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Digital Innovation and Quality Management Synergies: Evidence from High-Performance Organizations

Dahlan Abdullah

Department of Informatics, Faculty of Engineering, Universitas Malikussaleh, Aceh, Indonesia.
Email: dahlan@unimal.ac.id

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ABSTRACT

This paper will investigate the synergetic connexion between quality management practises and digital innovation and their joint effect on the performance of the organisation in a high-performance organisation. The study will be based on the Resource-Based View (RBV) and the Dynamic Capabilities Theory, which suggest that digital innovation capabilities complement the quality management systems, and their combination produces a synergistic effect, which reinforces business excellence performance. Relying on the quantitative survey design data were gathered in 312 managers of successful firms of manufacturing and service industries, and the suggested model was evaluated with the help of Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings indicate that digital innovation affects the performance of the organisation (β =0.34, $p < 0.001$) and quality management (β = 0.49, $p < 0.001$) influentially, and quality management, in its turn, affects the performance (β =0.41, $p < 0.001$) in an appropriate manner. The structural model describes 62% of the variance in the performance of the organisation (R^2= 0.62) in justification of a considerable predictive power, and the interaction effect confirms a high level of synergy between digital innovation and quality management. On the managerial side, the results indicate that to derive optimal performance growth, organisations need to combine digital transformation efforts with an established quality system in their strategic efforts to generate value and maintain a competitive edge. The study makes a contributions to the quality and innovation literature by empirically confirming the digital; quality synergy framework, and providing a sound model based on PLS-SEM that assists in comprehending the role of integrated capabilities in bringing business excellence.

1. INTRODUCTION

The intensive development of digital technologies has contributed greatly to transforming the process how organisations create a value as well as run their business activities and maintain a competitive edge. Digital transformation is not a one-dimensional process that consists solely in the adoption of technologies, but it is the process of organisational rejuvenation, development of capabilities and a twist in business model [1], [2]. The researchers believe that digital innovation helps companies to become more agile, better decision-makers due to the combination of data, as well as create new ways to interact with customers and, order efficiency [3], [4]. Meanwhile, quality management developed out of old inspection based strategies to holistic organisational systems like Total Quality Management (TQM), continuous improvement and process excellence models which focus on enhancing reliability, efficiency and long term performance results [5], [6]. Empirical research proves that good quality management practises can be used to boost the performance of innovation, operational effectiveness, and financial sustainability [7], [8].

However, although there has been an increasing amount of literature available on the topic of digital transformation and quality management on their own, very scarce empirical studies have been conducted regarding the joint or synergistic effects on organisational performance. Whereas the digital innovation research is identified as the development of dynamic capabilities and strategic renewal [2], [3], the studies in the field of quality management shed light on the structured processes, leaders commitment, and constant improvement mechanism [5], [7]. Nevertheless, the issue of whether the introduction of digital

innovation capacity in integrating with existing quality management systems has complementary or multiplicative performance impacts is under-researched. This discord appears to be especially important within the framework of high-performance organisations where coordination between technological innovation and quality excellence can be admitted one of the key sources of sustainable competitive advantage [4], [8].

This research is based on the Resource-Based View and dynamic capabilities perspectives arguing that it was digital innovation which improves qualities of the quality management system and its interaction, to give a synergistic influence over the performance of an organisation. The main goal of the study is to empirically study the direct effects of digital innovation and quality management to performance, analyse the effects of digital innovation to quality management practises, and test the moderating or interaction effect of digital innovation and quality management on performance through Partial Least Squares Structural Equation Modelling (PLS-SEM). Based on this, the research aims to determine whether digital innovation plays a major role in organisational performance, the effectiveness of quality management in the processes that lead to the performance of any organisation and the aspect of significant synergy between digital innovation and quality management in the improvement of the business excellence.

The rest of the paper is organised in the following way. The following part of the research surveyes the corresponding literature and formulates the research hypotheses. This is then followed by an elaborate description of the research methodology, measurement model and data analysis procedures. The following part provides the empirical results of the PLS-SEM analysis, both the measurement and structural model evaluation. Concluding the paper, theoretical and managerial implications, limitations and future research direction have also been discussed.

2. Literature Review and Hypothesis Development

In the modern world of business, digital innovation has become one of the central forces of organisational change. It includes the strategic use and consumption of digital technologies to redesign business processes, improve operational competence and development of new value propositions [1], [2]. Digital innovation is more than technological upgrades, more a wider organisational facility, comprising of data analytics, automation, platform integration, and process digitization, which together transformed the manner in which firms function and compete [3], [4]. Dynamic capabilities perspective lends visibility to the fact that organisations that effectively develop into digital capabilities are in a better position to enhance agility, responsiveness and the effectiveness of the decision making process, which contribute to the enhancement of overall performance results [5].

At the same time, the quality management has also become an end-to-end organisational philosophy based on relentless improvement and future excellence. TQM puts focus on the role of the leadership commitment, customer focus, employee involvement, process management and evidence based decision-making [6], [7]. The modern quality systems are comprised of standardised processes, structured performance measurement, and the process of building of a high culture of quality promoting learning and accountability individuals of any organisational level [8]. Empirical research conducted in the past proves that hard practises which include process control and standardisation and soft practises which include leadership and employee engagement are significant elements that have an impact on the operational and innovation performance [9]. By implementing well-organised schedules and strict discipline, quality management would allow the organisations to translate the strategic initiatives into the operational improvement of efficiency and competitiveness.

Business excellence and organisational performance is a construct of multidimensional concepts, including financial, operations as well as innovation results. Financial performance includes profitability and revenue increase, operational performance includes the productivity and quality consistency, and innovation performance is the power of the firm to produce new products/ processes [6], [9]. It is common of high-performance organisations to be characterised by high resonance between their strategic initiatives and operational systems that enable them to maintain a competitive edge over their competitors in the dynamic environments [2]. With the increasing pace of digital transformation in the industries, the ability to combine digital innovation with a well-developed quality management system may offer a gateway leading to a long-term business excellence.

The theory of the current research is based on Dynamic Capabilities Theory and Resource-Based View (RBV). According to the RBV, valuable, rare, inimitable, and non-substitutable organisational resources are the sources of sustainable competitive advantage [10]. Digital capabilities and quality management systems may be considered strategic resources that combined efficiently will improve the performance of firms. The Dynamic Capabilities Theory builds upon this reasoning, however, by underlining the

competencies of firms in terms of integration, construction, and reconfiguration to the change in the environment [11]. Digital innovation empowers organisations to feel the technological opportunities and re-architecture processes whereas quality management offers the disciplined transformation by offering structured routines. The interaction between these capabilities can then cause a synergetic effect of performance.

Based on this theoretical argument and on the previous empirical demonstrations, digital innovation will contribute to the positive performance of organisations through the improvement of efficiency and responsiveness to strategies. It also expects quality management practises to enhance the financial, operational, and innovation results. More so, digital innovation can reinforce quality management systems providing real-time monitoring, automation, and data-driven improvement mechanisms. Besides the direct connexions, quality management can also be a mediating variable whereby, digital innovation is transformed into better performance outcomes. In addition, synergistic effect of digital innovation and quality management is likely to generate a greater impact than the contribution of both in the circumstances in which digital innovation and quality management are obligating to be effective, especially in high-performance organisations where strategic alignment is essential. Fig. 1 shows the conceptual framework that explains the proposed relationships. Based on this, this research paper hypothesises the existence of a positive relationship between digital innovation and organisational performance, quality management and performance, digital innovation and quality management, quality management and organisational performance, and the relationship between digital innovation and quality management and quality management and organisational performance is significant.

Fig. 1. Conceptual framework of digital innovation, quality management, and organizational performance.

3. RESEARCH METHODOLOGY

In this research, the researcher uses a quantitative research in order to test the relationships between digital innovation, quality management, and organisational performance empirically. The research design used was cross-sectional because the data was collected at one point in time with the subject of managers who had worked in high-performance organisations. The quantitative design suits testing theoretically based hypotheses and measuring is complicated structural relationships with the help of Partial Least Squares Structural Equation Modelling (PLS-SEM). To measure the perceptions of the respondents about the digital innovation capabilities, quality management practises as well as achievement of performance results in their respective organisations, a structured survey tool was created. The survey method allows gathering systematic data on a huge sample and allows the generalisation of the results statistically.

The sample population was made up of high-performance organisations in both the manufacturing industry and service industry. The high-performance organisations were determined through the following criteria or used as being able to demonstrate sustained financial growth, ability to acquire quality certification as well as market positioning. A purposive sampling method was to be applied in order to make sure that the respondents used were in managerial or supervisory positions and have sufficient knowledge of digital transformation initiatives and quality management practises in their companies. The data collection was done by administering questionnaires online and offline within three months. The total number of responses was 347, and 312 responses out of them were considered valid after the screening of the questionnaire on missing items and consistency of responses. The sample size is adequate to meet suggested limits of PLS-SEM analysis and offers adequate statistical

power to test the hypothesised model of structure. The sample contained companies working in different sectors such as manufacturing, information technology, financial services, logistics, and consumer services, which increases the generalizability of the results.

The measurement device was created based on previously validated scales that are modified out of already existing literature on the digital innovation and quality management surveys. The scale of measurement was 7-point Likert scale where 1 indicated strongly disagree to 7 strongly agree so that there was more variability and sensitivity in the responses. Digital innovation was defined in terms of dimensions of technology adoption, process digitization and development of digital capability. The quality management was gauged using instruments that observed TQM practises, continuous improvement orientation, process standardisation and quality culture. Perceptual measures of organisational performance were used to evaluate financial, operational, and innovation performance against their competitors. Table 1 shows the operationalization of constructs and their sources.

Table 1. Construct Operationalization and Measurement Sources.

Construct	Dimensions / Sample Items	Source
Digital Innovation	Adoption of advanced digital technologies; integration of digital systems; development of digital capabilities	[1], [2]
Quality Management	Continuous improvement practices; process standardization; leadership commitment to quality	[3], [4]
Organizational Performance	Growth in profitability; operational efficiency; innovation success	[3], [5]

4. Data Analysis Using PLS-SEM

The proposed relations between digital innovation, quality management, and performance in the company were tested through the empirical analysis of the proposed relationships based on the PLS-SEM. PLS-SEM suits well to the predictive research model, multifaceted structural relationship and those research studies that focus on explaining the variance as opposed to comparing models [1]. Since the research at hand is rather exploratory, involving the study of the effect of synergy and mediation relationships, PLS-SEM allows it to be more flexible in the manipulation of interaction terms and latent constructs with several indicators. It was analysed with the help of SmartPLS 4 that allows robust measuring and modelling structural and measurement by means of a variance-based approach.

Data analysis was done in two steps which included first measurement model assessment and second structural model assessment. Preliminarily levels of the reliability and validity of constructs were tested in the form of indicator loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). The heterotraitmonotrait ratio (HTMT) was used to test discriminant validity. The structural relationships were assessed in the second stage by considering path coefficients (β), t -values, p -values, which were obtained after bootstrapping (5,000 resamples) and coefficient of determination (R^2) to establish explanatory power. The predictive relevance (Q^2) and the effect size (f^2) was also taken into account to determine the strength and predictive power of the model [1], [2].

Descriptive statistics and correlation analysis was done before the structural model evaluation to give a availability of an overview of the sample characteristics and to form relationships. Table 2 presents the demographic profile of the respondents in terms of the type of industry, managerial position, years of experience, and firm size. Such descriptive analysis is a guarantee of transparency in the composition of high-performance organisations in the research and contributes to the extrapolation of the results. The proposed synergy effect on the organisational performance was experimented with the help of the product indicator approach in the SmartPLS, where the interaction effect between digital innovation and quality management can be tested. The mediation analysis was implemented by evaluating the indirect impact of digital innovation on organisational performance in terms of quality management based on bootstrapping procedures to identify statistical significance. This detailed analytical structure will provide high validity of close and indirect relationships in the conceptual model.

Table 2. Sample Demographics of Respondents (n = 312)

Category	Classification	Frequency (n)	Percentage (%)

Industry	Manufacturing	98	31.4
	Information Technology	76	24.4
	Financial Services	52	16.7
	Logistics & Supply Chain	41	13.1
	Consumer Services	45	14.4
Managerial Level	Top Management	64	20.5
	Middle Management	148	47.4
	Operational/Supervisory	100	32.1
Firm Size	Small (<100 employees)	72	23.1
	Medium (100–499 employees)	119	38.1
	Large (500+ employees)	121	38.8
Experience	Less than 5 years	58	18.6
	5–10 years	117	37.5
	11–15 years	82	26.3
	More than 15 years	55	17.6

5. Measurement Model Evaluation

The measurement model was tested on the condition that all the constructs, including the digital innovation, quality management, and organisational performance were defined as reflective latent variables. Reflective measurement is right where indicators are a manifestation of the underlying construct, and are covariate. To be reliable and valid before testing the structure models, the evaluation was based on standard guidelines of PLS-SEM. The first reliability indicator that was analysed was the outer loading of each of the measurement items. Outer loadings are the correlation that exists between the measured indicators, and the latent constructs. As postulated in literature, loadings of above of 0.70 reflect satisfactory indicator reliability where the construct can explain greater than 50 per cent of the variance in the indicator. In this research, most of the outer loadings were far more than the 0.70 mark which validates sufficient item reliability. Items that had a loading of less than 0.70 were also retained when not taking away that item substantially increased the composite reliability and the AVE values.

ThePhone Cronbach alpha and composite reliability (CR) tests were used to measure internal consistency reliability. Cronbach alpha tests the lower limit estimate of reliability and omega gives a better estimate in the PLS-SEM situation due to the lack of equal weighting of indicators. Cronbach alpha and CR value of all constructs exceeded 0.70 set level of measurement satisfactory and significant internal consistency and reliability were established. The convergence validity was reviewed since the Average Variance Extracted (AVE) was used to determine how much a construct accounts for the indicators. AVE of more than 0.50 indicates that the construct accounts of more than half of the variance of its measurement items. The AVE score of digital innovation, quality management and organisational performance were greater than the recommended values enhancing sufficient convergence validity.

It was evaluated on the basis of both FornellLarcker criterion and heterotraitmonotrait ratio (HTMT). Based on FornellLarcker criterion, a square root of the AVE of the construct of a particular construct should be higher than its correlation with other constructs and therefore the construct has more variance with its indicators as compared to other constructs. This was met with all latent variables. The HTMT ratios were also tested in order to offer a more rigorous test of discriminant validity. The values in HTMT were all below the conservative value of 0.85, which proved that the constructs were empirically different to each other. Lastly, the multicollinearity was also assessed by analysing the variance inflation factor (VIF) values. Multicollinearity may inflate standard errors and Structural path estimates in case predictor constructs are correlated with each other. In this research, the values of all VIF were less than the advised 5, and thus, no case of collinearity was present.

In general, the findings of the measurement model test prove that the constructs have sufficient reliability, convergent validity, discriminant validity, and multicollinearity is not present. Thus, the measurement model is satisfactory regarding the requirements of the existing PLS-SEM and can be viewed as the adequate basis of the further structural models analysis.

6. Structural Model Assessment

The reliability and validity of the measurement model was confirmed; after that, structural model was reviewed to test hypotheses regarding the relationships between digital innovation, quality management and performance of the organisation. It was observed in terms of path coefficients, the power of the explanations, the magnitude of such effects, and the predictive relevance, as well as in terms of the postulated interaction (synergy)

effect. SmartPLS was used to bootstrap using 5,000 resamples using the purpose of determining the statistical significance of the structural relationships. As the path coefficient analysis (β) shows, organisational performance depends on digital innovation positively and significantly (β =0.34, t = 5.87, p < 0.001), which proves the claim of developing digital capabilities as having a positive influence on the performance of the firm. Quality management is also found to have a significant positive relationship to organisational performance (β = 0.41, t=6.92, p=0.001): this proves that continuous improvement and maintaining discipline are the focal points of business excellence. Moreover, quality management is affected by digital innovation also rather significantly (β = 0.49, t = 8.15, p < 0.001) which implies that digital technologies make organised quality practises more robust by the means of real-time monitoring and decision-making. The mediation analysis demonstrates that quality management mediates the correlation between digital innovation and organisational performance partially where the indirect relationship is statistically significant whereby the direct one is significant pointing to complementary drives of effect. In the evaluation of the explanatory power of the model, the coefficient of determination (R^2) was checked. The organisational performance has an $R^2$of 0.62, which has moderate to substantial explanatory power since it is greater than the standard of 0.50. The R2 value of the quality management is 0.24, which is close to the weak to moderate explanatory level. Such findings indicate that the model predicts strongly on performance results based on a large percentage of variation as indicated.

The effect size (f^2) was estimated to determine the comparative contribution of all exogenous constructs on endogenous variables. Digital innovation has a significant contribution in quality management with a large effect size (f 2 = 0.36). The quality management impact on the organisational performance shows a medium impact (f 2 =0.19) and the direct impact of digital innovation on organisational performance has a small to medium impact (f^2=0.11). These data indicate that although the two constructs alone have a direct influence on performance, quality management has a more significant direct role, and digital innovation strongly boosts quality systems. The predictive relevance (Q^2) was determined by the blind folding process. The $Q^2$of organisational performance is 0.41 and that of quality management is 0.18 which is more than zero. These findings validate the finding that the model has sufficient predictive relevance meaning that the exogenous constructs are predictive of the endogenous variables.

The proposed moderation or synergy effect among digital innovation and quality management was then tested by taking the product indicator approach. The result of the interaction indicates a favourable and statistically significant impact on the performance of an organisation (β = 0.17, t = 3.24, p = 0.0001), hence the existence of an interaction. It means that organisations that demonstrate high performance levels in both digital innovation and quality management have performance gains that are larger than the aggregation of the respective impacts. A basic slope analysis further shows that the effects of digital innovation on performance are high in the case of high quality management practises, which in the support of the supplementary reasoning based on the Resource-Based View and Dynamic Capabilities Theory. The analysis of the structural model findings, in general, have empirical evidence regarding the assumed relationships and supports the assumption that the execution of digital innovation and quality management has a tremendous positive effect on the overall performance of high-performance firms.

7. RESULTS AND DISCUSSION

This part is a presentation of the empirical part of the conducted study and how the empirical data is applied to the hypotheses and the current literature. The findings are grouped on the basis of hypothesis testing, analysis to determine the synergy effect, comparison of the past researches as well as theoretical contributions.

7.1 Summary of Hypothesis Testing

The results of the structural model indicate that the digital innovation and the quality management have a great impact on the organisational performance. Table 5 shows that digital innovation positively and significantly influences the organisational performance (β = 0.34, p < 0.001), which supports H 1. Quality management has a strong positive impact on organisational performance (β = 0.41, p < 0.001) as well, which proves H 2. Moreover, the H3 is supported because digital innovation is also deemed as having a substantial effect on quality management (β = 0.49, p < 0.001). The mediation results reveal that quality management has some mediating effect through which digital innovation and organisational performance relate, thus confirming H4. The indirect effect is also statistically significant with the direct path also being significant, which indicates that there are complementary pathways of influence. Digital innovation and quality management interaction term is positive and statistically significant (β =

0.17, p = 0.01), which suggests that H5 holds and proving the existence of the synergy effect. Table 4 presents the detailed results of hypothesis testing, whereas Table 3 presents the results of the reliability and the validity of these systematic associations. The model provides explanatory power as indicated in the values of R2 of endogenous constructs as shown in Figure 2.

Table 3. Measurement Model Results (Loadings, CR, AVE)

Construct	Loading Range	Cronbach's Alpha	Composite Reliability (CR)	AVE
Digital Innovation	0.76 – 0.85	0.89	0.92	0.66
Quality Management	0.79 – 0.88	0.91	0.93	0.69
Organizational Performance	0.83 – 0.89	0.88	0.92	0.75

Table 4. Structural Model Path Coefficients and Hypothesis Testing Results

Hypothesis	Structural Path	β	t-value	p-value	Decision
H1	Digital Innovation → Organizational Performance	0.34	5.87	< 0.001	Supported
H2	Quality Management → Organizational Performance	0.41	6.92	< 0.001	Supported
H3	Digital Innovation → Quality Management	0.49	8.15	< 0.001	Supported
H4	Digital Innovation → Quality Management → Organizational Performance (Indirect Effect)	0.20	4.36	< 0.001	Supported
H5	Digital Innovation × Quality Management → Organizational Performance	0.17	3.24	0.001	Supported

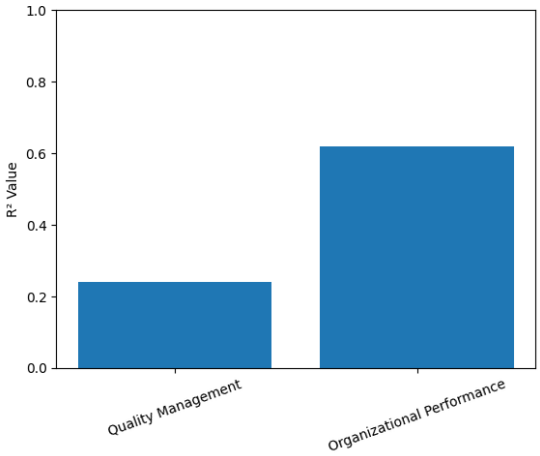

Fig. 2. Explained Variance (R^2) of Endogenous Constructs.

7.2 Interpretation of the Synergy Effect

Significant interaction effect shows that digital innovation and quality management do not work alone; instead, the combination of the two aspects results in increased organisational performance. Digital innovation reinforces quality outcomes through real-time monitoring of processes, predictive analytics, automation, and continuous improvement based on the data. Once digital capabilities are integrated into the organised quality systems, organisations will have the ability to attain quicker feedback loops, better defect avoidance, as well as an improved visibility of the operations. High digital innovation and effective quality management will lead to higher levels of financial performance, operational performance, and innovation when compared to companies that do not focus on all of these traits. This observation indicates that the most effective way to digitalize transformation efforts is through the disciplined quality practises. Figure 3 shows the corresponding interaction effect in which the slope of digital innovation on the organisational performance is steeper at the greater the level of quality management, proving the complementary and multiplicative characteristics of the given capabilities.

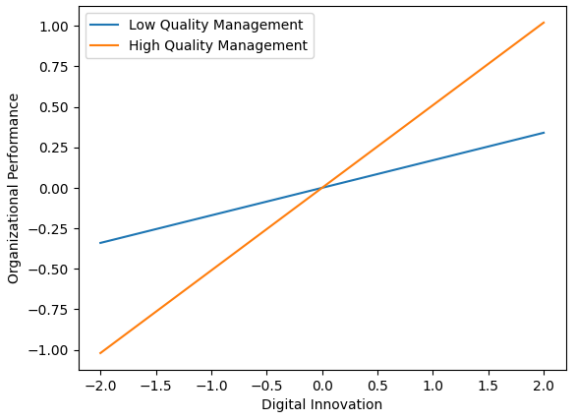

Fig. 3. Interaction Effect of Digital Innovation and Quality Management on Organizational Performance.

7.3 Comparison with Previous Studies

These results are consistent with the previous studies that propose that digital transformation positively affects the performance of firms in terms

of building capabilities, and renewing strategies. In line with the digital innovation literature, the operational relationship between performance and digital innovation has proven to have a positive relationship due to the above expectation that, technology-led agility increases the achievement of a competitive advantage. In the same manner, the powerful influence of quality management on performance proves the previous researches which show the relevance of TQM and continuous improvement to operational efficiency and innovative outcome. Nonetheless, the research is a continuation of other studies in that it empirically confirms the relationship between digital innovation and quality management. Although the constructs have been individually investigated in previous research, there is little empirical support researching to test the combined or synergistic effect of these constructs. The current results indicate that organisations that combine digital capabilities and organised quality systems attain high quality business excellence and therefore contribute to a significant shortcoming in literature.

7.4 Theoretical Implications

The research contributes to literature in a number of ways. First, it builds upon the Resource-Based View, by revealing that digital innovation and quality management serve as complementary strategic resources, which have a joint impact of improving the performance of an organisation. The findings describe these capabilities as a unit value instead of looking at them separately as deadly and hard to copy unit competencies within an organisation. Second, the findings can be added to the Dynamic Capabilities Theory because it demonstrates that digital innovation allows companies to feel and capture technological opportunities, and quality management can offer the systematic routines that help to reconfigure processes efficiently. The synergy effect helps to affirm the fact that sustained competitive advantage is not only created by having individual capabilities but also created and coordinated them in a strategic way. Lastly, the research also adds to the quality innovation integration theory by empirically confirming the role of digital technologies as a tool to improve the performance of quality management systems. The digital innovation and quality practises implementation is one of the strategic directions towards sustainable business excellence of high-performing organisations.

8. Managerial Implications

The results of the present research provide some relevant managerial implications to organisations that want to improve business excellence by incorporating the practise of digital innovation and quality management. To begin with, the managers need to focus on the gradual process of incorporating digital tools into the current quality management systems. The empirical data prove that digital innovation has a considerable impact on strengthening the quality management practises and enhancing the performance of the organisation. Process monitoring, predictive maintenance, defect prevention, and continuous improvement initiatives can be improved with the use of digital technologies, including real-time analytics, automation systems, artificial intelligence, and integrated enterprise platforms. Instead of considering digital transformation as an independent IT initiative, organisations must consider implementing digital capabilities within formal quality frameworks with the view of achieving optimal operational and financial performance.

Second, the research highlights the significance of strategic harmonisation between the innovation programmes and the operational excellence programmes. Digital innovation and quality management act as compliments, neither should work independently but instead, their result will have more significant performance benefits. Managers ought to make sure that the strategies of digital transformation are aligned to the quality goals, performance indicators and procedures. This congruence would allow organisations to turn the investment in technology into objective advances in efficiency, dependability, and innovation performance. Those firms that align digital efforts with a continuous improvement programme are in a better place to realise a sustained competitive advantage.

Third, leadership is highly important in influencing the transformation of digital qualities. The top management has to create an organisational culture that is both friendly and open to technological innovations and at the same time enforce strict quality standards. The leaders need to express a clear vision, incorporating digital transformation going along with process excellence, distribute funds in a strategic manner, and promote cross-functioning among IT, operations, and quality departments. The establishment of a common strategic focus can help leaders minimise resistance to change and make sure that digital tools improve, rather than undermine the quality systems that have been already established.

Last but most important, to high-performance organisation; the findings give feasible instructions on maintaining business excellence. The companies are advised to invest in the development of digital capabilities and empower quality culture, continuous improvement

strategies, and process standardisation. The organisations need to adopt data-driven decision-making systems, introduce performance monitoring dashboard of digital technology, and measure quality in online platforms. Through the alignment of digital innovation and quality management as mutually reinforcing competencies, organisations have the potential to gain a greater financial performance, operational efficiency, and innovation results, thus gaining the ability of long-term strategic resilience and competitive advantage.

9. Limitations and Future Research

However, in spite of the fact that this research has some rational empirical contributions to the relationship between digital innovation and quality management, it is important to point out that the study has some limitations. One, the study takes the cross-sectional design, which involves data collection at a given time. Although this method is suitable in testing structural relationship, it obstructs making causal prescription on the influence it can bring about in case of dynamic capability development through time. Digital transformation and integration of quality management are dynamic processes and respective long-term performance impacts may be realised over a period. The future study might assume the longitudinal designs to seek the effects of time and gain insight into how digital synergy of quality functions evolve and maintain their force over time through various stages of the organisational maturity. Second, the research involves high-performance organisations in select industries and geographical areas. Though this will increase internal consistency, it might restrict external validity of results in various economic environments, cultures, or new markets. The difference in technological infrastructure, regulatory frameworks, and organisational culture can also have an impact on the interaction between digital innovation and quality management. The future research efforts can be tasked with multi-country or cross-industry comparisons in order to identify the strength of the proposed model and analyse contextual moderating variables.

Third, the research is based on self-reported survey findings obtained by the managerial respondents. Even though the selection of respondents was made through their knowledge and their roles in decision making, perceptual measures might lead to common method bias and subjective evaluation effects. Future studies might use objective performance measures or archival financial data, or multi-source method of data collection to improve on the methodological rigour. Lastly, though this study uses PLS-SEM to investigate direct, mediating, and interaction effect, future studies may expand the analytical tool of incorporating hybrid SEM- machine learning (SEM-ML) tool. Circumference analysis: Predictive accuracy could be better when SEM is combined with other more sophisticated predictive models, like the Random Forest or gradient boosting algorithms, which could be missing important interaction trends not well represented by variance-based SEM alone. These integrative methods may offer more comprehensive knowledge on the joint impact of digital innovation and quality management on business excellence as well as [organisational] competitiveness.

CONCLUSION

This paper was aimed at analysing the synergy relationship between digital innovation and quality management and the combined effect of these practises on organisational performance in high-performance organisations. The study empirically tested direct, mediating, and interaction effects using a PLS-SEM technique between the following constructs. The results show that the digital innovations play a crucial role in improving both the quality management practises and the organisation performance, whereas the quality management itself is highly positively impactful on the performance outcomes. Notably, the findings support the existence of the synergy effect, as they show that the interplay of digital innovation and quality management leads to the more significant performance improvement than both of them individually. The model achieves a significant amount of discontinuity between the performance of organisations and its ability to explain the organisational performance, a factor that attests to its predictive ability and high practical value. In theory, the proposed research is relevant to the literature concerning quality and innovation by combining the perspectives of the Resource-Based View and dynamic capabilities to show that digital and quality capabilities are complementary strategy resources. The empirical confirmation of the digital quality synergy framework makes the research contribute to the knowledge on how organisations can manage to coordinate technological innovation and organised process excellence to the achievement of sustainable business excellence and long term competitive edge.

REFERENCES

1. Abbas, J. (2020). Impact of total quality management on corporate sustainability through the mediating effect of knowledge management. *Journal of cleaner production*, *244*, 118806.

2. Ciriello, R. F., Richter, A., & Schwabe, G. (2018). Digital innovation. *Business & Information Systems Engineering*, *60*(6), 563-569.
3. Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and organization*, *28*(1), 52-61.
4. Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital transformation: An overview of the current state of the art of research. *Sage Open*, *11*(3), 21582440211047576.
5. Li, L., Su, F., Zhang, W., & Mao, J. Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, *28*(6), 1129-1157.
6. Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship theory and practice*, *41*(6), 1029-1055.
7. Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management. *MIS quarterly*, *41*(1), 223-238.
8. O'Neill, P., Sohal, A., & Teng, C. W. (2016). Quality management approaches and their impact on firms' financial performance–An Australian study. *International Journal of Production Economics*, *171*, 381-393.
9. Prajogo, D. I., & Sohal, A. S. (2003). The relationship between TQM practices, quality performance, and innovation performance: An empirical examination. *International journal of quality & reliability management*, *20*(8), 901-918.
10. Sahoo, S., & Yadav, S. (2018). Total quality management in Indian manufacturing SMEs. *Procedia Manufacturing*, *21*, 541-548.
11. Talib, F., Rahman, Z., & Qureshi, M. N. (2013). An empirical investigation of relationship between total quality management practices and quality performance in Indian service companies. *International journal of quality & reliability management*, *30*(3), 280-318.
12. Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of business research*, *122*, 889-901.
13. Vial, G. (2021). Understanding digital transformation: A review and a research agenda. *Managing digital transformation*, 13-66.
14. Warner, K. S., &Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long range planning*, *52*(3), 326-349.
15. Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., & Blegind-Jensen, T. (2021). Unpacking the difference between digital transformation and IT-enabled organizational transformation. *Journal of the Association for information systems*, *22*(1), 102-129.
16. Zeng, J., Phan, C. A., & Matsui, Y. (2015). The impact of hard and soft quality management on quality and innovation performance: An empirical study. *International journal of production economics*, *162*, 216-226.