Research Article

A Structural Equation Model on Successful Digital Transformation of Agribusiness in Davao Region

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Abstract: The study aimed to determine the best-fit model for successful agribusiness digital transformation. The study utilized a descriptive non-experimental research design and structural equation model approach. A total of 402 food service employees in Davao region participated in the study. The collected data from the adapted questionnaires were analyzed using the structural equation model approach. Five models were generated, wherein only model 5 met the goodness of fit standard. The best-fit model achieves successful digital transformation (innovation, governance and resource attainment) from the significant influence of digital skills (empathy, creation, creative and information skills) and organizational culture (cultural alignment, experimental environment, agile structure, and leading transformation).

Keywords: Business Administration, Digital Information Services, Digital Skills, Digital Transformation, Organizational Culture.

I. INTRODUCTION

Businesses have been compelled to shift to digital by the COVID-19 pandemic drastically, and this digital transformation has introduced a metaphorical wave of change management to the company landscape (Patel, 2024). Even businesses in the agri-food sector are forced to create digital transformation strategies due to new and innovative business models, shifts in wholesale and customers' expectations and behavior, and concerns about food safety (Pachni-Tsitiridou & Fouskas, 2022). Every company is considering going digital (PECB, 2022), yet the success rates are not particularly high (Georgiou, 2023). Forbes (2022) posted that any firm must establish talent, organizational culture, and technology before pursuing a digital transformation, the three macro transformation pillars. However, the existing literature does not sufficiently examine the interdependencies between these variables or any integrative knowledge.

Recent reports demonstrate the importance of digital technologies. According to the World Bank (2023), digital technologies can reduce food loss and waste by 45% and enhance agricultural production by 70% by the year 2050. Furthermore, the Selected Statistics on Agriculture provides data on the production, trade, consumption, and prices of various agricultural commodities and the digital technologies application in the industry (Philippine Statistics Authority, 2022). The UK government (2023) also publishes the Food Statistics Pocketbook, which includes information on the food chain, food security, food safety, and food waste, among other topics, and emphasizes the significance of digital technologies in the food system. Even the Singapore Food Agency (2022) also published the Singapore Food Statistics, which covers the trends and developments of the food industry, including the adoption of digital solutions and innovations.

The agribusiness sector offers vital connections both in and out of the country. The three key sectors are the input, production, and food sectors. The industry that deals with the processing, marketing, and distribution of food is the food sector (sometimes referred to as the product sector or processing-manufacturing). Millions of people are employed by it in a range of industries, such as fast-food services, conventional restaurants, and supermarkets (David and Gold Berg, 1957). But as of now, no DT model—including for the agribusiness—has undergone complete testing. However, studies mention digital technologies, duties, processes, and challenges related to agribusiness, yet no study has previously enumerated them.

This study intends to develop the best-fit model for successful agribusiness digital transformation. The primary data was extracted from agribusinesses, particularly the food sector in Davao Region. The researchers only focused on food services such as fast-food services, restaurants, and café being part of a subcategory under this sector. Participants are employed by small - to medium-sized private-sector agribusinesses. A total of 402 food service employees in Davao region participated in the study. Structural Equation Modelling (SEM) was applied to assess the interrelations between the hypothesized models and to determine the best-fit model for successful digital transformation. The indices were produced to assess how well the models fit the data. To meet the requirements, the CMIN/DF ratio must be between 0 and 2, with a p-value greater than 0.05. Also, the

Tucker-Lewis Index (TLI), Goodness of Fit Index (GFI), Normative Fit Index (NFI), and Comparative Fit Index (CFI) must be greater than 0.95, and the Root Mean Square Error of Approximation (RMSEA) must be less than 0.08 and p-close must be greater than 0.05.

The study is aligned with the 9th Sustainable Development Goal highlighting the essential of developing resilient infrastructure, supporting inclusive and sustainable industrialization and advancing innovation. Additionally, this study will open a wide perspective in understanding food businesses' digital skills, organization culture and digital information services. Additionally, this study would greatly help various stakeholders, especially food businesses, concerned agencies, and researchers. The government and private sectors may be able to learn from this to mitigate the negative consequences on society and the environment while adjusting to the disruptive changes in business brought about by this phenomenon. The analysis might help and offer insights on what projects and investments food businesses should prioritize and implement to succeed in the digital transformation.

II. LITERATURE REVIEW

A) Digital Transformation

Digital transformation refers to using data and digital technologies to completely and holistically alter every facet of our socioeconomic existence, including how we work, live, and interact with one another (Vietnamese government, 2019). Digital technology is the center of this process, which creates and reinforces disruptive shifts in society and industry (Kozarkiewicz, 2020). Digital transformation is vital in many ways, especially during and after the pandemic. The pandemic has presented difficulties for the world economy, especially for the food and agricultural sectors (Bailey & Breslin, 2021; Rasul et al., 2021). Moreover, the use of internet marketing to promote agricultural products is a strategy that is gaining popularity worldwide. Many people are drawn to the digital trend due to its simple and affordable principles (Hermawati et al., 2023). In China, for instance, the performance of SMEs is impacted by digital transformation. To enhance performance and sustain sustainable development, small and medium-sized enterprises (SMEs) can benefit from digital transformation by prioritizing investments in digital technology, employee digital skills, and digital transformation strategies (Zteng et al., 2022).

Many firms have seen the positive effects of digital transformation, but adoption is still in its early stages in the Philippines due to both technological and human barriers (Blast Asia, 2019). The nation is dealing with issues such as the lack of trained digital workers, poor digital adoption, and micro, small, and medium-sized enterprises (MSMEs). President Marcos pointed out that more efforts should be made to catch up with digitalization (Sear, 2023). Truly, digitalization is and will continue to have a significant impact on organizations (Demir, 2019). Recognizing the significance of the research on successful agribusiness digital transformation, the researchers conducted a review to identify any potential contributing factors. Technology, organization, and culture are considered the three operational pillars of digital transitions (Krauthammer, 2020). It is also said that the essential success characteristics necessary for this endeavor to succeed are as follows: adoption and use of new technology, Cultural Change, and Data-driven decision-making, according to Jovanovic (2023). Hence, factors affecting the success of digital transformation are organizational culture (Bozkus, 2024; Wittmer, 2024; Al-Faihani & Al-Alawi, 2020), Digital Skills (Obermayer et al., 2023), and Technology (Wittmer, 2024).

B) Digital Skills

One of the exogenous variables in the framework is Digital Skills. In the study of Fan and Wang in 2022, six factors of digital skills were extracted, such as access to and management of digital content, use of digital means, communication of digital content, creation of digital content, digital empathy, and digital safety. People need a broad range of skills to facilitate and benefit from the digital transition. Digital safety skills refer to using digital technologies safely while safeguarding one's privacy and well-being. Digital empathy skills are the cognitive and emotional aptitude for using digital technology strategically while being reflective and socially responsible. Communication skills meant communication with others in digital environments. The capacity to create new material using digital technologies and media was referred to as creation abilities. Finally, the capacity to use digital tools to acquire and handle digital content efficiently is information skills. Furthermore, according to Helsper et al. (2020), digital skills are comprised of four dimensions: technical and operational abilities, information navigating and computation skills, interpersonal and collaboration skills, and content creation and production skills. Research on digital skills recognizes that it is important to consider both the fundamental abilities needed to access the internet and the abilities needed to understand and utilize online content (Ferrari, 2012).

C) Organizational Culture

On the other hand, the second variable is Organizational Culture. It is important to consider organizational culture while implementing digital transformation initiatives (Al-Faihani & Al-Alawi, 2020). Organizational culture is influenced by factors such as Cultural Alignment, Innovation Culture, Digital and Entrepreneurial Mindset, Experimental Environment, Agile Structure, Leading Transformation, and Transformation Performance Perception (Leso et al., 2023). Cultural alignment refers to practices and behaviors that enable organizations to absorb transformational principles and cultural regards. The term

"Innovation Culture" means instilling the principles of promoting innovation and digitalization. A Digital and Entrepreneurial Mindset refers to designing and managing organizational structures that foster novel business models and digital expansion. The experimental environment symbolizes the principles and behaviors that encourage an experiment-driven atmosphere. Agile Structure describes the flexibility businesses can create an organizational dynamic that leads to malleability, organized activities, and improved communication. Leading transformation refers to leadership's crucial role in the digital transformation process. Finally, Transformation Performance Perception is the leverage in terms of advancement and progress in digital transformation.

Digitalization has, therefore, had a profound impact on corporate culture by altering organizational structures and procedures as well as how individuals interact with one another (Grover, 2022). For a digital transformation to be effective, organizational culture must change to satisfy the evolving needs of a more technologically sophisticated environment. Additionally, the business development of small and medium-sized enterprises is impacted by organizational culture, environmental sustainability, and digitalization (Isensee et al., 2020). People know very little about what a digital organizational culture looks like and how it can be established in incumbent companies (Knecht & Hund, 2022). Also, organizations can use digitization to create prosperity by fostering such a culture but theorizing on digital culture in businesses is still very new (Grover et al., 2022). Most of the research also says very little about the details of culture change in the context of digital transformation and its management, even if earlier studies have acknowledged the significance of organizational culture for digital transformation (Hartl, 2019). Studying digitalization's significant influence on organizational culture through new theoretical perspectives is helpful, given how ubiquitous technology is today (Grover et al., 2022).

D) Digital Information Services
Digital Information Services are the third and last exogenous variable regarding Digital Information Services. The EFA's latent framework in the Klyton et al. (2020) study revealed that while conditions for facilitation and the perceived value of information stayed constant, digital autonomy, adaptability to the user requires, accessibility via mobile devices, and digital citizenship varied greatly. Regarding digital autonomy, this indicator refers to government and infolocal assistance. Responsiveness to user needs assesses the degree to which local institutions believe they can meet the demands of their constituents. Mobile access refers to the institution's capacity to improve mobile accessibility. Digital citizenship relates to how institutions see users' interaction with the infolocal. Facilitating conditions are the perceptions regarding the availability of infrastructure, resources and opportunities for technology adoption. Perceived usefulness of information refers to websites' contents, utility, and wider social implications.

Applying smart technologies could lead to several opportunities, risks, and unanticipated developments in the future. The contextual conditions in which a particular endeavor is anchored and the variety of public value-generating methods, including clever technologies and strategies, will determine how to approach the problems ahead (Criado & Gil-Garcia, 2019). Furthermore, it is critical to set up the necessary digital infrastructure and support systems for both current and upcoming pandemics (Xie et al., 2021). A sustainable goal of economic development and poverty reduction now depends heavily on access to information and communications technology. However, access is still concentrated in a small number of areas and demographic groups (Navas-Sabater et al., 2002).

E) Successful Digital Transformation
The endogenous variable of the study is successful digital transformation. As to successful digital transformation, the study of Mhlungu et al. (2019) highlights the existence of four dimensions of underlying factors of a successful ODT initiative. The variables are customer-centricity, governance, innovation and resource attainment. Customer centricity is the organization's tendency to concentrate on the organizational and transdisciplinary difficulties involved in effective planning and executing customer experience. Governance depicts the guiding principles, roles and responsibilities utilized to organize and direct the initiatives. Innovation describes the capacity of an organization to generate and apply novel concepts.

Lastly, resource attainment refers to the ability of an organization to obtain resources through partnerships, such as financing, infrastructure, expertise and knowledge. In addition to altering businesses, digital transformation is also reinventing markets and industries. It involves reimagining an organization's strategy and goals, structure of operations, processes, capabilities, and culture to align with the changing digital business context (Gurbaxani & Dunkle, 2019).

F) Conceptual Framework
Figure 1 presents the hypothesized structural model of the study. One hypothesized model was created, exposing the possible causal dependence encompassing the hypothesized model of the two latent constructs. The exogenous variables of this study are digital skills, organization culture and digital information services of agribusinesses. Conversely, the endogenous

variable is the successful agribusiness digital transformation. The proposed model exhibits the following: the oval represents the latent construct's measured variable; the single-heated arrow denotes the direct relationship between two variables. To create the greatest possible relationships between the variables, this model was investigated in an effort to improve plans and policies for digital transformation.
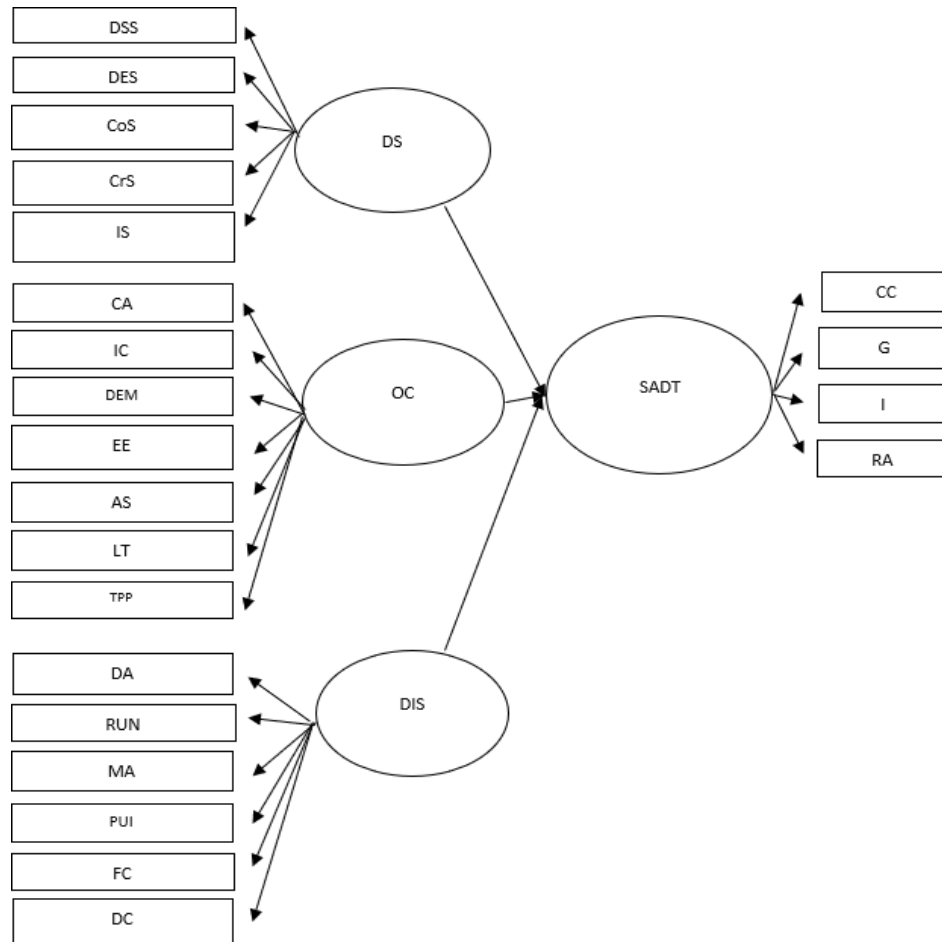

Figure 1. The conceptual model shows the direct relationship between the latent exogenous variables towards the latent endogenous variable

III. RESULTS AND DISCUSSION

A) The Best-Fit Model of Successful Digital Transformation

A detailed discussion of the interrelationships among the research variables is provided in this section. The goal was to choose the model that best explained the data by examining five different models. A structure model that produces a good fit demonstrates the coherence of the theory and the methodology applied to the variables of the empirical interactions the model predicts. A structured model that produces a good fit demonstrates the coherence of the theory and the methodology applied to the variables of empirical interactions the model predicts. Table 3 summarises the goodness of fit results for these five produced models. The study generated five models; however, the first four models did not meet the goodness of fit standard in terms of p-value.

Index	Criterion	Model 1	Model 2	Model 3	Model 4	Model 5
CMIM/DF	0<value<2	1.814	2.140	1.765	1.424	1.193
***p*-value**	>0.05	.000	.000	.003	.047	2.01
NFI	>0.95	.971	.973	.979	.984	.987
TLI	>0.95	.982	.979	.987	.993	.997
CFI	>0.95	.987	.985	.991	.995	.998
GFI	>0.95	.956	.966	.974	.979	.982
RMSEA	<0.08	.045	.053	.044	.033	.022
P-close	>0.05	.746	.334	.708	.933	.986

Table 1. Summary of Goodness of Fit Measures for Successful Digital Transformation

Legend:
CMIN/DF - Chi-Square/Degrees of Freedom   NFI - Normed Fit Index
GFI - Goodness of Fit Index   TLI - Tucker-Lewis Index
RMSEA - Root Mean Square of Error Approximation   CFI - Comparative Fit Index

The best-fit model is comprehended through the correlative effect of digital skills, organizational culture and digital information services to successful digital transformation. To improve model fit, modification indices were considered in this model, and error terms were correlated. After doing the Chi-square test, the result was 1.193 when divided by the number of degrees of freedom. The p-value was 2.01, which was greater than .05. The claim of the best fit model was additionally strongly supported by an RMSEA has a score of 0.022, which was less than 0.05. and whose corresponding P-close value was higher than 0.986. Likewise, NFI, TLI, and CFI values all fall under each threshold, indicating an exceptionally well-fitting model. A GFI value of 0.982, a CFI of 0.998, an NFI of 0.987, and a TLI of 0. 997.Given that all indices satisfied the predetermined criteria in comparison to the derived model fit value, the outcome of the goodness of fit analysis is quite satisfactory. These indices met the goodness of fit measures. Additionally, this suggests that the created model is the best-fit model.

Since every index in the produced structural model satisfies every condition, it was discovered that the indices consistently show a very good match to the data. Therefore, finding another model to test is unnecessary because the last model has already been determined to be the best of all tested models. As a result, the theory that there is no best-fit model was rejected. One may argue that there is a best-fit model that agribusinesses use to determine the successful digital transformation in the Davao region, as shown in Figure 2. The figure displays the structural model standard solution for digital skills and organizational culture for successful digital transformation. With a set beta coefficient of 0.06, the results show that digital skill has a significant consideration impact on successful digital transformation. A unit increase in digital skills corresponds to a 0.06% increase in the degree of successful digital transformation, assuming the other variables remain constant. Moreover, evidence indicates that a 0.75 rise in organizational culture corresponds to an increase in successful digital transformation, anticipating the other variables to remain constant.

The model makes it abundantly evident how crucial skills and organizational culture are to successful digital transformation. However, the model revealed that only four digital skills indicators remained very significant predictors: digital empathy skills, communication skills, creative abilities, and information skills. Also, four of the seven indicators for organizational culture were found to significantly impact successful digital transformation, such as cultural alignment, experimental environment, agile structure, and leading transformation. Governance, innovation and resource attainment are the indicators retained for successful digital transformation. To enhance the model fit, it has been advised to remove non-significant components of the original model during the modeling process, such as removing digital information services as a latent variable suggested by the modification index. Nonetheless, the model change procedure considered changes that made sense or were supported by theory. This was done to encourage real measurement advancement (Arbuckle, 2013).
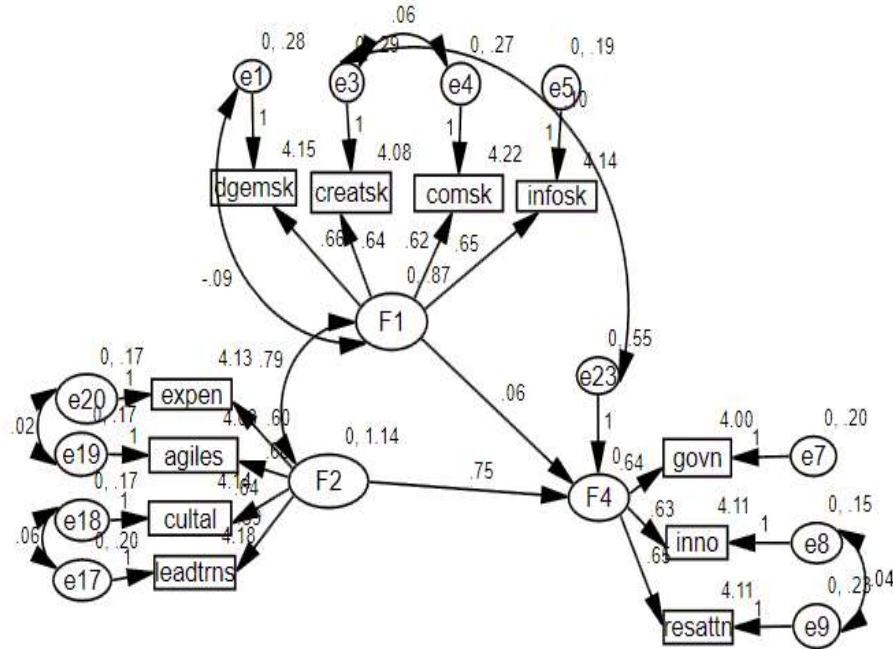
Figure 2. Best fit model- Structural Model 5 in Standardized Solution

Legend:

F1-Digital Skills	F2- Organizational Culture	F4- Successful Digital Transformation
dgemsk-Digital Empathy Skills	expen-Experimental Environment	govn- Governance
creatsk-Creation Skills	agiles-Agile Structure	Inno- Innovation
comsk-Communication Skills	cultal-Cultural Alignment	resattn- Resource Attainment
infosk- Information Skills	leadtrns-Leading transformation	

The best-fit model achieves successful digital transformation from the significant influence of digital skills and organizational culture. A culture that supports change is required in digital transformation while enabling the company's overarching strategy (Hemerling et al., 2018). In the 2019 Harvard Business Review, Tabrizi and company (2019) support this result by stating that Digital Transformation is not about technology. Instead, it is about how these organizations concentrated on altering members' perspectives in addition to the corporate culture and procedures. Therefore, Digital Transformation will just accentuate the shortcomings of the current organizational processes if people lack the necessary mindset to change. In 2015, Kane and associates also believed that strategy, rather than technology, propels digital transformation. He said that the transformation would be fueled by a distinct digital strategy, as well as a culture and leadership ready to go. Kane again underlined in 2019 that people are the true key to digital change. In essence, digital transformation involves more than just implementing technology; it involves a culture shift that values creativity and a digital-first mindset (Patel, 2022). Ultimately, successful digital transformation requires a comprehensive strategy that unites technology breakthroughs with organizational goals, enabling businesses to adapt, develop and take the lead in their respective sectors (Patel & Ramos, 2024).

IV. CONCLUSION

The results related to the level of digital skills, organizational culture, digital information services and successful digital transformation attained a high level, implying that all these variables are often observed. The results also suggested that the agribusinesses in the region are committed to assisting their employees in developing their digital skills, that the management is committed to improving organizational culture, and that the digital transformation services are highly elevated, implying that they have given their customers the best possible service and that the food services considered digital transformation.

The high-level rating of the four variables used in the study indicates that further improvement could be achieved by elevating them to an extremely high level. To help employees acquire the necessary skills, culture and technology, the organization may conduct comprehensive digital literacy programs and improve business models to successfully navigate digital transformation. By doing so, the organization can have an advantage over rivals, making it trendier. Based on the analysis conducted, successful digital transformation obtained the lowest mean score, particularly in governance. Hence, agribusinesses are advised to ensure that this can be improved by ensuring that the organization has updated security systems, standards, and practices; that monitoring and evaluation criteria and mechanisms for digital systems are clearly defined; and

that the organization has redefined the guiding policies and decision-making practice in a digital environment. With this, they might be able to guarantee the success of the digital transformation. Due to the interdependence of all the variables, each one is required for the successful digital transformation of agribusinesses.

Secondly, the correlation analysis revealed that employee digital skills, organizational culture, and digital information services have correlations with the successful digital transformation of agribusinesses in the Davao Region. The strong correlation of digital skills, organizational culture, and digital information services towards successful digital transformation suggests that agribusinesses need to maintain these variables because higher levels translate into higher levels of successful digital transformation. This can be achieved by consistently allocating and investing in digital innovation within the company.

Lastly, this research has generated a new model that showed that the best predictors of successful digital transformation were digital skills, organizational culture, and digital information services. Hence, concerned agencies may integrate these variables in their initiatives. Also, the government might improve its partnership with the agri-food sector, given the growing potential of digitalization. With their assistance, agribusinesses might be able to keep advancing digital systems while simultaneously advancing the growth of the country. Also, given the narrow scope of this investigation, the researchers suggest that future research on this sector may consider additional direct or indirect aspects to fully comprehend successful digital transformation as well as policy-related issues and concerns.

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