

Moderating Effect of ICT Capability on the Relationship between Supply Chain Agility and Competitive Advantage of Drugstores in Davao Region

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ABSTRACT

The purpose of the study was to determine the moderating effect of ICT capability on the relationship between supply chain agility and competitive advantage among 300 drugstores in Davao Region. It made use of quantitative research design, specifically the descriptive-correlational approach. An adapted and modified research instrument was used in gathering the data. Hierarchical logistic regression was used to analyze the moderating effect of ICT capability on the relationship between supply chain agility and competitive advantage. The findings revealed that the overall levels of supply chain agility, ICT capability, and competitive advantage of drugstores are all high. The interrelationship among variables was found to be significant, however, supply chain agility and competitive advantage relationships were not significantly moderated by ICT capability. This indicates that the positive effect of supply chain agility on competitive advantage did not significantly change with different levels of ICT capability.

Keywords: Business management, competitive advantage, supply chain agility, ICT capability, moderating effect, Davao Region, Philippines

INTRODUCTION

Today's business world is indeed highly competitive, with global competition intensifying, posing challenges for companies to establish long-term competitive advantages [1]. More than half of small businesses fail within the first five years due to a lack of strategies to maintain a competitive advantage [14]. Moreover, drugstores, in particular, are also facing intensifying competition, requiring them to adopt strategies to maintain their competitive advantage [38]. In the global arena, the pharmaceutical industry is grappling with numerous challenges, including drug shortages, high costs, and the complexities of the work [22]. These issues are further exacerbated in the Philippines, where the national drug policy is struggling to address specific problems with providing adequate drugs and achieving rational use with systemic issues like staff shortages, poor management, and supply chain bottlenecks [28], while the absence of licensed pharmacists as a major issue in drugstores [2].

Competitive advantage is a key determinant of business success and survival, allowing firms to outperform rivals [40]. Factors that contribute to competitive advantage in various industries include customer service, product range, and operational efficiency [22]. Maintaining a competitive advantage is imperative for drugstores to remain viable and provide quality, accessible healthcare services [20]. It allows these businesses to provide superior value to their customers, thereby gaining a larger market share [42]. The

social relevance of this study lies in its potential to enhance the efficiency and effectiveness of drugstores in Davao Region, ultimately benefiting the local community by ensuring the timely and reliable provision of essential pharmaceutical products.

Several studies have highlighted the relationship between supply chain agility (SCA), information and communication technology (ICT) capability, and competitive advantage (CA). The study revealed that there is a positive relationship between SCA and competitive advantage, which indicates a widespread recognition that the vital component of the supply chain is SCA [30]. Results indicate that ICT capability contributes to competitive advantage, emphasizing the role of ICT capability as a key tool in management processes that contribute to sustained CA for businesses [33].

Several studies have investigated whether ICT capability moderates the relationship between SCA and competitive advantage. While previous research has explored these concepts separately, the researcher has not yet found a study that combines the three components in a drugstore setting. The proposed study focused on drugstores and examined the potential moderating effect of ICT capability on the relationship between SCA and competitive advantage. By investigating these three components in a specific industry context, the researcher provides valuable insights into the interactions between ICT capability, SCA, and CA in drugstores. This will contribute to the existing literature on the role of ICT capability in moderating the relationship between SCA and CA in various industries.

Research Problems

This study sought to determine the moderating effect of ICT capability on the relationship between SCA and CA of drugstores in Davao Region. More specifically, this sought to answer the following research questions:

1. What is the status of the competitive advantage, SCA, and ICT capability of drugstores in Davao Region?
2. Is there a significant relationship between:
 - o SCA and competitive advantage
 - o ICT capability and competitive advantage
3. Is the relationship between SCA and the CA of the drugstore in Davao Region significantly moderated by ICT capability?

Hypothesis

The following null hypotheses were tested at 0.05 level significance:

Ho 1. There is no significant relationship between SCA with CA and ICT capability with competitive advantage.

Ho 2. ICT capability does not significantly moderate the relationship between SCA and CA .

METHODOLOGY

Research Design

The study employed a descriptive-correlational design utilizing a moderation analysis to investigate the relationship between SCA, ICT capability, and CA in the drugstore context. The descriptive research design

was used to characterize the population, circumstance, or phenomenon to explore one or more variables without modifying them but merely observing and measuring them [12]. In this study, the descriptive research design was utilized to describe the status of SCA, ICT capability, and CA in drugstores.

Furthermore, correlation research design is a model that aims to identify and determine the connection between two or more variables, as well as the degree of their existing relationship [8]. In the context of this study, correlation was crucial in understanding the extent to which SCA and CA were related to each other. Additionally, the study utilized a moderation analysis, which involves exploring the influence of a moderating variable on the relationship between two other variables [5]. In this case, the moderation analysis was employed to explore how ICT capability moderated the relationship between SCA and CA in drugstores.

Research Locale

The study was conducted in Davao Region, Philippines, known for its thriving drugstore industry with a significant number of registered drugstores [24]. The Food and Drug Administration (FDA) reported that there were a sizable number of registered drugstores in the area [25], which led to the selection of the pharmacies in Davao Region. Specifically, the study was conducted in selected drugstores located in different parts of Davao Region, namely Davao City, Davao del Norte, Davao del Sur, Davao de Oro, Davao Oriental, and Davao Occidental.

According to data from the Food and Drug Administration (FDA), there were 24,660 registered drugstores in the Philippines in 2023, with 1,371 located in Davao Region. In Davao City, there were 597 drugstores, while Davao del Norte, Davao del Sur, Davao de Oro, Davao Oriental, and Davao Occidental had 335, 162, 133, 110, and 34 drugstores, respectively [11].

Research Respondents

The research had 300 respondents, primarily regular pharmacists managing retail drugstores, who had been engaged in the drugstores for more than one year and were involved in ICT operations related to pharmacy work in Davao Region. This sample size was deemed appropriate for conducting business research [16].

The study employed proportionate stratified random sampling techniques. By using proportionate stratified random sampling, researchers could obtain a representative sample that accurately reflected the characteristics and diversity of the entire population [17]. In this study, the researcher identified the representative population in each of the provinces in Davao Region in proportion to the population of drugstores in each province.

Research Instrument

The researcher utilized three sets of questionnaires adapted from various authors and validated by experts on questionnaire construction. Additionally, after expert validation, pilot testing took place to guarantee the reliability of the research instruments. The research instruments used a 5-point Likert type scale of which 5- Very High and 1- Very Low.

CA. This survey questionnaire was adapted and consisted of five dimensions with 16 item constructs [26]. Furthermore, the measurement's reliability score was high, with a Cronbach's alpha of 0.965.

SCA. The questionnaire was adapted with a Cronbach's alpha of 0.975. It has five dimensions: alertness, accessibility, decisiveness, swiftness, and flexibility, and consists of a 14-item construct [15].

ICT capability. The ICT Capability survey questionnaire was adapted. This tool contains a 13-item construct with a Cronbach's alpha value of 0.970[30].

Data Gathering Procedure

The data collection process for this study began with obtaining permission from the Dean of Graduate School. Subsequently, the researcher secured ethical clearance from the University of Immaculate Conception Research Ethics Committee (UIC-REC) to review compliance with policies and guidelines and approve data collection. With the letter of approval from the UIC Graduate School and the certification from the Research Ethics Committee released on October 2023, the researcher wrote a permission letter to 300 drugstore owners, managers, and pharmacists in Davao Region through the Food and Drug Administration via eFOI. After obtaining permission, the researcher began collecting data by contacting pharmacists who met the study's criteria.

Furthermore, the researcher hired enumerators in each municipality to administer the survey. The enumerators were trained and compensated according to the number of survey questionnaires administered. With the approval granted, the researcher began gathering data by providing the list of drugstores per municipality to the identified enumerators. The enumerators then located the respondents who met the study's criteria. After the respondents were identified, the enumerators began administering the survey.

The survey questionnaire was divided into two parts: the informed consent form and the study questionnaire. Each respondent was required to sign the informed consent form before participating. The entire survey questionnaire was expected to take about ten to fifteen minutes. Since the data collection was conducted face-to-face, the entire process was completed within two months, from October to November 2023.

Statistical Tools

The study utilized these statistical tools to provide a more comprehensive interpretation and analysis of the data gathered.

Mean was used to measure the levels of CA, SCA, and ICT capability in drugstores in Davao Region.

Standard Deviation (SD) was used to measure the dispersion of a set of data from the mean. The higher the distribution of variability, the greater the SD and the more significant the magnitude of the deviation from the mean's value.

The Pearson Product Moment Correlation was used to determine the relationships among CA, SCA, and ICT capability of drugstores in Davao Region.

Hierarchical Logistic Regression Analysis and Modgraph were used to ascertain the predictive power of CA, SCA, and ICT capability of drugstores in Davao Region. Further, it was also used to determine the moderating effect of ICT capability on the relationship between SCA and CA.

RESULTS AND DISCUSSION

Status of CA, SCA, and ICT capability among Drugstores in Davao Region

Displayed in Table 1 are the status of CA, SCA, and ICT capability among drugstores in Davao Region.

Table 1. Status of CA, SCA, and ICT capability among Drugstores in Davao Region

Indicator	SD	Mean	Descriptive Level
CA(DV)	0.63	4.07	High
Price	0.70	4.23	Very High
Quality	0.63	4.41	Very High
Delivery dependability	0.90	4.01	High
Product/Service Innovation	0.90	3.92	High
Time to Market	0.87	3.77	High
SCA (IV)	0.64	4.12	High
Alertness	0.72	4.13	High
Accessibility	0.74	4.24	Very High
Decisiveness	0.75	4.07	High
Swiftness	0.74	4.06	High
Flexibility	0.72	4.10	High
ICT capability (ModV)	1.02	3.76	High

The data presented on CA demonstrates a standard deviation ranging from 0.63 to 0.90 for most indicators. This indicates a general consistency in the responses provided by the participants. The drugstores' CA reflected an overall mean of 4.07, described as high. The overall high level denotes that the CA among drugstores is evident most of the time in Davao Region.

This finding supports the study by [18] that an evidence-based pharmacy practice and business's long-term success depends on its unique resources and capabilities as well as business strategies in terms of price, quality, delivery dependability, innovation, and time to market. For instance, the very high descriptive levels in price (4.23) and quality (4.41) further indicate a CA is always evident among drugstores in Davao Region. These findings imply that drugstores have established a robust competitive position in the market, particularly in terms of providing affordable prices and high-quality products. The interconnectedness of quality and price underscores customer satisfaction and repurchase intention, further significant in maintaining CA [36].

On the other hand, the Time to Market dimension, with a mean score of 3.77, while the lowest, still reflects a high descriptive level, suggesting that CA among drugstores is evident most of the time in Davao Region. This finding aligns with the notion of [19] that a faster time-to-market (TTM) can lead to better positioning in the market.

SCA. Likewise, the data presented in SCA demonstrates a standard deviation ranging from 0.64 to 0.75 for most indicators. This indicates a general consistency in the responses provided by the participants. The mean levels of SCA and its indicators in drugstores provide valuable insights into the operational capabilities and responsiveness of these establishments within the pharmaceutical supply chain.

SCA (IV) got an overall mean score of 4.12, indicating that SCA is evident most of the time among drugstores in Davao Region. This high mean value suggests that drugstores are well-equipped to adapt and respond effectively to dynamic market conditions. The very high mean level of accessibility (4.24) indicates that this is always evident among drugstores in Davao Region. This emphasized the significance of SCA and innovativeness in enhancing firms' CA [7].

This very high mean level of accessibility, with a mean score of 4.24, indicated that SCA among drugstores

is always evident in Davao Region. Drugstores are a prime source of easy access to nonprescription medicines, underscoring the significance of accessibility in the pharmaceutical supply chain[35] On the other hand, swiftness indicates the lowest mean (4.06) but still a high descriptive level; this denotes that swiftness is most of the time evident among drugstores in Davao Region. Despite the relatively lower score for swiftly dealing with threats, it provided insights that swift decision-making and trust in fast-paced environments are relevant to drugstore operations [37].

ICT Capability. The high mean value of ICT capability, with a mean of 3.76, showed that ICT capability was most of the time manifested in drugstores in Davao Region, which could significantly influence CA . However, the standard deviation of ICT capability was greater than 1.00, indicating a high variation in respondents' opinions regarding these capabilities.

Several studies support the findings that high ICT utilization can improve operations and services in the pharmacy sector. For instance, a study on the integration of ICT within community pharmacies in Bosnia and Herzegovina found that 100% of pharmacies in Europe are computerized, have an internet connection, and many utilize electronic dispensing software programs[6]. This supports the high level of ICT utilization found in the drugstores in Davao Region. Moreover, the high level of ICT capabilities in drugstores in Davao Region suggests that they have adopted advanced ICT tools and systems to enhance their operations and services. The role of ICT in enhancing SCA and firm performance[9]. By leveraging technology, drugstores in Davao Region can improve their CA and respond effectively to market changes.

Correlation Among Variables

Reflected in Table 2 is the correlation among the three variables in the study.

Table 2. Correlation among the Variables

Independent / Moderating Variable	Dependent Variable	r-value	p-value	Interpretation
SCA (IV)	Competitive Advantage	.698**	.000	Significant
ICT capability (ModV)	Competitive Advantage	.565**	.000	Significant

The correlation between SCA and CA, as shown in the table, demonstrates a significant and strong positive relationship ($r = .698$, $p < 0.05$) between these variables, thus rejecting the null hypothesis that there is no significant relationship between SCA and CA. This demonstrates that as SCA increases, CA also increases within the pharmaceutical industry. This correlation found that SCA has a positive and significant association with CA [21]. Additionally, this indicated that SCA is positively associated with competitive capability, aligning with the observed correlation [27].

Similarly, the correlation ($r = 0.565$, $p < 0.05$) between ICT capability and CA indicates a positive relationship, leading to the rejection of the null hypothesis. This implies that as ICT capability increases, CA also increases, signifying a significant relationship between the two [33]. This underscored the significance of ICT capability in driving CA [29].

The Moderating Effect of ICT capability on the Relationship Between SCA and CA

As shown in Table 3, the independent variable, SCA, was entered into the hierarchical procedure as stepone. The first model only includes the variable of SCA. The unstandardized coefficient (*B*) is 0.682, and the

standardized coefficient (Beta) is 0.698. The t-value is 16.805 ($p < 0.05$), indicating that SCA significantly predicts CA. The R squared change is 0.487, suggesting that SCA explains about 48.7% of the variance in CA. This aligns with previous studies that have established the positive relationship between agile supply chain capabilities and CA ([3], [4],[21],[30]).

Table 3. Hierarchical Regression to Assess the Moderating Effect of ICT capability on the Relationship Between SCA and CA

Model		Unstandardized Coefficients			t	Sig.	R Square Change
		B	Std. Error	Beta			
1	(Constant)	1.258	.169		7.438	.000	.487
	SCA	.682	.041	.698	16.805	.000	
2	(Constant)	1.214	.161		7.554	.000	.053
	SCA	.541	.045	.554	11.916	.000	
	ICT capability	.166	.028	.271	5.829	.000	
3	(Constant)	.823	4.74		1.737	.083	.001
	SCA	.637	.119	.652	5.373	.000	
	ICT capability	.286	.139	.467	2.049	.041	
	SCA by ICT C	-.029	.033	-.264	-.878	.380	

The hierarchical regression analysis revealed significant insights into the predictors of CA in drugstores in Davao Region. The first model, which included only the variable of SCA, demonstrated strong predictive power, with a significant unstandardized coefficient (*B*) of 0.682, a standardized coefficient (Beta) of 0.698, a high t-value of 16.805 ($p < 0.05$), all indicating that SCA significantly predicts CA. Furthermore, the R squared change of 0.487 suggests that SCA explains approximately 48.7% of the variance in CA

Moving to the second model, the addition of ICT capability alongside SCA further enhances the predictive power for CA. Both SCA and ICT capability exhibit significant positive relationships with CA, as indicated by their unstandardized coefficients of SCA and ICT capability of 0.541 and 0.166, respectively, and both variables exhibited significant levels ($p < 0.05$) indicating both variables predicts CA in their capacities as separate variables. The R squared change of 0.053 suggests that the inclusion of ICT capability explains an additional 5.3% of the variance in CA.

However, in the third model, which introduces an interaction term for SCA and ICT capability, the results show that the interaction between these two variables is not a significant predictor of CA. The unstandardized coefficient for this interaction term is -0.029, and the standardized coefficient is -0.264. The t-value is -0.878 ($p > 0.05$) with a minimal R square change of 0.001.

In addition to the hierarchical regression analysis, the results support the hypothesis that ICT capability do not significantly moderate the relationship between SCA and CA. It is highlighted that IS capability for agility plays a crucial role, however it may not act as a significant moderator in the relationship between SCA and CA [10][39]. ICT capability do not significantly moderate the relationship between SCA and CA [7].

On the contrary, there are also studies that provide evidence contradicting the hypothesis. Business agility strengthens the indirect link between ICT capability and CA, suggesting that ICT capability may play a

moderating role in improving CA through business agility [33]. The use of ICTs has a significant impact on the relationship between their dynamic capabilities and their performance, indicating that ICT capability may have an impact on organizational performance through dynamic capabilities [40].

Table 4. Summary of Means on the Main Effects of SCA and ICT capability on CA

Mod V IV	High ICT capability	Medium ICT capability	Medium ICT capability
High SCA	3.92622	4.24575	4.56528
Medium SCA	3.73669	4.07527	4.41385
Low SCA	3.54716	3.90479	4.26242

Table 5. Statistical Output Necessary to Graph the Main Effects of SCA, ICT capability and the Interaction on CA

Variable	B	Mean	SD
SCA	.637	4.123	.64133
ICT capability	.286	3.7608	1.02433
Interaction Term	-.029		
Constant	.823		

To validate the result of the regression, a modgraph (Fig.1) was generated from the interaction data displayed in Tables 4 and 5. The modgraph displayed three parallel lines, each representing different levels of ICT capability, SCA, and CA . A graph showing three parallel lines implies that the moderator has no interaction with the main effect [23] .

Therefore, the modgraph’s display of three parallel lines indicates that there was no interaction between SCA and CA across different levels of ICT capability. This suggests that the positive effect of SCA on CA did not significantly change with different levels of ICT capability.

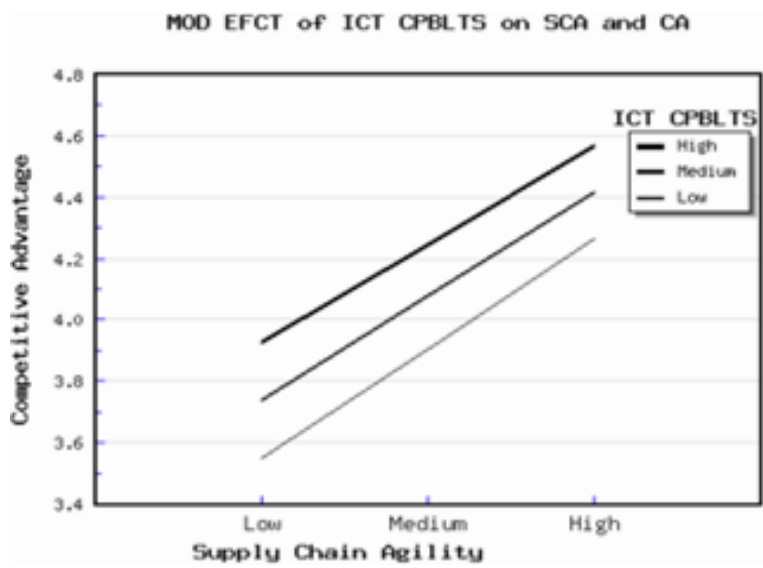


Fig. 1 Graphical Depiction of the Moderating Effect of ICT capability on the Relationship between SCA and CA

CONCLUSION

Based on the findings of the study, it is evident that the drugstores exhibit a very high level of CA, particularly in terms of quality and price, and a high level of delivery dependability, product/service innovation, and time-to-market. The drugstores also demonstrate a very high level of SCA, particularly in terms of accessibility, as well as high alertness, flexibility, decisiveness, and swiftness. Additionally, the drugstores' ICT capability is reported to be high.

The study also establishes a significant relationship between SCA and CA, as well as between drugstores' ICT capability and CA. However, it is noted that ICT capability does not moderate the relationship between SCA and CA.

Theory confirmation. The findings of the study supports Porter's Theory of CA, emphasizing the capacity of an industry to innovate and upgrade as a key determinant [32]. The drugstores' high level of CA, SCA, and ICT capability are in line with Porter's theory, focusing on local market demand conditions, factor conditions, related and supporting industries, firm strategy, structure, and rivalry [13]. SCA provides strategic advantages and innovations to respond to market uncertainty, aligning with Porter's emphasis on innovation and local market demand conditions [33]. The role of ICT capability emphasized the role of local market resources and capabilities in determining competitiveness [29]. Additionally, the study by [7] demonstrated that IT integration positively affects a firm's CA, aligning with Porter's emphasis on local market demand conditions and related industries as determinants of CA.

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