The Impact of Digitization of Marine Services in Suez Canal

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ABSTRACT

Digital transformation has been a hot topic in recent years. Marine services are one of the key sectors for digital transformation. Suez Canal authority is facing pressure to become smarter and to improve how it transacts with customers. Therefore, the main objective of this paper is to examine the implementation of digital transformation and its effect on the quality of marine services within the case study of Suez Canal Authority (SCA). Moreover, it aimed to study the concept of digital transformation and the associated technologies, and highlight the digital trends and discuss the admissible dimensions of service quality in the marine domain. This paper undertakes an exploratory approach on SCA by conducting a survey with the aim of examining various aspects pertaining to the variables being investigated, which are digital transformation and service quality. The findings of this research revealed a significant positive effect of digital transformation on quality of marine services.

Key Words: *Digitization, marine service, quality, Suez Canal, technology transformation*

บทคัดย่อ

การนำเทคโนโลยีดิจิทัลมาปรับใช้กับทุกภาคส่วนในองค์กร เพื่อให้เกิดการเปลี่ยนแปลงตั้งแต่ฐานรากไปจนถึงกระบวนส่งมอบแก่ลูกค้าเป็นหัวข้อที่อยู่ในความสนใจในช่วงหลายปีที่ผ่านมา การให้บริการทางเรือเป็นหนึ่งในภาคส่วนที่สำคัญสำหรับการเปลี่ยนแปลงนี้ หน่วยงานที่ดูแลคลองสุเอซกำลังเผชิญกับแรงกดดันเพื่อปรับปรุงการให้บริการกับลูกค้า ซึ่งเป็นที่มาของวัตถุประสงค์หลักของบทความนี้ เพื่อศึกษาการเปลี่ยนแปลงจากการนำเทคโนโลยีดิจิทัลมาปรับใช้กับทุกภาคส่วนในองค์กรและผลกระทบต่อคุณภาพของการบริการ จากกรณีศึกษาของหน่วยงานรัฐวิสาหกิจที่ดูแลคลองสุเอซ นอกจากนี้ยังศึกษาแนวคิดการเปลี่ยนแปลงดิจิทัล เทคโนโลยีที่เกี่ยวข้อง แนวโน้ม รวมถึงมิติด้านต่าง ๆ ของคุณภาพในการให้บริการทางเรือ งานวิจัยนี้ทำขึ้นเพื่อค้นหาข้อมูลเบื้องต้นโดยการสำรวจตัวแปรต่าง ๆ ทางด้านการเปลี่ยนแปลงจากการนำเทคโนโลยีดิจิทัลมาปรับใช้ และคุณภาพของการบริการ ผลจากการวิจัยพบว่า การเปลี่ยนแปลงจากการนำเทคโนโลยีดิจิทัลมาปรับใช้มีผลเชิงบวกต่อคุณภาพของการบริการ

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INTRODUCTION

New digital technologies and concepts such as Social technologies, Mobile technologies, Analytics technologies, big data, cloud computing, and the Internet of things are more and more penetrating the areas of social life and represent a new way of doing business and process information. With its high degree of networking and its large number of interfaces, marine services offer a broad range of applications for digital technologies. Digital trends such as Smart Ports (Xue, Wu, Chen, Van Gelder, & Yan, 2019), Autonomous ships, Robotics and Autonomy, Augmented Reality and Digital twin will be an important driver in the upgrading and improving the quality of marine services. With the use of digital transformation, the fleet controls can be optimized, whereby costs are reduced and environmental protection is improved. Traffic control and traffic flows may be optimized by using the ship's operative information, thereby avoiding critical situations and so reducing the danger of accidents.

By the end of the year 2018, the facility in port Caofeidian (China) has been completely autonomous, where ships loaded and unloaded by automatic cranes and coordinated from a central remote-control room (Raconteur.net). As well, Tuas Port (Singapore) will be an efficient and intelligent port that harnesses data analytics to optimize operations such as electronic Certificates, The Marine Single Window for quicker port clearance, just-in-time vessel arrivals, and electronic bills of lading. In May 2017, Kongsberg and global fertilizer firm announced the development of the world's first fully electric and autonomous container ship, which will be launched in 2019. In 2017, Rolls-Royce and global towage operator have successfully established the world's first remotely operated commercial vessel in Copenhagen harbour (Denmark).

The subject vessel features multi sensors which combine different data inputs using advanced software to give the captain an enhanced understanding of the vessel and its surroundings (Rolls-Royce.com). On 16 October 2017, DNV-GL rolled out its IMO-compliant fully electronic class and statutory certificates across its entire classed fleet, a historic first in the ship classification industry. Just four days after DNV-GL launched the solution, the LNG carrier Macoma built at Daewoo Shipbuilding and Marine Engineering (DSME) in Okpo (South Korea) was delivered to Teekay Shipping with a full set of digitally signed electronic class and statutory certificates.

In April 2017, DNV-GL has launched the port state control planner (PSC) to help ship operators, managers and owners to increase the operational efficiency, and give an overview of a vessel or fleet-wide performance. Also, DNV-GL has introduced a new machine learning tool to the Direct Access to Technical Experts service (DATE). When customers have a query, this service connects them to one of more than 400 technical experts located at five support hubs worldwide (Marine impact, 2017). By 2019 an automated version of the Smart survey booking application is expected to be available. Based on this time window and a list of possible ports entered by the operator, the system also looks for the closest geographical location, accounting for the scope and duration of the survey, port capabilities and surveyor availability, and issues a recommendation. This minimizes both the time involved in booking the survey and the inconvenience for the vessel while keeping the costs down by helping reduce surveyor travel times.

DNV GL's has designed the Veracity industry data platform to help companies improve data quality and manage the ownership, security, sharing and use of data. In the future the marine services may benefit from the veracity data platform by allowing DNV GL's marine customers to document compliance of main onboard machinery and systems through predictive analytics and removing the necessity for calendar-based inspections. CMA CGM group has adopted new tools and revamped its information systems to introducing new technology (augmented reality glasses, mobile apps, e-commerce platform, smart containers, and optimization of the repositioning of empty containers, navigational aid) and next generation of marine services. On the other hand, the Group has even created its own start-up incubator ZEBOX which has been launched in June 2018 (CMA CGM Magazine, 2018). The above-mentioned initiatives reflect the future of the marine services. Hence, this paper aims to examine the implementation of digital transformation and its effect on the quality of marine services within the case study of Suez Canal Authority (SCA).

LITERATURE REVIEW

Digital transformation is more than technology. It means innovation to connect technology, data science, devices, design, and business strategy to change a business process or customer experience. It is about putting the customer, device, organization or business process at the center of change that improves agility, revenue and cost by connecting the physical world to the digital code world.

In marine services domain, there are a number of key digital innovations that will address the future requirements and affect almost all aspects of connected and automated marine services processes such as Robotics and autonomy, autonomous vehicles, simulation and optimization, open system integration, the Internet of Things and Big Data Analytics, Cyber-physical systems, Internet of Services, cloud computing, Augmented and virtual reality simulation (von Lukas, 2010), and cyber-security and next generation of connectivity between ship and shore.

These technologies may affect the quality of marine services through reduce costs by enhancing operational efficiency, automating processes, improving safety and security, and reducing negative environmental impact. The improved marine connectivity will have a significant effect on how the marine industry manages information. Most ship systems, shore based support centers, ports, and integrated transport systems will be linked to the Internet. This will enable data streams from multiple sources to be combined for real-time decision making, leading to more efficient operations, as well as more automated ships and guided vehicles. This will also have a positive effect on the safety of life at sea, and bring many benefits, such as reducing fuel consumption, remote condition monitoring, and more efficiently organized supply chains.

In the digital age, people term is an abbreviation for digitally connected individuals and communities who leave their marks (data) in the digital world. People use digital capabilities via different types of devices (desktops, laptops, tablets, smart phones, wearable devices like smart watches and e-glasses, and so on. The term Businesses is digitally connected businesses or groups of businesses that combine their digital capabilities to create new solutions. The term Things is an abbreviation for digitally connected objects, or smart things. Smart things are typically equipped with sensors that produce data and might even have their own application logic. Data is an abbreviation for real-time, complete, detailed, consistent, transparent, and accessible information and any algorithms employing this data for analysis, planning, and prediction including cognitive computing. This includes sophisticated analytics procedures that process small or large amounts of data generate consumable information.

Digital transformation framework is a simple representation of a digital service provider's future business architecture consisting of three major layers, business, operations, and infrastructure. (1) Business transformation refers to the redesign of the strategic position in the digital ecosystem, service portfolio, and business models. (2) Operational transformation refers to the restructuring of the operating model and capabilities that enables an effective execution of the future business models, through digitization of front-end capabilities including marketing, sales, services, and Omni-channel interaction. (3) Infrastructure transformation refers to a full reconstruction of ICT infrastructure including equipment, network, service and operations (software – defined and virtualization – cloud data center) (Martín-Soberón, Monfort, Sapiña, Monterde, & Calduch, 2014).

Digital strategy has defined by Sebastian et al. (2020) as a business strategy inspired by capabilities of powerful, readily accessible technologies (like SMACIT), intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions. As well they have mentioned tow digital strategies, (1) Digital engagement strategy which typically aims to create a seamless, Omni-channel experience that makes it easy for customers to order, inquire, pay and receive support in a consistent way from any channel at any time. (2) Digitized solutions strategy which aims to reformulate a company's value proposition by integrating a combination of products, services and data. This type of digital strategy is driven by R&D efforts that seek to anticipate rather than respond to customer needs.
The business model concept is a useful lens for better understanding the business logic of a company by describing how value is created, delivered and captured (Osterwalder & Pigneur, 2010). A business model can be categorized as digital if digital technologies trigger fundamental changes in these value dimensions (Veit et al., 2014).

Thai (2008) has developed and validated a measurement model (ROPMIS) to explore the concept of service quality in marine services domain. This model consists of the following six dimensions: resources, outcomes, process, management, and image and social responsibility, and incorporated newly developed elements, such as management, image, and social responsibility-related quality dimensions, on the basis of a comprehensive review of various service quality dimensions and factors in previous studies. Compared with the SERVQUAL model, the ROPMIS model is more applicable to the marine industry because it incorporates the image and social responsibility aspects that are critically important in this industry. The author suggested that these factors could be revised for specific sub-sectors in the marine industry, such as ports, even though the model was supposed to be generally applicable to marine services domain. This current research paper adopted this model and revised the operationalized measurement items specific to the Suez Canal authority.

Holotiuk and Beimborn (2017) developed a DBS framework, based on a structured review of 21 industry reports, and it yielded 8 generic dimensions with a total of 40 critical success factors (CSFs) for DBS. Sassanelli, Seregni, Hankammer,Cerri, &

Terzi (2016) found that IOT technologies have a huge impact on the different phases of the whole PSS lifecycle. Xue et al. (2019) claimed that the piloting decision recognition model, based on the fuzzy Iterative Dichotomies 3 (ID3) decision tree, possesses a high reasoning speed and can accurately identify current piloting behavior. Im, Shin, and Jeong (2018) summarized that an architectural structure in which autonomous ships and shore data center are organically converged and integrated based on the latest Intelligence Information Technology. Kil, Son, and Lee (2018) indicated that by using VR (Virtual Reality) based survey simulator, surveyors possibly achieve improvement of competence in survey quality by means of safe and immersive training environment. They suggested the possibility of consistent use of 3D model as the digital twin of a ship. El-Sakty and Ezzat (2021) discussed six dimensions of measuring service quality in maritime services domain including resources, outcomes, process, management, image and social responsibility. Table 1 summarizes the digital trends in the marine services domain.

Table 1: Digital Trends in the Marine Services Domain

• Automated Shipbuilding • Advanced Manufacturing • Software Systems Integrity Management • Mobility with Immersive Technology • Intelligent Automation • Robot • Ship Trials in The Virtual World • Digital Twin • Digital Thread • Digital Classification • Self-Certification and Assurance • Data and Analytics with Intelligent Systems • Autonomous Systems • Automatic Systems • Standardization of Data • Drones • Artificial Intelligence (AI) • Big Data Analytics in Marine Industry • Future Decision Support Systems • Augmented Reality (AR) • Robotics and Autonomy • Cyber-Security • Smart and Connected Ports • Smart And Autonomous Ships	• Marine Digital Highway • Integrated Transport Information System • E-Navigation • Smart Port • Port Community System • Cloud Computing in Marine Industry • Wireless Communication Technologies • Internet of Things (IoT) Marine Industry • Big Data Analytics Marine Industry • Future Decision Support Systems • Augmented Reality (AR) • Robotics and Autonomy • Cyber-Security in Marine Industry • Sea Traffic Management • Situation Awareness in Remote Operation of Autonomous Ships • Online Monitoring System for The Ship Discharging Pollution at Harbor • Internet of Services at Sea • Shipping 4.0

Meanwhile, since the dependent variable which is "service quality" comprises five dimensions considered in this study which are Resources, Outcomes, Process, Management and Image and Social Responsibility (Thai, 2008), whereby the independent variable is common which is "Digital transformation".

PROBLEM STATEMENT AND RESEARCH QUESTIONS

Due to the fact that Suez Canal share 8% of the world seaborne trade and 24.5% of the world container trade (SRM report, 2015), and in the line with Suez Canal authority vision, mission, duties and services, the Suez Canal authority is facing the pressure to become smarter, digitally enabled and to improve how it interacts and transact with customers and competitors. Turning a potential threat into an opportunity to achieve true digital transformation will require an accurate definition of digital transformation and its enabler technologies, and also explore the digital megatrends in the marine domain to achieve a positive effect on the service quality. Hence, this research aims to understand how digital transformation can contribute positive effect on the quality of the marine services provided by Suez Canal authority. The main and sub-questions are displayed as follows:

- Does digital transformation have an effect on the quality of the marine services?
    - What is Digital Transformation?
    - What are the digital technologies associated with digital transformation?
    - What are the digital trends in the marine services domain?
    - What are the admissible dimensions of service quality in the marine services domain?

Research Objectives

The objectives of the research are addressed as follows:

- To examine the implementation of digital transformation in the marine domain and its effect on the quality of services.
- To study the concept and digital transformation and the associated technologies.
- To highlight the digital trends in the marine services domain.
- To discuss the admissible dimensions of service quality in the marine domain.

Research Methodology

The study was conducted through qualitative data gathered from the results of a survey involving questions utilizing a LIKERT scale. The survey was provided by e-mail. The questions were close-ended and multiple choice. The first portion of the survey involved demographic information. The data were analyzed using IBM SPSS and included measurements of central tendencies. These measurements were instrumental in determining the validity and reliability of the data through the use of variability. The qualitative data inputted into IBM SPSS allowed the researcher to conduct statistical analysis tools as descriptive analysis, regression model and ANOVA tools to test the hypotheses and to the indicate the effect of digital transformation on service quality in the marine services domain (Agatić & Kolanović, 2020).

- Descriptive Analysis of frequencies and percentages to describe the characteristics of respondents.
- Mathematical "Mean" to find out how high or low the study sample responded to the study and their replies on the paragraphs of the questionnaire metrics.
- Standard Deviation to know the extent of deviation of the study sample responses on each paragraph of the questionnaire metrics. It is noted that the standard deviation shows the dispersion in the study sample responses on each adequacy. Whenever its

value becomes closer to zero, responses become concentrated and their dispersion decrease in the scale.

- Correlation Coefficient of "PEARSON" to measure the validity of the questionnaire in addition to the direction & strength of the correlation between variables.
- Reliability test "CRONBACH'S ALPHA" coefficient methodology to determine the reliability of the questionnaire.
- Simple Liner Regression to test the hypothesis of the thesis.
- ANOVA test to test the significance of the full simple regression model and finally investigate whether each demographic factor has a significant impact on the independent and dependent variables.

SUEZ CANAL CASE STUDY: ANALYSIS AND FINDINGS

The two types of sampling strategies are probability and non-probability. The primary difference is that probability sampling involves random sampling, whereas non-probability does not involve random sampling. Probability sampling includes random sampling and allows "an equal and independent chance of being selected" (Landreneau & Creek, 2009). This decreases the likelihood of researcher bias. Due to the randomness of the sample, validity and reliability are increased. The types of probability sampling include "1) simple random, 2) stratified random, 3) cluster and 4) systematic" (Landreneau & Creek, 2009).

In contrast, non-probability sampling includes "a variety of sampling techniques for selecting a sample, which is appropriate when random sampling cannot be done because there is no "complete list of the population" (Saunders & Lewis, 2007). The non-probability sampling techniques include 1) quota, 2) convenience, 3) self-selection, 4) purposive, and 5) snowball (Saunders & Lewis, 2007). Furthermore, it is suggested that non-probability sampling can increase the possibility of researcher bias and unethical behaviors to occur. This study used probability sampling, particularly random sampling strategy.

As a result, Sample size calculated using sample size calculation equation was actually 114 clients with a 95% confidence level and 80% confidence interval. However, to accommodate for potential human error and aiming for more accurate results, the researcher decided to use a sample size of 170, so the questionnaire was distributed to 170 respondents, out of which 150 usable responses were received with response rate 88.24% as shown on in Table 2.

Table 2: Research Sample Distribution

Category	Sample Number	Distributed Questionnaires	Accepted Questionnaires	Response Rate
Representatives	114	170	150	88.24%

Correlation between digital transformation and service quality

- **Digital transformation (DT)** has a significant impact on **Resources**

Table 3: Correlation Coefficient and Coefficient of Determination between Digital Transformation and Resources

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.777[a]	.604	.601	.35032

* Predictors: (Constant), DT

The correlation coefficient (R) between the independent variable (Digital transformation) and the dependent variable (Resources) is 0.777, i.e. a Strong positive correlation. More investigation has been made through simple linear regression analysis as follows.

Table 4: Coefficients of Linear Regression for Digital Transformation and Resources

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	2.016	.127		15.847	.000
DT	.564	.038	.777	15.010	.000

A Positive sign of the slope of the regression model (0.564) implies a positive correlation between the independent variable (Digital transformation) and the dependent variable (Resources). The slope value of 0.564 means that when the independent variable X (Digital transformation) increases by one unit, the dependent variable Y (Resources) increases by 0.564 units.

Based on above regression analysis, it can be concluded that there is a significant relationship between the independent variable (Digital transformation) and the dependent variable (Resources), and that there is a positive impact of Digital transformation on Resources. Furthermore, the ANOVA test was made in order to test the overall proposed simple linear regression model.

Table 5: ANOVA Test for Digital Transformation and Resources

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	27.650	1	27.650	225.306	.000[b]
Residual	18.163	148	.123		
Total	45.814	149			

* Dependent Variable: SQRES
* Predictors: (Constant), DT

- There is no positive impact of **Digital transformation** on **Outcomes**

Table 6: Correlation Coefficient and Coefficient of Determination between Digital Transformation and Outcomes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.749[a]	.560	.557	.41039

* Predictors: (Constant), DT

The correlation coefficient (R) between the independent variable (Digital transformation) and the dependent variable (Outcomes) is 0.749, i.e. a Strong positive correlation. The coefficient of determination (R2) is equal to 0.560, which implies that the variations in the dependent variable (Outcomes) are interpreted by variations in the independent variable (Digital transformation) at the extent of 56.0%. More investigation has been made through simple linear regression analysis as follows.

Table 7: Coefficients of Linear Regression for Digital Transformation and Outcomes

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.720	.149		11.545	.000
DT	.604	.044	.749	13.734	.000

* Dependent Variable: SQOUT

Furthermore, the ANOVA test was made in order to test the overall proposed simple linear regression model.

Table 8: ANOVA Test for Digital Transformation and Resources

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	31.768	1	31.768	188.630	.000[b]
Residual	24.926	148	.168		
Total	56.694	149			

*. Dependent Variable: SQOUT

*. Predictors: (Constant), DT

Based on previous analysis, it is concluded that there is a statistically significant relationship between the independent variable (Digital transformation) and the dependent variable (Outcomes), and that there is a positive impact of Digital transformation on Resources.

- There is no positive impact of **Digital transformation** on **Process**.

Table 9: Correlation Coefficient and Coefficient of Determination between Digital Transformation and Process

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.750[a]	.562	.559	.50795

*. Predictors: (Constant), DT

The coefficient of determination (R2) is equal to 0.562, which implies that the variations in the dependent variable (Process) are interpreted by variations in the independent variable (Digital transformation) at the extent of 56.2%. More investigation has been made through simple linear regression analysis as follows.

Table 10: Coefficients of Linear Regression for Digital Transformation and Process

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	.937	.184		5.083	.000
DT	.751	.054	.750	13.787	.000

* Dependent Variable: SQPRO

Moreover, the coefficients table provides us with necessary information to predict the value of the dependent variable (Process) from the value of the independent variable (Digital transformation) through the equation of the regression model which can be derived as follows based on above information. Based on above regression analysis, it can be concluded that there is a significant relationship between the independent variable (Digital transformation) and the dependent variable (Process), and that there is a positive impact of Digital transformation on Process. Furthermore, ANOVA test was made in order to test the overall proposed simple linear regression model.

Table 11: ANOVA Test for Digital Transformation and Process

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	49.042	1	49.042	190.074	.000[b]
Residual	38.186	148	.258		
Total	87.229	149			

* Dependent Variable: SQPRO
* Predictors: (Constant), DT

Based on previous analysis, it is concluded that there is a statistically significant relationship between the independent variable (Digital transformation) and the dependent variable (Process) and that there is a positive impact of Digital transformation on Process.

- There is no positive impact of **Digital transformation** on **Management**.

Table 12: Correlation Coefficient and Coefficient of Determination between Digital Transformation and Management

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.798[a]	.636	.634	.41991

*. Predictors: (Constant), DT

The coefficient of determination (R2) is equal to 0.636, which implies that the variations in the dependent variable (Management) are interpreted by variations in the independent variable (Digital transformation) at the extent of 63.6 %. More investigation has been made through simple linear regression analysis as follows.

Table 13: Coefficients of Linear Regression for Digital Transformation and Management

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.021	.152		6.695	.000
	DT	.724	.045	.798	16.083	.000

*. Dependent Variable: SQMANG

Based on above regression analysis, it can be concluded that there is a significant relationship between the independent variable (Digital transformation) and the dependent variable (Management), and that there is a positive impact of Digital transformation on Management. Furthermore, the ANOVA test was made in order to test the overall proposed simple linear regression model.

Table 14: ANOVA Test for Digital Transformation and Management

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	45.606	1	45.606	258.655	.000[b]
	Residual	26.095	148	.176		
	Total	71.702	149			

*. Dependent Variable: SQMANG
*. Predictors: (Constant), DT

Based on previous analysis, it is concluded that there is a statistically significant relationship between the independent variable (Digital transformation) and the dependent variable (Management) and that there is a positive impact of Digital transformation on Management.

- There is no positive impact of **Digital transformation** on **Image & Social Responsibility**.

Table 15: Correlation Coefficient and Coefficient of Determination Digital Transformation and Image & Social Responsibility

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.673[a]	.452	.449	.44981

*. Predictors: (Constant), DT

The coefficient of determination (R2) is equal to 0.452, which implies that the variations in the dependent variable (Image & Social Responsibility) are interpreted by variations in the independent variable (Digital transformation) at the extent of 45.2 %. Therefore, it can be concluded that there is a significant relationship between Digital transformation (independent variable) and Image & Social Responsibility. (Dependent variable), and that there is a positive impact of Digital transformation on Image & Social Responsibility. More investigation has been made through simple linear regression analysis as follows.

Table 16: Coefficients of Linear Regression for Digital Transformation and Image & Social Responsibility

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.989	.163		12.179	.000
DT	.533	.048	.673	11.057	.000

*. Dependent Variable: SQISRES

Based on above regression analysis, it can be concluded that there is a significant relationship between the independent variable (Digital transformation) and the dependent variable (Image & Social Responsibility) and that there is a positive impact of Digital transformation on Image & Social Responsibility. Furthermore, the ANOVA test was made in order to test the overall proposed simple linear regression model.

Table 17: ANOVA Test for Digital Transformation and Image & Social Responsibility

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	24.736	1	24.736	122.256	.000[b]
	Residual	29.945	148	.202		
	Total	54.681	149			

*. Dependent Variable: SQISRES

*. Predictors: (Constant), DT

Based on previous analysis, it is concluded that there is a statistically significant relationship between the independent variable (Digital transformation) and the dependent variable (Image & Social Responsibility) and that there is a positive impact of Digital transformation on Resources.

CONCLUSION AND RECOMMENDATIONS

According to statistical analysis of the data collected including correlation, regression analysis and ANOVA, the findings of this study revealed that there is a positive effect of digital transformation on Resources, Management, Process, Outcomes and Image & Social responsibility, which typically means that there is a positive effect of digital transformation on quality of service. As well the statistical results demonstrated that SCA still in the second generation of digital transformation; where the arithmetic mean of the total statements related to smart procedures is 2.60, which shows the degree of "Neutral" of the research sample answers to these statements; thus SCA should gear up to rapid transformation to close this digital gap. As a recommendation, SCA should establish a Chief Digital Officer (CDO) as part of the executive management. Also, the element of a digital-ready culture is very important in the speed at which the maritime industry is embracing the digital revolution, and the SCA should be ready to attract the right talents to develop the digital agenda and promote innovation.

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