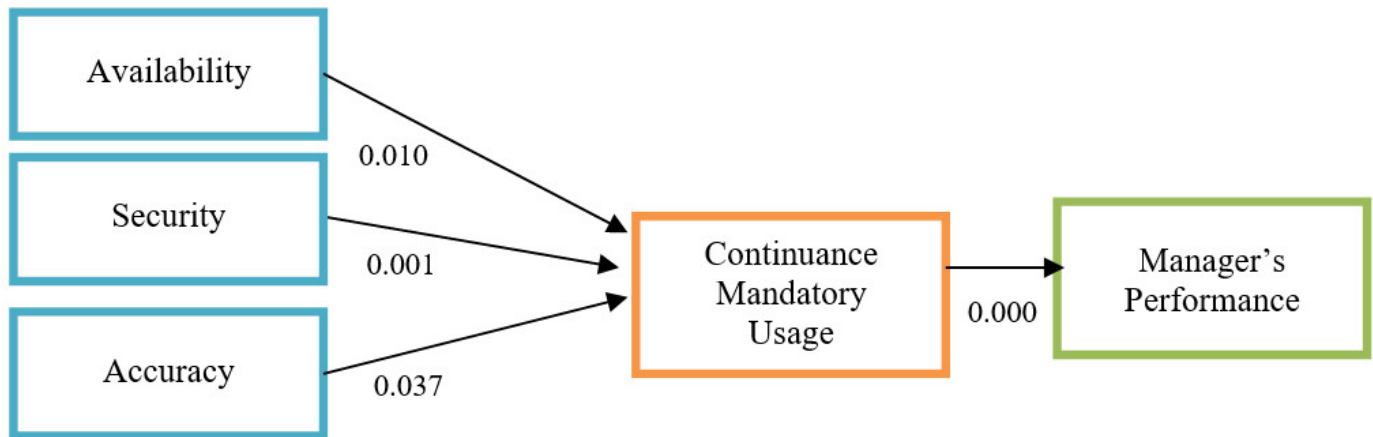
Source: Author.

their tasks. Mismatched tasks and technology can impede both individual and maritime agencies performance, hindering success and progress (Norzaidi et al., 2007).

Conclusion and Future Research.

Based on the survey findings, the recommendations provided in this paper are expected to offer valuable insights for port organizations aiming to enhance their technology implementation. Additionally, these recommendations can serve as a blueprint for other industries seeking to adopt new technologies. However, the interpretation of the survey results has been approached cautiously due to the limitations of a small sample size and narrow scope. Future research should include larger sample sizes and examine a broader range of industries to provide a more comprehensive understanding. Furthermore, subsequent studies should address three key issues. First, voluntary technology usage should also be considered rather than focusing solely on mandatory usage. Second, attention should be given to the potential implications of program withdrawal and withdrawal from work and their correlations to managerial performance. Third, investigating the performance of non-supervisory and non-managerial staff concerning technology usage could yield additional valuable insights. Finally, conducting cross-cultural studies would be beneficial in exploring whether the findings differ across diverse cultural contexts.

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