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IT Capabilities' Impact on Postponement and Supply Chain Viability of Retail Manufacturers: A Dynamic Resource-Based View

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Abstract: It is commonly assumed that information technology capabilities (ITCs) are instrumental in supply chain viability (SCV), despite negligible empirical evidence. Based on the dynamic resource-based view, this study explores how the SCV competitive advantage is influenced by the heterogeneous resource ITC through the internal operating capability postponement (POST). A quantitative survey was administered to 298 senior managers from retail manufacturing firms, to test hypotheses using hierarchical multiple regression analysis. The SPSS PROCESS Macro was used to determine the mediation and interaction effects of the dual-stage moderated-mediation model, identifying a positive correlation between ITC and POST strategies, highlighting that modern real-time data synchronization and on-demand customization IT systems are needed. POST strategies greatly improve SCV by enhancing operational flexibility, reactivity, and adaptability to dynamic market conditions. The moderators "market orientation" and "demand uncertainty" shape these relationships, emphasizing the need for firms to align their strategies with market dynamics and uncertainties. The research emphasizes the importance of valuable, rare, and inimitable resources in driving sustained competitive advantage. Practical implications suggest strategic investments in advanced IT systems and collaborative efforts in retail manufacturing firms are essential for optimizing supply chain processes. The results, discussion, implications, limitations, and suggestions for additional studies are addressed.

Keywords: dynamic resource-based view; information technology capabilities; market orientation; demand uncertainty; postponement; supply chain viability

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1. Introduction

Modern technology, especially in the IT field, has brought about tremendous changes in company processes. Manufacturers are increasingly integrating IT into their supply chains (SCs) to benefit from the increased operational efficiency, decreased cycle times, improved supply chain agility, and on-time product delivery for customers [1,2]. "Viability" in the SC context refers to the ability of chains to adapt and ensure future survival, by withstanding detrimental interference and recovering from disruptions in both the short and long term [3,4]. Information technology capabilities (ITCs) comprise a critical component that can help businesses achieve supply chain viability (SCV) by providing timely, efficient, transparent, and highly resilient information related to the SC [5]. Although IT is frequently cited as having a positive impact on SCV, empirical research on this topic is lacking, and the majority of researchers who examined the subject in detail used qualitative techniques, including literature reviews and case studies, and most existing research on this emerging

field is conceptual in nature [6–8]. This study addresses this gap by providing empirical evidence on how ITCs transform into a sustained competitive advantage. It also aids in bridging the theory–practice gap by providing insights to businesses seeking to leverage IT to boost SCV.

The current work seeks to offer an empirical examination of ITC impacts on postponement (POST), which has not been addressed in previous research. POST is typically only possible when certain fundamental conditions are met, like efficient information management [9,10]. Van Hoek [11] states that information plays a crucial role in facilitating POST, making IT the backbone for generating valuable and timely insights for data-driven decision-making. Furthermore, companies need commensurate resources to handle adjustments entailed by POST in terms of value-adding activities. Since it is easier to access the internal resources of an organization (i.e., external resources are typically more costly), it is important to develop ITCs that enhance POST practice.

The dynamic resource-based view (DRBV), rooted in the resources–capabilities–competitive advantage paradigm offers a robust framework for understanding how firms can leverage their resources and capabilities to sustain competitive advantages in dynamic environments [12]. In this context, the primary contribution of this study is to explore how SCV as a competitive advantage is influenced by the firm's ITC resource through internal operating capabilities, specifically postponement strategies. Through the use of ITC, the level of consistent real-time information-sharing throughout the SC has increased. This has expanded the options for POST, which has improved the dynamic reconfiguration of SC structures in an adaptable manner to guarantee long-term viability. SCV has not received sufficient attention in prior studies, despite the fact that POST is acknowledged as a useful method for enhancing SC resilience by managing disruptions along the whole SC [13,14]. The study develops a conceptual model that combines ITC, POST, and SCV into an integrated framework.

Additionally, the study adds to the body of knowledge on DRBV that shows how diverse internal resources may be adapted and coordinated to support competencies and preserve long-term competitive size and first-mover advantages, which are the two main instrumental heterogeneous resources [15–17]. This study views "market orientation" (MO) and ITC as two common forms of resource heterogeneity. According to Ghemawat [15], ITCs essentially confer size advantages, generated from resource scale bases. MO demonstrates a company's strategy focus on adapting and being the first mover to customer wants, which correlates to first-mover benefits of resources [18].

This study investigates the interaction between MO (first mover advantage) and ITC (size advantage) as a heterogeneous resource needed to enhance POST. By doing so, the study addresses the request made by Saghiri and Barnes [19] to elucidate the resources that encourage POST. The results will typically support the body of knowledge that holds that sources of inter-firm advantages can occasionally account for a business's superior performance [20]. Thus, the study contributes to the literature on operations management by arguing that a firm must deploy and integrate internal size advantages and first-mover advantages, two common types of resources, to thereby optimize the contribution of POST to operational capabilities, and thereby enhance SCV and responsiveness to demand. The latter is pertinent because demand interruptions as well as supply interruptions render POST particularly efficacious [21].

POST is a strategy that can significantly enhance SCV, particularly in environments characterized by high demand uncertainty. POST is essential for handling disruptions throughout the whole SC, because of the product's capacity to be swiftly reconstructed in reaction to unforeseen alterations in demand and/or supply shortage [13,22–25]. A company will be more resilient to re-compose the product when distinctiveness is desired if it can al-

ter the design of the product to suit other clients in the event of a demand disruption or use different components in the event of SC disruption [21]. Therefore, postponement is more beneficial in riskier scenarios when demand disruptions are more likely. It is particularly beneficial in industries where demand fluctuates seasonally or customer preferences are unpredictable. By better matching supply to real market demand through postponement, firms can increase efficiency and lower the chance of stockouts or overproduction [10]. In dynamic and uncertain contexts, this strategy helps guarantee that supply chains maintain their resilience and adaptability. Companies adopting postponement strategies are able to enhance flexibility, shorten lead times, and mitigate risk in uncertain environments, ultimately increasing the supply chain's overall viability and efficiency [14]. This study particularly contends that a high degree of "demand uncertainty" (DU) has a greater impact on POST's influence on the SCV of businesses than a low amount of the same. This study thus answers the need for exploring the possibilities of connections between business resilience tactics and uncertainty [25,26].

In summary, this study contributes to the current body of knowledge by conceptually and empirically evaluating how manufacturers leverage ITCs to improve SCV through POST under the contingency of MO and DU. The primary focus of this research is to provide insights into the foundational research questions:

- How do ITCs contribute to enhancing SCV through the mediation of POST?
- How does MO moderate the effect of ITCs on POST?
- How does DU moderate the effect of POST on SCV?

The literature review, hypothesis development, and research framework are all covered in the sections that follow. The methodology of the study is then discussed, followed by presenting and discussing the results, acknowledging this study's limitations, and proposing directions for future research.

2. Literature Review and Hypotheses Development

2.1. ITC and POST

Grover and Malhotr [27] defined ITC as the technological capacity to gather, process, and convey data conducive to making decisions, facilitating the coordination, communication, and cooperation of various SC participants. ITCs that enable organizations to manage information, processes, and decision-making effectively entail the consistency and application of data for numerous SC functions [28–30]. Mobile internet, AI, cloud, and big data technologies enable organizations to maintain consistent and accurate data across various stages of the SC, making it easier to implement POST strategies effectively [31].

Ferreira et al. [32] define POST as the act of transferring one or more processes or activities (such as manufacturing, sourcing, and delivery) to a much later stage of the SC. SC applications can enhance visibility and flexibility, enabling firms to forecast, anticipate, and respond quickly to risks and opportunities. Information technologies, such as AI and IoT, enable predictive capabilities of the SC, allowing companies to respond quickly to changes in demand or market conditions, supporting POST strategies [33,34]. ITC improves information-sharing strategies within a firm, which in turn facilitates POST to drive SC performance [35]. IT infrastructure facilitates real-time communication, collaboration, and information-sharing among SC partners, enabling them to delay final product configuration, customization, or differentiation until customer demand is known [9,36,37]. The reviewed literature underscores that a firm's ITCs significantly influence its ability to implement POST strategies effectively. Thus, the following hypothesis has been developed:

H1. *ITC positively affects POST.*

2.2. ITC and SCV

SCV pertains to the ability of an SC to continue operating effectively, efficiently, and adaptably in the face of shifting market conditions [38]. Wu et al. [1] cautioned that even when businesses use conventional IT resources, this does not necessarily guarantee SC success. However, they discovered that SC performance was enhanced by IT-enabled SC capabilities, which converted IT-related resources into higher value capabilities. These capabilities, however, have to be unique to the company and difficult for other firms to replicate in order to confer a competitive advantage. Zhao et al. [39] found that SC digitization, including the use of IT, enabled companies to achieve absorptive, response, and recovery SC resilience capabilities, leading to better performance. This was due to IT improving cost-effectiveness, enhancing information communication and efficiency, and promoting resilience. Sundram et al. [40] found a positive correlation between IT, information-sharing, and SC integration. They suggested that firms in the manufacturing industry adopt IT and information-sharing practices to achieve strategic improvement within their SC. Han et al. [41] highlighted the importance of flexibility in SC management. They found that IT facilitated operational, transactional, and strategic flexibilities, enabling firms to adapt to changes in day-to-day operations, handle changes in transaction volume and type, and support new business strategies. Agile information systems were essential for SCV. These systems allowed organizations to eliminate uncertainty and achieve standardization, enabling an agile SC. This agility ensures a business's ability to respond quickly to changes, thrive in dynamic markets, and take advantage of new opportunities [42,43]. Accordingly, the following hypothesis has been formulated:

H2. *ITC positively affects SCV*.

2.3. POST and SCV

SCV is crucial for an organization's resilience and competitiveness in the market [38]. POST strategies help firms respond to dynamic market demands and reduce inventory holding costs by postponing final product configuration until customer preferences become certain [44]. This results in efficient inventory carrying, improved operational efficiency, reduced lead times, and enhanced coordination among SC partners [45,46]. POST also contributes to SC flexibility, allowing companies to be more agile and responsive in the face of market uncertainties and changing customer preferences [47]. Qrunfleh and Tarafdar [48] showed that that POST plays a mediating role in the relationship between agile SC strategy and SC responsiveness, positively affecting SCV. Additionally, POST strategies help control SC risk by enhancing flexibility, reducing inventory-related risks, and aligning business operations more closely with actual market demand [49]. POST also leads to improved forecasting accuracy, as it allows firms to delay final product configuration until closer to customer demand, reducing the uncertainty of predicting future demand [50]. This agility allows companies to adjust production plans based on live market signals and real-time customer insights, allowing them to adapt more effectively to fluctuations in demand than with a traditional push-based system. In conclusion, POST strategies contribute to SCV by enhancing overall SC performance and adapting more effectively to dynamic market conditions. Consequently, the following hypothesis has been proposed:

H3. *POST positively affects SCV*.

2.4. POST's Mediating Role in ITC–SCV Relationship

ITCs play a pivotal role in facilitating and enhancing POST strategies by enabling efficient communication, data analysis, and decision-making across the entire SC [51]. They enable firms to gather and analyze real-time data, forecast demand more accurately, and synchronize production activities. This enables the effective implementation of POST strategies, allowing firms to respond more effectively to changing market dynamics and customer preferences [52]. Advanced analytics for demand forecasting can reduce forecasting errors, improve inventory management, and align production with customer demand [53]. Consequently, companies can implement POST strategies more effectively by aligning production with actual demand. Investing in digital collaboration tools and platforms also improves SC efficiency through better communication and collaboration [54]. These tools facilitate coordination between suppliers, manufacturers, and distributors, ensuring all stakeholders are informed and aligned in real time. Rigid IT systems for risk management can lead to lower SC disruption costs and better recovery from disruptions. Therefore, POST acts as a mediator between ITC and SCV, helping firms mitigate risks and maintain SCV. Therefore, the following hypothesis has been developed:

H4. *POST mediates the relationship between ITC and SCV.*

2.5. Market Orientation's Moderating Role in ITC–POST Relationship

MO can be defined as "The generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization wide responsiveness to it" [55]. Higher MO leads to a better understanding of and response to customer needs, influencing SC management and POST strategies. Market-oriented firms prioritize customization and personalization, which is supported by ITC, leading to more efficient and targeted POST strategies [56,57]. High MO allows firms to gather and process market data efficiently, enabling them to adapt production plans and customize products based on real-time customer demands [58]. ITC plays a crucial role in facilitating this flexibility, enabling the collection of relevant data and information for POST. Accurate market research enabled by strong MO can lead to better demand forecasting and prediction of customer behaviors across organizations [59]. This allows firms to utilize ITC for efficient stock management and POST strategies, minimizing inventory costs and improving responsiveness to real-time demand [60]. The positive relationship between ITC and POST is moderated by the level of market orientation, suggesting that the synergy between accurate market research, strong market orientation, and ITC is critical for optimizing stock management, minimizing inventory costs, and enhancing responsiveness to real-time demand. Hence, the following hypothesis has been suggested:

H5. *MO moderates ITC's positive impact on POST, such that the relationship is stronger when MO is high.*

2.6. Demand Uncertainty's Moderating Role in POST–SCV Relationship

According to Ndubisi et al. [61], DU refers to "a market environment where client needs and requirements are ever-changing and indeterminate". In high DU contexts, POST strategies are crucial for mitigating risks and enhancing SC sustainability [62]. These strategies allow firms to delay specific SC activities until clearer demand signals emerge, minimizing stock-outs, forced markdowns, and obsolete inventory. This flexibility allows firms to adapt to dynamic market changes and align SC operations more closely with actual customer demands, contributing to improved SCV [63]. Boon-itt and Wong [64] found that DU positively moderates the relationships between performance and the quality

of relations between SC stakeholders. In high DU, the quality of relationships within the SC becomes more influential in determining overall SC performance [65]. Letsoin et al. [66] found that DU positively moderates the relationship between strategic supplier partnerships and SC responsiveness. However, Wagner et al. [67] found that as businesses strive to be agile, efficient, and in line with customer demands, demand uncertainty acts as a stimulant to reinforce the beneficial correlation between postponement and supply chain responsiveness. Therefore, the following hypothesis has been formulated:

H6. *DU moderates POST's positive impact on SCV, such that the relationship between POST and SCV is stronger when DU is high.*

2.7. The Dual-Stage Model

An integrated research model is proposed considering the previously mentioned arguments. A dual-stage moderated-mediation hypothesis was developed by the researchers in which MO and DU moderate the ITC's indirect influence on SCV through POST, and that this effect is more pronounced at higher MO and DU values. Market-oriented firms tend to make decisions based on a deep understanding of customer demands and this guides the strategic use of ITC to gather and analyze customer data, enabling more accurate demand forecasting. As a result, this phenomenon supports effective POST strategies. In contexts characterized by high DU, the implementation of POST strategies becomes crucial for mitigating the risks associated with uncertain demand patterns and enhancing SCV. Accordingly, the following hypotheses are posited.

H7. *MO moderates ITC's positive indirect link with SCV through POST, whereby high MO strengthens the positive indirect relationship.*

H8. *DU moderates ITC's positive indirect link with SCV through POST, whereby high DU strengthens the positive indirect relationship.*

H9. *The positive indirect association between ITC and SCV via POST is moderated by MO and DU, with a stronger indirect positive relationship with higher MO and DU.*

The hypotheses derived from reviewing the related literature are integrated to contrive our conceptual model, displayed in Figure 1.

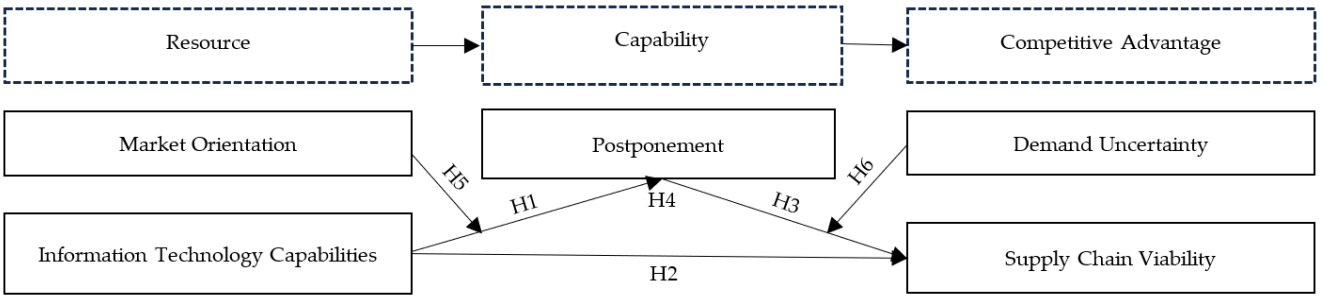

Figure 1. Research model.

3. Materials and Methods

3.1. Measures

To operationalize the study's constructs, all the scales used were adopted from previous literature, as explained below, and shown in detail in Appendix A.

Information Technology Capabilities: This was measured using a 12-item measurement scale developed by Ganbold et al. [2]. Sample items include "Automatic data capture

systems are used (e.g., bar code) across the supply chain" and "Customer relationship management applications communicate in real time with internal applications of our firm".

Postponement: POST was measured with the five-item scale of Li et al. [68]. The sample items include "Our products are designed for modular assembly" and "We delay final product assembly activities until customer orders have been received".

Supply Chain Viability: This was measured using the scale proposed by Ruel et al. [38], comprising 18 items. Sample items include "Our supply chain redesigns its structure" and "Our supply chain establishes adaptive mechanisms transitions between the structural designs".

Market Orientation: Based on Kohli et al. [55] and Min et al. [69], 12 items were used to measure market orientation. Sample items include "Firm representatives meet with customers to find out what products they will need in the future" and "My firm frequently surveys customers to evaluate quality".

Demand Uncertainty: Based on Jaworski and Kohli's [70], six items were used to measure DU. Sample items include "Customers' product preferences change quite a bit over time" and "Our customers tend to look for new products all the time".

Attitude Toward the Color Blue (ATCB): Based on Miller and Simmering [71], seven items were used to measure attitude toward the color blue. Sample items in the scale include "I like the color blue" and "Blue is a nice color".

All of the scales were initially developed in English. The responders were asked to score their level of agreement or disagreement using a five-point Likert-type scale, whereby 1 denotes "strongly disagree" and 5 denotes "strongly agree".

3.2. Sample and Data Collection

In analyzing the links between ITC, POST, and SCV in retail manufacturing companies operating within a SC, the USA offers a particularly important example as a hub for high-performance manufacturing, and American firms are key players in global SCs. This empirical and quantitative research uses structured questionnaires and convenience sampling. Qualtrics software v 2023 was used to collect responses via an online survey, while participant recruitment was facilitated through the Prolific software v 5.14.0. A link to the online survey was distributed to senior management and executives of retail manufacturing companies in the USA, and all participants' responses were treated with confidentiality. To determine the appropriate sample size, we applied the a priori method [72]. The calculator indicated that a minimum sample size of 193 was needed in order to detect a medium effect size of 0.3 [73], with 0.8 statistical power and 0.01 level of significance for a solution consisting of 5 constructs measure through 53 items. As a result, the final sample size (n = 298) that was employed in the analysis might be justified. Table 1 displays the informants' demographic profile.

3.3. Analytical Tools

Hierarchical multiple regression analysis was used to test the research hypotheses using IBM SPSS Statists version 25. To assess the mediation and interaction effects of the dual-stage moderated-mediation model, a test was conducted using the PROCESS macro in SPSS software, specifically PROCESS Model 1, 4, 7, and 21, with the bootstrap sampling method (sample size = 5000), as in the approach of Hayes [74], in line with which bootstrap sampling was employed to create asymmetric 95 percent confidence intervals (CIs) for the mediating and interaction effects.

Table 1. Sample characteristics (n = 298).

	Frequency	Percentage
Firm age (years)		
≥5	37	12.4
6–10	41	13.8
11–15	46	15.4
16–20	50	16.8
Over 25	124	41.6
Firm size (no. employees)		
<50	50	16.8
50–249	81	27.2
250–1000	82	27.5
>1000	85	28.5
Industry type		
Food	28	9.4
Textiles mills and clothing	23	7.7
Wood and bamboo products	16	5.4
Chemical and material	35	11.7
Plastic and rubber materials	13	4.4
Computers and electronics	58	19.5
Machinery and equipment	34	11.4
Motor vehicles and transport	25	8.4
Other	66	22.1
Job title		
President/vice president	61	20.5
Director	64	21.5
Manager	118	39.6
Other	55	18.5

4. Results

4.1. Descriptive Statistics

As shown in Table 2, consistent with the hypotheses, ITC was positively correlated with POST (r = 0.80, $p < 0.01$) and with SCV (r = 0.80, $p < 0.01$). POST is also correlated with SCV (r = 0.83, $p < 0.01$). Table 2 presents the means, standard deviations, and correlations.

4.2. Testing for Common Method Variance

In order to limit and manage the potential common method variance (CMV) resulting from the data collection method, both statistical and procedural strategies were employed [75]. Procedure-wise, the privacy of the personal information and each participant's identity were ensured. Two attention-check questions were included in order to reduce the possibility that participants might give false or fabricated responses [75,76].

To test for the presence of common method variance statistically, the partial correlation procedure [77] and the Harman single-factor test [78] were used.

Table 2. Descriptive statistics.

Variables	M	SD	1	2	3	4	5	6	7	8	9	10
1. Age	3.61	1.45		0.62 **	0.16 **	0.07	0.12 *	0.04	0.09	0.1	0.1	0
2. Size	2.68	1.06	0.62 **		0.04	−0.02	0.1	0.04	0.06	0.09	0.07	0.03
3. Industry	5.73	2.64	0.16 **	0.04		0.19 **	0.1	−0.04	0.08	0.05	0.05	−0.03
4. Title	2.56	1.01	0.07	−0.02	0.19 **		0.22 **	0.08	0.12 *	0.1	0.15 *	0.069
5. ITC	3.55	1.29	0.12 *	0.1	0.1	0.22 **	**0.9**	0.79 **	0.80 **	0.79 **	0.80 **	0.09
6. MO	3.15	1.24	0.04	0.04	−0.04	0.08	0.79 **	**0.86**	0.82 **	0.78 **	0.82 **	0.07
7. POST	3.45	1.08	0.09	0.06	0.08	0.12 *	0.80 **	0.82 **	**0.84**	0.80 **	0.83 **	0.06
8. DU	3.03	1.01	0.1	0.09	0.05	0.1	0.79 **	0.78 **	0.80 **	**0.81**	0.81 **	0.07
9. SCV	3.47	1.16	0.1	0.07	0.05	0.15 *	0.80 **	0.82 **	0.83 **	0.81 **	**0.85**	0
10. ATCB	4	1.16	0	0.03	−0.03	0.069	0.09	0.07	0.06	0.07	0	**0.84**

Note. ** $p < 0.01$, * $p < 0.05$, M: mean, SD: standard deviation. Above the diagonal are correlations controlled for ATCB, and below the diagonal are non-controlled correlations. Boldfaced values on the diagonal are the reliabilities (α).

First, ATCB [71] was the marker variable utilized to detect for common method variance in the partial correlation procedure. Table 2 displays blue color-controlled correlations above the diagonal and non-controlled correlations below it. Even after controlling for the color blue, significant relationships remain. The correlations between the observable variables were within an acceptable range, and the correlations between the variables before and after controlling the blue color variable were unchanged. Since CMV is not a major concern, it is unlikely to affect how the research's findings are interpreted.

Second, the results of Harman's single-factor test demonstrate that the single common factor did not account for the majority of the variance, with the first component or factor derived from the data accounting for 37.3% of the overall variance. Since the variance % explained is less than the suggested threshold of fifty percent, the findings of Harman's single-factor test show that no dominating factor emerged from the factor analysis, proving that there is not CMV [75]. Furthermore, according to Hair et al. [79], the tolerance levels and VIFs fell within the acceptable ranges.

4.3. Reliability and Validity

A reliability analysis on the items and their corresponding constructs has been performed to assess and confirm the validity of the survey scales. The reliability of the constructs was examined by Cronbach's alpha and composite reliability as internal consistency measures [80–82]. The adequate level for the reliability of the measure is 0.70 and beyond. Table 3 displays the results of the reliability analysis. The stated Cronbach scale alphas reveal that all measurements are reliable. Cronbach's alpha was 0.98 for IT capabilities, 0.97 for market orientation, 0.89 for POST, 0.90 for DU, and 0.97 for SCV. All Cronbach's alphas were above 0.7 [79]; therefore, we can conclude that the internal consistency of each variable is acceptable for research purposes. The stated Cronbach alpha scale implies that all measures are reliable since they all exceed the cut-off point. Moreover, the composite reliability was also found to be >0.70 and to fall under the acceptable range of the composite reliability of the construct [80].

Table 3. Reliabilities and validity estimates.

Variables	M	SD	CA	CR	AVE	1	2	3	4	5	6
1. ITC	3.55	1.2	0.98	0.98	0.81	**0.90**	0.82	0.85	0.81	0.86	0.10
2. MO	3.15	1.2	0.97	0.97	0.74	0.79	**0.86**	0.80	0.75	0.81	0.09
3. POST	3.45	1.0	0.89	0.92	0.71	0.80	0.82	**0.84**	0.82	0.86	0.05
4. DU	3.03	1.0	0.90	0.92	0.66	0.79	0.78	0.80	**0.81**	0.84	0.04
5. SCV	3.47	1.1	0.97	0.98	0.72	0.80	0.82	0.83	0.81	**0.85**	0.02
6. ATCB	4.00	1.1	0.90	0.90	0.71	0.09	0.07	0.06	0.07	0.00	**0.84**

Note. M: mean, SD: standard deviation, CA: Cronbach's alpha coefficient, CR: composite reliability, AVE: average variance explained. Bold diagonal values indicate the square root of AVE statistics for discriminant validity by the Fornell–Larcker criterion. The correlations between the constructs are shown beneath the diagonal elements. The Heterotrait–Monotrait ratios are located above the diagonal elements.

Furthermore, convergent validity and discriminant validity were assessed using CFA via PLS. Each of the average variances extracted (AVE) is greater than 0.5 [80]. Consequently, all phases of this experiment have convergent validity. The discriminant validity analysis by Fornell–Larcker suggests that the value of the square root of AVE must be greater than the values of the inter-construct correlation [83]. Table 3 displays all AVEs, and the square root of each construct's AVE is more than the construct's maximum correlation with any other inter-construct. Estimations indicate that these constructs are reliable and valid [80]. As a discriminant validity approach, the Heterotrait–Monotrait criteria (HTMT), as indicated in Table 3, were evaluated. According to the results, the correlation values fully satisfy the HTMT criteria, which state that each construct's value in the correlation must be less than 0.90. As a result, all of the values were determined to be within the acceptable range [80].

4.4. Model Fit

To conduct the CFA analysis, AMOS 25 (SPSS Inc., Chicago, IL, USA) was used. A range of model fit indices and the overall chi-square, which was suggested by Hooper et al. [84], were used to evaluate the study model's goodness-of-fit (GOF) on the provided dataset. The comparative fit index [85], the GOF index, the normed fit index, the root mean square error of approximation [84], the standardized root mean square residual [86], and the *p*-value significance value were among the metrics used to assess the model's GOF. Table 4 presents the overall GOF metrics for the model.

Table 4. Model fit indices.

Fit Indices	Estimates	Acceptable Level
Chi-square	2681.86	
Degree of freedom	1246	
p-value	0.06	>0.05
Normed chi-square	2.15	<3.00
Goodness-of-fit index	0.91	≥0.90
Normed fit index	0.90	≥0.90
Comparative fit index	0.93	≥0.90
Root mean square error approximate	0.06	<0.08
Standardized root mean square residual	0.03	<0.08

4.5. Hypothesis Testing

All hypotheses were tested using hierarchical multiple regression analysis.

In Hypothesis 1, *"ITC positively affects POST"*. The results of the hierarchical multiple regression analyses showed that, as demonstrated in Model 2, the relationship between ITC and POST was positive and significant (b = 0.72, $p \leq 0.01$) after controlling for age, size, industry type, and job title, as shown in Table 5. Hypothesis 1 was thus confirmed.

Table 5. Summary of the hierarchical regression results (unstandardized coefficients) (n = 298).

Variables	POST					SCV					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Model 11**
Intercept	2.83 **	1.15 **	1.15	2.75	0.95	0.18	0.70	0.35	0.69	0.99	1.02
Age	0.05	0.01	0.02	0.06	0.02	0.02	0.02	0.02	0.03	0.02	0.03
Size	0.02	−0.04	−0.05	0.02	−0.04	0.01	−0.03	−0.02	−0.03	−0.05	−0.06
Industry	0.02	0.00	0.02	0.01	−0.01	−0.01	0.00	−0.01	0.00	−0.01	0.00
Title	0.12	−0.07	−0.01	0.16	−0.04	0.05	0.07	−0.01	0.06	0.03	0.05
ITC		0.72 **	0.27 **		0.77 **			0.40 **	0.45 **	0.45 **	0.41 **
MO			0.19 **						0.28 **		0.18 **
ITC × MO			0.06 **						0.07 **		0.05 **
POST						0.82 **	0.82 **	0.73 **	0.73 **	0.72	0.71 **
DU							0.24 **			0.35 **	0.16 **
POST × DU							0.09 **			0.12 **	0.11 **
R^2	0.02	0.71	0.78	0.03	0.71	0.72	0.80	0.78	0.81	0.84	0.84
ΔR^2	-	0.69	0.07	-	0.03	0.69	0.08	0.07	-	0.10	0.01
F	1.76	141.95	146.28	2.263	143.10	153.02	166.37	169.87	150.74	170.07	144.97
df	293	292	290	293	292	292	291	291	289	289	287

Note. ITC: IT capabilities; MO: market orientation; POST: postponement; DU: demand uncertainty; SCV: supply chain viability. ** $p < 0.01$.

In Hypothesis 2, *"ITC positively affects SCV"*. ITC positively impacts SCV in Model 5 as presented in Table 5 (b = 0.77, $p \leq 0.01$). Therefore, Hypothesis 2 was supported.

In Hypothesis 3, *"POST positively affects SCV"*. POST positively affects SCV in Model 6 as shown in Table 5 (b = 0.82, $p \leq 0.01$). Thus, Hypothesis 3 was confirmed.

In Hypothesis 4, *"POST mediates the relationship between ITC and SCV"*. Since both direct and indirect relationships are significant, Model 8 in Table 5 supported the hypothesis by demonstrating that POST was significantly related to SCV (b = 0.73, $p \leq 0.01$) and that the effect of ITC on SCV was significant (b = 0.40, $p \leq 0.01$). This suggests that POST partially mediated the influence of ITC on SCV [87]. CIs were constructed using bootstrapping procedures in order to estimate the mediating impact, as indicated in Table 6. The findings showed a positive and significant relationship between ITC and SCV (direct effect = 0.39, SE = 0.05, 95% CI = [0.30, 0.49], excluding 0). Additionally, PROCESS Macro's findings showed that ITC had a positive and substantial indirect influence on SCV through POST (indirect effect = 0.37, SE = 0.05, 95% CI = [0.28, 0.46], excluding 0). Thus, POST supports Hypothesis 4 by partially mediating the impact of ITC on SCV.

Table 6. Bootstrap analysis results for the indirect effect of ITC on SCV via POST.

	Effect	**Boot SE**	**Boot Lower CI**	**Boot Upper CI**
Direct effect	0.39	0.05	0.30	0.49
Indirect effect	0.37	0.05	0.28	0.46

Note. 95% CI (two-tailed). Bootstrap sample size = 5000; n = 298. SE: standard error.

In Hypothesis 5, *"MO moderates ITC's positive impact on POST, such that the relationship is stronger when MO is high"*. ITC and MO had a substantial interaction effect on POST

(b = 0.06, $p < 0.01$), as indicated in Table 5 (Model 3). POST was favorably correlated with the statistically significant interaction between ITC and MO (b = 0.06, SE = 0.02, $p \leq 0.01$). CIs were constructed using bootstrapping procedures in order to estimate the interaction impact. When MO was high (simple slope = 0.51, SE = 0.06, CI [0.40, 0.62], $p < 0.01$), the positive connection between ITC and POST was greater than when it was low (simple slope = 0.38, SE = 0.04, CI [0.29, 0.46], $p < 0.01$), according to Figure 2 and simple slope tests in Table 7. The interaction pattern and this noteworthy interaction impact support Hypothesis 5.

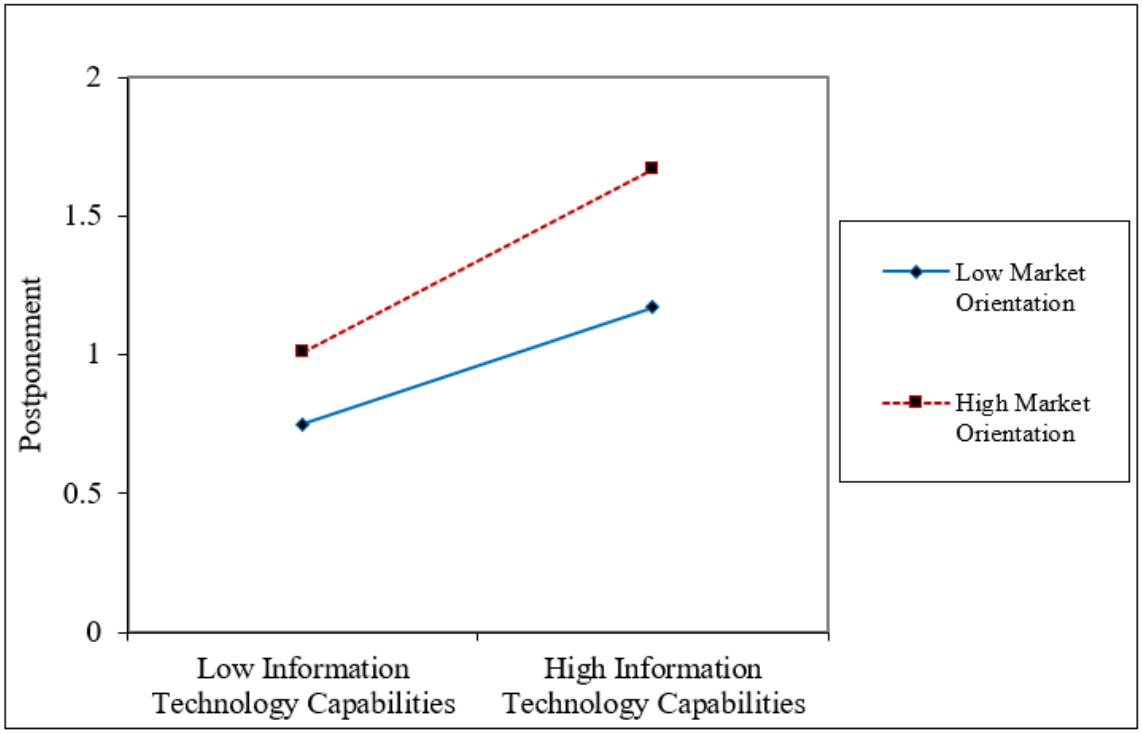

Figure 2. The moderating effect of MO on the relationship between ITC on POST.

Table 7. Bootstrap analysis results for the conditional effect of MO on the relationship between ITC and POST.

	Boot Effect	Boot SE	Boot Lower CI	Boot Upper CI
1 SD below mean	0.38	0.04	0.29	0.46
Mean	0.44	0.04	0.36	0.52
1 SD above mean	0.51	0.06	0.40	0.62

Note. 95% CI (two-tailed). Bootstrap sample size = 5000; n = 298.

In Hypothesis 6, *"DU moderates POST's positive impact on SCV, such that the relationship between POST and SCV is stronger when DU is high"*. The interaction between POST and DU on SCV was significant (b = 0.09, SE = 0.03, $p < 0.01$, CI [0.00, 0.12]), as indicated in Table 5 (Model 7). The hypothesis is supported by this important interaction effect. CIs were constructed using bootstrapping procedures in order to estimate the interaction impact. When DU was high (simple slope = 0.45, SE = 0.06, CI [0.32, 0.57], $p < 0.01$), the positive connection between POST and SCV was stronger than when it was low (simple slope = 0.23, SE = 0.06, CI [0.11, 0.35], $p < 0.01$), according to Figure 3 and simple slope tests in Table 8. Hypothesis 6 is thus supported by the interaction pattern and this noteworthy interaction effect.

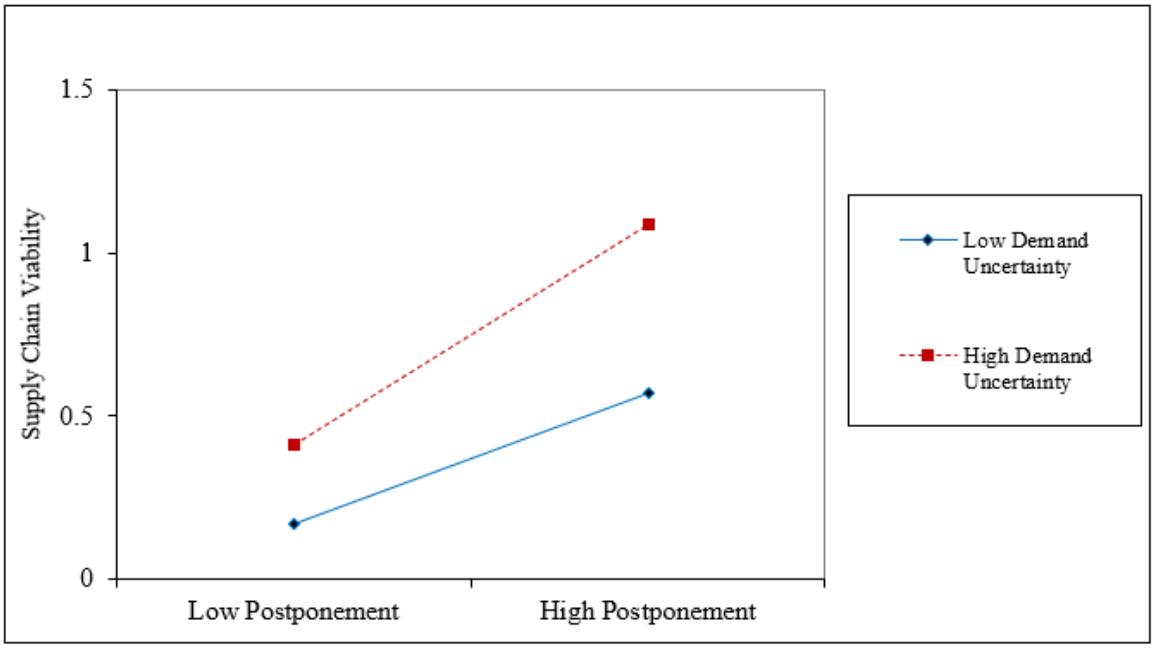

Figure 3. The moderating effect of DU on the relationship between POST and SCV.

Table 8. Bootstrap analysis results for the conditional effect of DU on the relationship between POST and SCV.

	Boot Effect	Boot SE	Boot Lower CI	Boot Upper CI
1 SD below mean	0.23	0.06	0.11	0.35
Mean	0.34	0.05	0.23	0.44
1 SD above mean	0.45	0.06	0.32	0.57

Note. 95% CI (two-tailed). Bootstrap sample size = 5000; n = 298.

In Hypothesis 7, "*MO moderates ITC's positive indirect link with SCV through POST, whereby high MO strengthens the positive indirect relationship*". This hypothesis claimed that MO acts as a moderator of the indirect effect of ITC on SCV through POST, meaning that a high MO will cause a greater indirect effect than a low MO. Since all of the correlations in this hypothesis are significant and ITC has a favorable impact on SCV, Model 9, as displayed in Table 5, supports this hypothesis (β = 0.45, $p < 0.01$), ITC*MO has a positive impact on SCV (β = 0.28, $p < 0.01$), MO has a positive impact on SCV (β = 0.28, $p < 0.01$), POST has a positive impact on SCV (β = 0.73, $p < 0.01$), and POST partially mediates the relationship between ITC and SCV as the ITC–SCV relationship is still significant (β = 0.77, $p < 0.01$). Additionally, the indirect effect of ITC on SCV at two levels of MO (i.e., −1 SD and +1 SD) was tested using the Hayes [74] technique with PROCESS Macro. According to Table 9's index of moderated mediation, the two conditional indirect effects differed statistically significantly (indirect effect = 0.03, SE = 0.01, 95% CI = [0.00, 0.06]). At high MO (indirect effect = 0.27, SE = 0.04, 95% CI = [0.18, 0.35], excluding 0), the indirect effect of ITC on SCV via POST was significant and positive; at low MO (indirect effect = 0.19, SE = 0.03, 95% CI = [0.13, 0.27], excluding 0), the indirect effect was significant and positive. When combined, MO moderated ITC's indirect impact on SCV. Consequently, Hypothesis 7 was supported.

In Hypothesis 8,"*DU moderates ITC's positive indirect link with SCV through POST, whereby high DU strengthens the positive indirect relationship*". This hypothesis claims that a high DU will result in a higher indirect effect than a low DU, since it is predicted that DU moderates the indirect effect of ITC on SCV via POST. ITC has a positive impact on SCV (β = 0.45, $p < 0.01$), POST has a positive impact on SCV (β = 0.72, $p < 0.01$), DU has a positive

impact on SCV (β = 0.35, $p < 0.01$), the interaction effect (POST × DU) also has a positive impact on SCV (β = 0.12, $p < 0.01$), and POST partially mediates the relationship between ITC and SCV because the ITC–SCV relationship is still significant (β = 0.77, $p < 0.01$). The hypothesis is supported by Model 10. Additionally, the indirect effect of ITC on SCV at two levels of DU (i.e., −1 SD and +1 SD) was tested using the Hayes [74] technique with PROCESS Macro. According to Table 10's index of moderated mediation, the two conditional indirect effects differed statistically significantly (indirect effect = 0.04, SE = 0.02, 95% CI = [0.00, 0.07]). At high DU (indirect effect = 0.29, SE = 0.05, 95% CI = [0.20, 0.38], excluding 0), the indirect effect of ITC on SCV via POST was significant and positive; at low DU (indirect effect = 0.21, SE = 0.03, 95% CI = [0.15, 0. 28], excluding 0), the indirect effect was significant and positive. When combined, DU moderated ITC's indirect impact on SCV. Hypothesis 8 was thus validated.

Table 9. Bootstrap analysis for the conditional indirect effect of ITC and SCV (MO as a moderator).

	Boot Indirect Effect	Boot SE	Boot Lower CI	Boot Upper CI
1 SD below mean	0.19	0.03	0.13	0.27
Mean	0.23	0.04	0.16	0.30
1 SD above mean	0.27	0.04	0.18	0.35
Index for moderated mediation	0.03	0.01	0.00	0.06

Note. 95% CI (two-tailed). Bootstrap sample size = 5000; $n = 298$.

Table 10. Bootstrap analysis for the conditional indirect effect of ITC on SCV (DU as a moderator).

	Boot Indirect Effect	Boot SE	Boot Lower CI	Boot Upper CI
1 SD below mean	0.21	0.03	0.15	0.28
Mean	0.25	0.04	0.18	0.33
1 SD above mean	0.29	0.05	0.20	0.38
Index for moderated mediation	0.04	0.02	0.00	0.07

Note. 95% CI (two-tailed). Bootstrap sample size = 5000; $n = 298$;.

In Hypothesis 9, "*The positive indirect association between ITC and SCV via POST is moderated by MO and DU, with a stronger indirect positive relationship with higher MO and DU*". This hypothesis asserted that the positive indirect association between ITC and SCV via POST is moderated by both MO and DU, and that the strength of the positive indirect relationship increases when both MO and DU are high as opposed to low. The hypothesis is supported by Model 11 in Table 5, where all of the relationships are significant. ITC has a positive impact on SCV (β = 0.41, $p < 0.01$), MO has a positive impact on SCV (β = 0.18, $p < 0.01$), ITC*MO has a positive impact on SCV (β = 0.05, $p < 0.01$), POST has a positive impact on SCV (β = 0.71, $p < 0.01$), DU has a positive impact on SCV (β = 0.16, $p < 0.01$), POST*DU has a positive impact on SCV (β = 0.11, $p < 0.01$), and POST partially mediates the relationship between ITC and SCV, because the ITC–SCV relationship is still significant (β = 0.77, $p < 0.01$). The indirect effects and CIs at various combinations of higher and lower moderator levels are displayed in Table 11. When MO and DU are substantially high, ITC has a considerable and beneficial indirect effect on SCV through POST. As expected, when both MO and DU were high, the indirect relationship was highest (β = 0.23, 95% CI [0.15, 0.30]). Table 11 presents the results of the integrated model test. Therefore, through POST, MO and DU positively moderate the relationship between ITC and SCV. Thus, Hypothesis 9 was supported. In brief, all hypothesis were confirmed, except for Hypothesis 4, which was only partially supported.

Table 11. Indirect effect of ITC on SCV via POST at low and high MO and DU.

Conditional Effects at M ± 1 SD	MO	DU	Boot Indirect Effect	Boot SE	Boot Lower CI	Boot Upper CI
POST	−SD	−SD	0.09	0.03	0.04	0.14
POST	−SD	Mean	0.13	0.03	0.08	0.19
POST	−SD	+SD	0.17	0.03	0.11	0.24
POST	Mean	−SD	0.10	0.03	0.04	0.17
POST	Mean	Mean	0.15	0.03	0.09	0.21
POST	Mean	+SD	0.20	0.03	0.13	0.27
POST	+SD	−SD	0.12	0.04	0.05	0.19
POST	+SD	Mean	0.17	0.04	0.11	0.24
POST	+SD	+SD	0.23	0.04	0.15	0.30
Index for moderated-mediation model			0.01	0.003	0.00	0.012

Note. 95% CI (two-tailed). Bootstrap sample size = 1000; n = 298.

5. Discussion

The findings of this study align with the DRBV, emphasizing the role of ITC in terms of valuable, rare, and inimitable resources contributing to sustained competitive advantage. Drawing on the findings of Bharadwaj [35] and Prajogo et al. [30] which emphasize the strategic value of ITC and information management in improving operational performance, this study confirms the pivotal role of ITC resources in facilitating POST strategies. In this context, the empirical results of the study affirm the pivotal role of ITC resources in facilitating POST strategies. ITC, encompassing integrated systems and data-driven technologies, enables real-time data synchronization across SC links, aiding in the timely customization and finalization of products closer to the point of demand. ITC empowers organizations to implement POST techniques efficiently, aligning production closer to actual demand patterns while minimizing excess inventory (and associated costs).

Considering the evidence presented by Baber et al. [57] and Kumar et al. [59], which highlight that businesses with a strong market orientation are more proactive in meeting the demands and preferences of their clients when using advanced technologies, this study indicates that the influence of ITC on enabling POST strategies becomes highly noticeable in firms with high market orientation. Businesses with a strong focus on the market are better able to use ITC to match their products to real consumer demand and increase manufacturing process flexibility, which improves the effectiveness of postponement techniques and brings them into line with real-time market dynamics. The findings indicate that when firms possess a high market orientation, the influence of ITC on enabling POST strategies becomes highly noticeable.

Reflecting on the research findings of Simao et al. [46] and Qrunfleh and Tarafdar [48], this study affirms that postponing improves supply chain viability. By reducing risks such as excess production and inventory holding expenses, Simao et al. [46] show how the strategic use of postponement can improve supply chain performance and logistics, ultimately increasing supply chain viability. Similarly, Qrunfleh and Tarafdar [48] stress that postponement strategies, when combined with lean and agile supply chain techniques, enhances supply chain responsiveness. This study confirms that supply chain's overall viability is strengthened by the increased responsiveness from postponement, which allows businesses to adjust to changes in demand, improve supply chain adaptability, and foster long-term competitive advantages.

Building on the insights from Boon-itt and Wong [64] and Letsoin, Santosa, and Sd [66], which highlight the critical role of demand uncertainty and supply chain responsiveness

in shaping operational performance, this study confirms that businesses can better match output to actual demand by delaying some supply chain processes, which increases the viability and efficiency of the supply chain. POST enables companies to respond swiftly and precisely to diverse customer preferences allowing organizations to adapt swiftly to evolving market demands and unforeseen disruptions. As a result, it minimizes inventory holding costs, reduces lead times, and optimizes resource allocation, thereby enhancing SCV. This adaptability aligns with the notion of SCV, as it enables the SC to sustain its operations effectively under a wide range of conditions. This is an indication that, in environments with high DU, the impact of ITC and the effectiveness of POST strategies in bolstering SCV are more prominent. Therefore, it is highly likely for firms in volatile markets to leverage advanced ITC and POST strategies to navigate demand uncertainties and enhance SCV.

5.1. Theoretical Implications

Three important theoretical insights are provided by this study. First, it explores the relationship between a firm's IT resources, internal operating capability (i.e., POST), and SCV as a competitive advantage. This pioneering empirical investigation reinforces the core tenets of the DRBV. RBV has been criticized by many academics for being static, but adding dynamic components in DRBV overcomes this drawback and enhances RBV, to explain how resources and capabilities can produce long-term competitive advantages [88].

Second, this study considered ITC and MO as size and first-mover advantages into which resource heterogeneity can be divided. These heterogeneous resources may be internally transferred and modified, adhering to the theoretical logic of DRBV. Size advantages refer to the scale benefits of different amounts of resources controlled by enterprises [16], and IT capability is a significant intangible resource that is correlated with size benefits. First-mover advantages are another form of resource heterogeneity. According to Liebman and Montgomery [89], first-mover advantages are the result of a company's innovative attempts to acquire resources that are superior to those of their competitors. This idea aligns with the study's focus on market orientation. Market-driven businesses are quick to adapt to customer demands, and are thereby better positioned to produce and deliver goods and services that meet those needs. This study demonstrates how the interaction of size and first-mover advantages facilitates POST, as delaying activities until the latest possible point in time requires real-time information flow that results from the interaction of the firm's ITC and market orientation.

Third, the study anticipated that POST would "fit" well with a high degree of DU, as per the contingency theory, which posits that a firm's ability to perform depends on how well its operations and structure "fit" with its surroundings [90]. The application of POST has a higher chance of success under specific circumstances. In conditions that are easily predicted, corporations would obviously not benefit much from POST. POST's strength lies in its ability to handle the unpredictable circumstances that come with dynamic and constantly shifting markets, which may require businesses to adjust their business plans. The SC must respond quickly to the erratic demand in order to reduce stock-outs, forced markdowns, and outdated inventory; in such situations, POST is advantageous. Therefore, according to the contingency approach, the external environment (such as DU) might alter how internal capabilities (such as POST) affect the viability of the SC.

5.2. Practical Implications

From the findings of this study, a number of practical implications can be identified. First, the findings suggest that firms can strategically invest in advanced IT systems, such as on-demand customization platforms and real-time data synchronization. By facilitating

better information flow, these technologies allow businesses to enhance operational efficiency, responsiveness, and adaptability. Executives responsible for SC management should prioritize integrating these technologies into their processes to implement customized and agile responses to changing customer demands, contributing to improved SCV. Businesses should concentrate on developing rare, valuable, and inimitable IT resources in order to maintain their competitive advantage. By cultivating distinctive ITCs that are difficult for competitors to imitate, businesses can secure sustainable and viable supply chains.

Second, IT managers and professionals in retail manufacturing firms should collaborate with SC stakeholders to identify and implement advanced IT tools that streamline data consistency, facilitate real-time integration, and support cross-functional collaboration. Such collaboration can help firms design and implement POST strategies that optimize resource allocation, reduce lead times, and enhance SC responsiveness. Regulatory bodies and industry associations can facilitate knowledge-sharing platforms, provide guidelines, and promote collaborations to encourage the adoption of advanced IT systems and POST strategies, promoting increased competitiveness and efficiency across the US retail manufacturing sector.

Third, businesses can greatly improve their operational flexibility, reactivity, and adaptability to changing market conditions through implementing POST strategies. To lower the risk of excess inventory or supply and demand mismatches, retail manufacturing companies should give priority to systems that allow them to postpone product differentiation or final assembly until demand patterns become more apparent. Furthermore, POST strategies enable businesses with enhanced responsiveness to sudden shifts in consumer preferences or market conditions, allowing for prompt modifications and adjustments. POST strategies foster adaptability, putting businesses in a better position to contend in uncertain and competitive marketplaces. By providing products that better match real demand rather than depending on imprecise estimates, retail manufacturers can operate with lower inventory levels, cut waste, and enhance SCV.

Fourth, firms must adopt a market-oriented approach to recognize new opportunities and reduce the risks brought on by shifts in the market. Market-oriented firms can use IT solutions to more precisely track demand and have a deeper understanding of customer preferences. ITC integration in SCs enables better order visibility and tracking, which are essential prerequisites for POST strategies that call for flexibility in the scheduling of production and delivery. Firms with a high degree of MO are better able to predict changes in the market and modify their strategies accordingly. This might be particularly crucial in sectors with fluctuating demand. Firms can employ POST strategies to reduce risks such as sudden changes in consumer preferences, market volatility, or supplier disruptions when ITC are employed effectively in a market-oriented setting.

5.3. Limitations and Future Directions

There are a number of limitations to this study that suggest areas for future research. First, one limitation pertains to the potential for sampling bias, as the study relied on online surveys directed at key informants within targeted companies, such as SC managers and top-level executives. This could have overlooked perspectives from other stakeholders, compromising the comprehensive understanding of the relationships under investigation. Future research should employ random sampling to guarantee that the sample is representative, and lower the possibility of self-selection bias.

Second, the cross-sectional nature of the study limited its ability to establish causality or examine how relationships between variables evolve over time. This led to the overlooking of potential fluctuations or variations in these dynamics, hindering a comprehensive understanding of the long-term implications of ITC and POST strategies on SCV. Future

research should adopt longitudinal designs to track changes and developments over time. Longitudinal studies will enable the examination of causal relationships and dynamics between ITC, POST strategies, and SCV across different stages of organizational evolution [91,92]. This approach will in turn offer a more comprehensive understanding of how these relationships evolve.

Third, the study has limitations of generalizability. This limitation may apply to other geographical regions, as the study investigates firms in the United States. The study's specific focus may limit its broader implications beyond the firms sampled in the study. Future studies should expand the scope beyond retail manufacturing in the USA to encompass diverse industries and global contexts can enhance the generalizability of findings. Comparative studies across various industries or geographical regions can help to reveal sector-specific nuances, and shed light on how different organizational settings influence the relationships between ITC, POST strategies, and SCV.

Fourth, a limitation of this study is its exclusion of other supply chain strategies that could also play a significant role in managing uncertainty and enhancing SCV. While the study focuses on POST, future studies could investigate the impact of just-in-time (JIT) strategy on SCV, particularly the role of pull replenishment systems, such as Kanban using the customer order decoupling point (CODP) approach. Real-time material tracking is facilitated by the integrated building information modeling (BIM)-enabled Kanban system, which guarantees that stock levels align with on-site demand [93]. A future direction of the study should investigate how the integration of IT and Kanban can address inefficiencies in material flow and inventory management. Specifically, research should investigate how a company's supply chain can benefit from pull replenishment and real-time demand reporting by ensuring that resources are restocked in response to actual demand rather than projections, thereby minimizing overproduction and surplus inventory.

6. Conclusions

The current research analyzed ITC and SCV relations with the mediation of POST and the moderation of MO and DU. A particularly important outcome is that the interaction effects of MO and DU on the indirect relationship between ITC and SCV via POST are more pronounced with greater MO and DU. This implies that these factors enhance the path by which ITC influences SCV through POST strategies. Therefore, organizations doing business in industries that are characterized by intense changes in the market or high demand risks may want to exploit this opportunity. They may choose to embrace and invest in modern IT and ensure that their market-oriented strategies are in consonance with POST approaches with a view of enhancing SC performance. This is the reason why it is crucial for firms to recognize and utilize this interaction in order to manage the challenges that are present in the current markets and improve their SCV.

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Data Availability Statement: The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Measuring items.

No.	Item	References
	Information Technology Capabilities (ITCs)	
ITC 1	Automatic data capture systems are used (e.g., bar code) across the supply chain.	[2]
ITC 2	Definitions of key data elements (e.g., customer, order, part number) are common across the supply chain.	
ITC 3	The same data (e.g., order status) stored in different databases across the supply chain are consistent.	
ITC 4	Data are integrated among internal functions.	
ITC 5	The enterprise application is integrated among internal functions.	
ITC 6	Inventory management is integrated among internal functions.	
ITC 7	Logistics-related operating data are searched in real time.	
ITC 8	All internal functions from raw material management through production, shipping, and sales are integrated and connected in real time.	
ITC 9	Supply chain planning applications (e.g., demand planning, transportation planning, manufacturing planning) communicate in real time.	
ITC 10	Supply chain transaction applications (e.g., order management, procurement, manufacturing, and distribution) communicate in real time.	
ITC 11	Supply chain applications communicate in real time with internal applications of our firm (e.g., ERP).	
ITC 12	Customer relationship management applications communicate in real time with internal applications of our firm.	
	Postponement (POST)	
POST 1	Our products are designed for modular assembly.	[68]
POST 2	Our production process modules can be re-arranged so that customization can be carried out later at distribution centers.	
POST 3	We delay final product assembly activities until customer orders have actually been received.	
POST 4	We delay final product assembly activities until the last possible position (or that nearest to customers) in the supply chain.	
POST 5	Our goods are stored at appropriate distribution points close to the customers in the supply chain.	
	Supply chain viability (SCV)	
SCV 1	Our supply chain redesigns its structure.	[38]
SCV 2	Our supply chain creates adaptable structural design.	
SCV 3	Our supply chain establishes adaptive mechanism transitions between the structural designs.	
SCV 4	Our supply chain controls adaptive mechanism transitions between the structural designs.	
SCV 5	Our supply chain builds sustainable operational systems.	
SCV 6	Our supply chain develops systems able to respond to new market models (e.g., omnichannel).	
SCV 7	Our supply chain develops systems able to respond to new business models (e.g., circular economy).	
SCV 8	Our supply chain develops systems able to respond to positive disruptions (e.g., innovations).	
SCV 9	Our supply chain redesign considers knowledge management.	
SCV 10	Our supply chain redesign helps to bypass problems in the supply chain.	
SCV 11	Our supply chain redesign brings more visibility in the supply chain.	
SCV 12	Our supply chain implements a positive feedback cycle (=agility-oriented cycle).	
SCV 13	Our supply chain implements a volatile feedback cycle (=resilience-oriented cycle).	
SCV 14	Our supply chain implements a survivability feedback cycle (=survival-oriented cycle).	
SCV 15	Our supply chain masters/controls basic SC processes.	
SCV 16	Our supply chain identifies SC skills and training.	
SCV 17	Our supply chain implements sales and operations planning (S&OP) process.	
SCV 18	Our supply chain sets up KPIs.	

Table A1. *Cont.*

No.	Item	References
	Market Orientation (MO)	
MO 1	Firm representatives meet with customers to find out what products they will need in the future.	[55,69]
MO 2	My firm frequently surveys customers to evaluate quality.	
MO 3	My firm frequently collects and evaluates general macroeconomic information.	
MO 4	My firm periodically has interdepartmental meetings to discuss market trends and developments.	
MO 5	When something important happens to a major customer, the firm quickly knows about it.	
MO 6	Data on customer satisfaction are disseminated at all levels in this firm on a regular basis.	
MO 7	My firm periodically circulates documents that provide information on our customers.	
MO 8	My firm is quick to start business with new supply chain partners whenever we think they are better than existing ones.	
MO 9	If a major competitor were to launch an intensive campaign targeted at our customers, my firm would implement a response immediately.	
MO 10	When my firm finds that customers would like us to modify a product, the departments involved make concerted efforts to do so.	
MO 11	My firm tends to take longer than our competitors to respond to a change in regulatory policy.	
MO 12	My firm is quick to respond to significant changes in our competitors' pricing structures.	
	Demand Uncertainty (DU)	
DU 1	Customers' product preferences change quite a bit over time.	[70]
DU 2	Our customers tend to look for new products all the time.	
DU 3	Sometimes our customers are very price-sensitive, but on other occasions, price is relatively unimportant.	
DU 4	We are witnessing demand for our products and services from customers who never bought them before.	
DU 5	New customers tend to have product-related needs that are different from those of existing customers.	
DU 6	We cater to many of the same customers that we used to in the past.	
	Attitude Toward the Color Blue (ATCB)	
ATCB 1	Blue is a beautiful color	[71]
ATCB 2	Blue is a lovely color	
ATCB 3	Blue is a pleasant color	
ATCB 4	The color blue is wonderful	
ATCB 5	Blue is a nice color	
ATCB 6	I think blue is a pretty color	
ATCB 7	I like the color blue	

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