Measuring the Integration Impact between Logistics, Marketing and Production on Supply Chain Performance: The Mediating Variable Role of Information Technologies

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***Abstract*— In today's conditions, the lack of ability of businesses to compete effectively and independently of other members in the supply chain forces businesses to cooperate with these stakeholders. This indicates the importance of supply chain integration and internal integration as a part of it in the performance evaluation dimension. The aim of this study is to demonstrate the perception of the effect of internal integration between logistics, marketing and production, which perform related activities, on the time-oriented performance of the supply chain through the mediating-variable role of Information Technologies. For this purpose, an empirical study was conducted for medium and large enterprises in the manufacturing sector in the provinces of Istanbul and Ankara, and the theoretical model created was analyzed using the bootstrap method for the analysis of the brokerage effect along with the structural equality model. According to the results of the research, it has been found out that the internal integration between logistics, marketing and production directly affects the perception of the impact of the supply chain on time-oriented performance and positively affects the situation when information technologies are used as a medium. This research has been conducted according to the findings and it is important in terms of providing new areas for researchers in the field of supply chain management and showing the perception of the impact of internal integration on performance for managers.**

***Keywords*—** *Logistics, Marketing, Production, Internal Integration, Time-Oriented Performance of the Supply Chain, Information Technologies*

1. Introduction

According to Ref.'s [1] definition, the 21st century is a period when large-scale changes in the economic, social, political and technological fields are rapidly beginning to occur under the influence of globalization in a world. This period is a century in which organizations affected by changes and whose competitive environment in which they are considered to have reached unbearable dimensions are also trying to adapt all their structures in order to keep up with the ever-changing environment. In recent historical development, businesses have taken into account concepts such as cost, quality and flexibility as different competitive priorities [2].

The supply chain (SC), which emerged in the early 1980s and gained importance in the 1990s, is a concept that has emerged to compete in terms of businesses [3]. The fact that the businesses are in a new era of competition between SCs [4], they are forced to improve the integration of information sharing content within their own organization and with other members in SC such as suppliers, manufacturers, wholesalers, retailers, distributors and customers [5]. In this case, businesses focus on creating effective integration between their departments and functions and the external stakeholders that make up the SC [6], [7]. The concept of integration, which removes the barriers between businesses and departments, improves cooperation, and prevents operations in segregated functional areas with information flow [8] is one of the factors for achieving success in terms of management and performance of SC [9].

The concept of integration, stated by Ref. [10] as covering inter-organizational and intra-

organizational interaction, coordination and flow of the information, material, money of the businesses, consists of internal integration and external integration dimensions in the SC special. Accordingly, internal integration from the dimensions of SC integration refers to the function of business departments and functions as part of the integrated process [11]. Despite the importance it contains, internal integration is not yet adequately understood [12]. Logistics, marketing and production departments within the businesses are the departments that carry out intertwined operations with related responsibilities as their fields of activity. Ref. [13], [14] and [15] who are among the academicians that highlighted the importance of internal integration in the current period explain the impact of this element on performance in their work.

The ability to compete in terms of businesses does not occur independently of suppliers and other members in SC [4]. In this case, the issue of evaluating SC performance for effective performance of managing SC comes to the fore. In the studies conducted by academicians, many performance criteria were established by carrying out different classifications related to the evaluation of SC performance. In this regard, the concept of "measuring time" is of special interest. Criteria for this concept trigger drastic changes in SC performance measurement, such as agility and time-oriented competition [16].

In a study conducted by Ref. [17] on mediating factors used within the scope of SC integration dimensions and performance relationship, the literature was examined in this context and it was determined that many factors of different characteristics and sizes were used. From these variables, information technologies (IT) were used in terms of mediating role within the scope of this study, assessing that it can affect the relationship between internal integration and SC performance.

The aim of this study is to examine the perception of the effect of internal integration between logistics, marketing and production within businesses on the time-oriented performance of the SC in which the business is located through the role of the IT variable as a mediator. In this way, as a contribution to the literature, an attempt was made to fill the gap associated with the topic in the relevant article in understanding the relationship between internal integration and performance. In addition, an analysis of the evaluated mediating variables that may affect this relationship will be revealed. Accordingly, the rest of the study has been structured as follows. In the second part, the concepts that constitute the subject of the research and the conceptual framework related to the studies found in the field article have been laid out and related hypotheses have been created based on the research model. In the third section, the collection of samples and data related to the research method and the scales used in the research are explained. In the fourth chapter, the results obtained by analyzing the data on the research model have been expressed, and in the fifth chapter, the results in question have been evaluated by associating them with the conceptual framework and making recommendations to industry stakeholders.

2. Literature and Hypothesis Development

2.1. The Concept of Integration and Internal Integration

The concept of integrative relations within SC has been widely studied under different concepts. While the concept of integration is most widely used in this subject, other concepts such as coordination or collaboration are often expressed towards integrative efforts throughout SC [18], [19]. Ref. [20] define integration in the way that separate parties work together collaboratively to achieve acceptable results, stating that this definition covers cooperation, coordination and interaction.

The difference between the concepts of interaction and cooperation within the definition of integration is that interaction activities have a mandatory, formal and concrete structure. On the other hand, cooperation as a voluntary and communicative process has no obligation, programmability and formality [21]. In addition, another point that makes the difference between the concepts of interaction and cooperation is that interaction is an easily tracked, observable phenomenon, and the concept of cooperation is more difficult to observe [22]. Ref. [23] describes cooperation as a concept that emphasizes solidarity, which she sees as a source of advantage in a competitive environment.

SC integration can be defined as the strategic cooperation of a business with stakeholders within SC, and the cooperation of intra-organizational and inter-agency processes [11]. Internal integration from the dimensions of SC integration refers to integration between parts of an organization [20].

2.2. SC Relationship with Internal Integration between Internal Logistics, Marketing and Production

In addition to creating external integration with other structures in SC from the point of view of businesses, internal integration between logistics, marketing and production, which operates in customer-oriented activities and in this context carries out the tasks of producing and delivering customer demands in connection with each other, is also important. In this context, Ref. [24] states that without realizing the coordination within the business as the first factor of 12 factors that provide competitive advantage of SC, the coordination desired to be established with the other organizations of the SC in which the business is located cannot be achieved. Similarly, Ref. [22] state that logisticians do not give the importance of external integration at the point of establishing integration between departments.

The first reason for choosing the internal integration between these three departments within the business is stated as follows. Until the 1950s, in the business structure consisting of production, marketing and finance [25], as stated by Ref. [26], any issue at the interface of the main functions of production and marketing that seem different but not actually independent from each other contains the essence of the business [27]. In addition, business logistics, which Ref. [25] said arose in the 1960s as a result of physical costs, is a concept that has responsibilities along with both marketing and production as a task area. The second reason is the impact of integration between logistics, marketing and production departments, as stated by Ref. [28] and [29], on improving business and SC performance.

Logistics, marketing and production departments that operate within the business in connection with each other have intersecting activities in their fields. While production planning, factory site selection and purchasing activities are activities at the intersection for production and logistics; customer service, packaging, pricing, retailer location selection, distribution channels and information flow activities are activities that intersect between logistics and marketing [29]. It is evaluated that the high level of cooperation of the logistics, marketing and production departments can have an impact on improving the performance of the SC, of which the business is a member, by realizing internal integration from the point of view of the business.

Ref. [30] stated in their study that among the 10 major trends that they consider to increase the performance of SC is the integration of logistics, production, marketing and purchasing into the process. Ref. [31] emphasize the importance of interaction and coordination of business departments, including production, marketing and logistics, for SC performance within the scope of inter-functional and inter-organizational coordination, with the interaction they count among the key qualities of the SC.

On the other hand, Ref. [32] highlight SC's relationship with marketing, logistics and production as core disciplinary areas by using functional, inter-functional and inter-organizational management levels determined as a result of a managerial perspective.

Ref. [33], state that an analysis of the relationship between internal integration and performance can be done in their study based on logistics. In their study, they determined that internal integration between logistics and marketing and logistics and production interfaces positively affects performance.

2.3. Time-Oriented Performance of SC

In a globalized world, based on the fact that businesses maintain their competitiveness through the SCs they are in, the effectiveness and efficiency of these SCs is a matter of importance. Instead of carrying out their activities alone, businesses try to achieve their goals by acting together with other businesses in the position of a SC stakeholder. At the point of determining the effectiveness and efficiency of SC, performance evaluation is carried out by determining various methods and techniques.

Ref. [34], reviewing the literature for evaluating SC performance, suggest that very few studies are related to the performance criteria of SC, and therefore innovations are needed for the performance criteria of SC. However, some difficulties are encountered in the design of performance evaluation systems for SCs:

- SCs consist of businesses that have different strategies, cultures, policies, characteristics and are also in more than one SC [35], [36],
- SCs consist of different levels such as suppliers, manufacturers, distributors and customers, and the complex and wide network structures of businesses at these levels affect each other [37],
- Having insufficient view on setting

performance criteria, uncertainty about what to measure, low level of communication between those collecting and using information on performance criteria, dispersed IT infrastructure [38].

Business managers' perceiving the concept of time as a source of competition and turning towards radical changes in time management in their businesses leads to faster decisions, to the development of new products earlier, to turning customer orders into deliveries before their competitors, and ultimately to achieving a singular value in the markets they serve, rapid growth, and higher profits. Fast cycle time plays 2 important roles in businesses that act in this way:

- This creates a performance level by the management as an organizational capability to shape and form the business activity systems and employee attitudes. In this way, an organization design is implemented without the bottlenecks, delays, errors and inventory that many businesses experience together. A faster flow of decisions and information in a large organization allows to respond to customer orders more quickly or keep up with changes in market demand and competitive conditions.
- The rapid realization of cycle time creates a way of thinking about how to gain real advantage over competitors and how to organize and guide a business [39]. In order to ensure fast cycle time, it is necessary to establish an IT-based infrastructure and be widely implemented within the enterprise and within the scope of SC, of which it is a member.

Ref. [40], drawing attention to the concept of time, state that shortening the preparation times in procurement / supply, production, distribution, consumption activities will provide different advantages as well as meeting customer expectations for a business. Within the framework of relations with suppliers, logistics service providers and customers, which are the stakeholders of the business in the SC, the reduction of the said preparation times affects the product life cycle and the flexibility in meeting customer expectations by reducing the time in the production and distribution of the product to the customer. Ref. [39] state the advantages gained by fast-loop capability as follows:

- Reduction of costs due to less additional load collection in terms of production material and information and no inventory accumulation during operation,
- Improvement of customer service level due to reduced preparation time from receipt of order to loading of material,
- Improving quality due to increasing the speed of the product cycle from one end to the other by performing each process at the first time and correctly,
- Developing the innovative aspect of rapidly realized new product development cycles in meeting customer needs.

When the literature regarding the time-oriented performance of SC, which is a part of the classification in Table 1 within the scope of the study, is examined for the evaluation of the SC performance, frequently seen and defined below criteria are new product development time, manufacturing lead time, delivery speed and response to customers. Because these criteria are often used, it is argued that new product development, manufacturing, delivery and customer service are key integrated strategic processes that contribute to SC's time-oriented performance. In addition, in an empirical study conducted in this context, the factors affecting the time-oriented performance of SC were identified as the implementation of information-intensive IT infrastructure and the use of process development applications [16].

- New Product Development Time: Minimizing the time required to develop and launch new products.
- Manufacturing Delivery Time: Minimizing the time from sending the order to the production department to completing the order.
- Delivery Speed: Minimizing the time between receipt of the customer's order and final delivery.
- Responding to Customers: It is the minimization of the time required to resolve customer needs by subjecting their complaints to a process, approving their orders quickly, and minimizing customer information preparation time.

Table 1. Supply chain performance criteria classification

Qualitative and Quantitative Criteria	*[41] *[42] *[37] *[43] *[44] *[45]	**Four Stages of SC and Decision Levels Criteria**	*[46] *[47] *[48]
Cost and Non-cost Criteria	*[49]	**SC Cooperation, Coordination, Efficiency and Configuration Criteria**	*[50]
Criteria based on SC Processes	*[51]	**Quality, Cost, Distribution and Flexibility Criteria**	*[52]
Delivery Time, Cost, Quality and Service Level Criteria	*[53]	**SCOR Model**	*[54]
27 Key Performance Criteria	*[34]	**Structural and Operational Level Criteria**	*[55]
Criteria for System and Subsystem Layers	*[56]	**SC Joint Work Criteria**	*[57]
Balanced Scorecard Approach	*[58] *[59] *[60] *[61] *[62]	**Time-Oriented Performance Criteria of SC**	*[16] *[63] *[64] *[65]

Source: Developed based on the study of [66].

Ref. [63] determined product development time (time to market), product cycle time (product preparation time) and response as time-oriented performance criteria in their empirical study. In this context, Ref.'s [64] empirical study which is similar to the study of [16], determined that SC's time-oriented performance criteria (new product development time, manufacturing delivery time, delivery speed, response to customers) are affected by certain areas of IT and process development methods. As time-oriented performance criteria, Ref. [65], who studied within the scope of SC, also used the services and service level performance to be offered to the customer, production lead time performance, product development and innovation performance and delivery speed performance.

Accordingly, although various classifications were created for the evaluation of SC performance and performance criteria were specified, criteria determined to be frequently used in a certain number of academic studies on time-oriented performance are new product development time, manufacturing delivery time, delivery speed and customer response.

Considering the effect of internal integration on performance, Ref. [11], [67], [68], [69], [70], [71], [72], [73], [74], [75], [76] conducted various studies on the general, operational and financial dimensions of performance and SC performance. But in this context, this study aimed at measuring the perception of SC performance focused on time as one of the performance dimensions tried to fill the gap in the literature on this issue. The following hypothesis has been developed for testing in accordance with the current literature and research:

H1a: *The level of internal integration between logistics, marketing and production has a direct positive effect on the perception of time-driven performance of SC.*

2.4. IT's Mediating Variable Role

Concepts affecting internal integration, which can take place between various disciplines or departments operating within the business, which are emphasized considering the possible impact on performance, are indicated by Ref. [19] as senior management support, IT, communication, business structure, measurement and reward system, cross functional teams and job rotation.

In addition, in the scope of classification of mediating variables used for SC integration and performance relations, including internal integration [17], 27 different mediating variables are used by researchers. Accordingly, in 17 studies conducted within the framework of the relationship between internal integration and performance; other integration dimensions, demand uncertainty, technological uncertainty, environmental uncertainty and instability, differentiation strategy, leadership cost strategy, IT competence, senior management support were used as mediating variables. In this study, the IT mediating variable was evaluated within the context of the relationship between internal integration and performance.

The IT mediating variable supports SC integration and thus contributes to the internal integration that is part of SC integration. First, IT coordinates and controls the activities carried out in the chain up and down through information sharing. It also plays a critical role in achieving SC integration by optimising business processes. From the point of view of managers, it is desirable to increase performance by investing in IT, in connection with the fact that the ultimate goal of the business is to make a profit. In this way, IT becomes a tool in ensuring the competitive advantage of the business [72]. In this context, a study conducted by Ref. [77]

revealed the facilitating effect of SC capacity in terms of improving SC performance through SC IT. The following hypothesis has been developed for testing in accordance with the current literature and research:

H1b: *The level of internal integration between logistics, marketing and production has a positive effect on the perception of time-driven performance of SC through the IT mediating variable.*

In the current period, the dynamic structure of the global market and the developments in IT have led businesses to develop their agility levels on the basis of flexibility and responsiveness to meet changing market needs. At this point, the importance of IT becomes apparent. Besides, the design and management of SC has become a popular operational approach with the increasing use of information and communication technologies, including structures such as electronic data exchange (EDI) to overcome the increasing complexity among chain stakeholders, the Internet, and the Network Around the World [47].

Considering the rapid development of SC as a discipline, Material Requirements Planning (MRP) related to inventory control developed primarily starting in the 1960s and 1970s. In the following period, Manufacturing Resource Planning (MRP II), which includes the planning of resources used in production and which is the development of MRP, and Enterprise Resource Planning (ERP), where the entire enterprise is evaluated with the development of MRP and PRP came forward in the 1980s. In the 2000s, IT-based management of SC was carried out with Customer Relationship Management (CRM) and Supply Chain Management (SCM) in addition to ERP. Since IT has a critical role in the integration processes, it affects the strategy of the business by integrating technological resources with other elements [18]. Businesses that aim to increase internal integration in accordance with their strategy focus on the IT infrastructure that will ensure this integration. Internal integration between different departments uses various IT tools. The following hypothesis has been developed for testing in accordance with the current literature and research:

H2: *The level of internal integration between logistics, marketing and production has a positive effect on the IT mediating variable.*

Currently, it is possible for businesses to see IT as a strategic tool, as well as the advantages of being able to compete and provide efficiency. Accordingly, business managers determine the level of management at which data and applications will be used as part of the different options offered by IT before making strategic decisions. In addition, IT's guiding advantage is taken advantage of in supplier selection and implementation of operating standards and policies [78].

As part of the rationalization and optimization of SCs, IT is critical to combat operational inefficiencies, improve business efficiency, and strengthen the competitive aspect of the business. The fact that SC managers base knowledge on decision-making also affects chain performance. Accordingly, the use of IT facilitates SC integration. In the current period, businesses have to decide which technologies to use (EDI, internet, ERP vb.) in analyzing and sharing information in the SC and how to integrate these technologies with their own businesses and SC members [79]. In this context, a study conducted by Ref. [80] found that IT's functions for internal integration positively affect performance. In addition, Ref. [81] with [75] revealed the significant impact of IT on performance. Again, Ref. [82] found the relationship between IT and performance to be partially significant. The following hypothesis has been developed for testing in accordance with the current literature and research:

H3: *The IT mediating variable has a positive effect on the time-oriented performance perception of SC.*

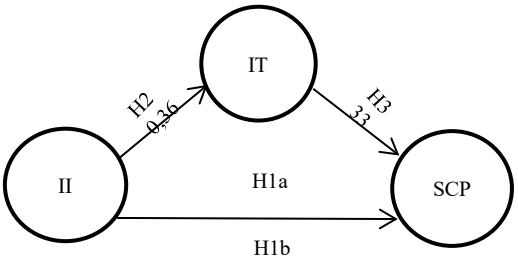

Figure 1: Research model on internal integration (II) and time-oriented performance of the SC (SCP) with IT as a mediating variable.

For the model developed in the study, the relationship between internal integration and performance was created using the model created by Ref. [33]. However, unlike the study in question, for the first time in the literature, the perception of the effect of internal integration on the time-oriented performance of SC was measured within the scope of this research. In addition, the model that evaluates the implementation of internal integration within the framework of measuring its impact on the concept of IT, which is determined as a mediating variable with a direct impact on performance, is shown in Figure 1.

3. Method

Survey form was used as data and information collection method in the research. Accordingly, in the introduction section of the scale, six questions were asked to determine the demographics of the businesses in which they work with the managers of the businesses that answered the scale. The dimension associated with the internal integration between logistics, marketing and production used in scale was created using the scale used by Ref. [33]. Since the scale in question was originally in Spanish, it was first translated into Turkish by a Spanish teacher, then it was back translated into Spanish by another Spanish teacher and it was determined that no meaning shift occurred. The dimension of the scale related to SC's perception of time-oriented performance is formed from the scale used by Ref. [65]. In addition, the IT concept, which aims to measure the relationship between the internal integration between logistics, marketing and production and the time-oriented performance perception of SC, was determined as the mediating variable. For IT, scales used by Ref. [65] were used. Items related to the scales used in the study are shown in Table 2.

Table 2. Scales and clauses used in the research

Internal Integration between Logistics, Marketing and Production	Non-formal teamwork
	Sharing ideas, information and other resources
	Working as a team
	Forecasting and joint planning of current problems
	Creating goals together
	Developing a common understanding of responsibilities
	Making joint decisions to improve cost efficiencies
Time-Oriented Performance of SC	Services to be provided to the customer and service level performance
	Production lead time performance
	Product development and innovation performance
	Delivery speed performance
IT	Internal Computer-to-Computer Communication (Intranet)
	Electronic Information Sharing (Internet)
	Credit Card Device Data Communication
	CAD/CAE
	CAM
	Robots
	Flexible Manufacturing Systems
	Computer-Based Production Planning Systems
	Enterprise Resource Planning Systems
	Automated Data Recognition Systems
	Local Area Networks Systems
	Wide Area Networks Systems
	Exchange of electronic data between businesses of standard documents
	Value-Adding Network Systems
	Automatic Material Handling Systems

SPSS (Statistical Package for the Social Sciences) 21 and LISREL (Linear Structural Relations) 8.8 package programs were used for internal consistency and descriptive statistical analyzes within the scope of the study. Explanatory and confirmatory factor analysis (CFA), structural equation modeling (SEM) and bootstrap method and mediation test were used to test the linear and non-linear relationship between variables for modelling of the research related to the internal integration between logistics, marketing and production and the time-oriented performance perception relationship of SC.

The main mass of the scale form to be applied within the scope of the research is the managers of logistics/SC departments of businesses in Turkey or the unit managers responsible for these activities. The sample is the managers of medium and large businesses operating in the manufacturing sector in the provinces of Istanbul and Ankara. In this context, according to the information obtained from the Ankara and Istanbul Chambers of Industry, a total of 1962 enterprises in the manufacturing sector, including 658 in Ankara and 1302 in Istanbul, were determined as working universe. A telephone survey was conducted with 400 business managers by calculating the sample adequacy for the working universe.

In the SEM analysis, which is used to test the relationship between the variables in the research model, to determine the number 400 representing the sample size, Ref. [83] state that there is no generally accepted rule about how much the sample size will be. Ref. [84] state that SEM requires a larger sample compared to other complex statistical techniques. In this context, Ref. [85] states that a number less than 100 is a small sample, a number between 100 and 200 is a medium sample, and a number greater than 200 is a large sample. Similarly, Ref. [86] states that LISREL users should use a sample size of at least 200 in various situations. Accordingly, it was decided to use 400 samples that meet all the above-mentioned views to determine the sample size within the framework of the research.

4. Findings

4.1. Descriptive Statistics

The frequencies and percentages for the descriptive statistics of the businesses participating in the research are given in Table 3. Accordingly, as the capital structure of the

businesses that respond to the scale, 90.5% are completely domestic, 6% are foreign partners, 3.5% are completely foreign. In addition, when the market structures of the companies participating in the study are examined, it is seen that 19.4% operate only domestically, 7% only abroad, and 73.6% operate in both markets.

Table 3. Descriptive statistics of participants

		Frequency	Percent (%)
Capital Structure of the Business	Fully Domestic	364	90.5
	Foreign Partners	24	6
	Total Abroad	14	3.5
Markets of the Business	Domestic Only	78	19.4
	Abroad Only	28	7
	Both Markets	296	73.6
Position	Production Manager	132	32.8
	Marketing Manager	144	35.8
	Logistics Manager	80	19.9
	SC Manager	46	11.4
How long has s/he been working in this position?	1-3 years	117	29.1
	4-6 years	91	22.6
	7-12 years	102	25.4
	More than 12 years	92	22.9
Number of Employees	50-249 people	315	78.4
	250 people and above	87	21.6
Operating Year of the Business	0-10 years	30	7.5
	11-20 years	111	27.6
	21-30 years	102	25.4
	31-40 years	73	18.2
	41-50 years	36	9
	51 years and above	50	12.4

4.2. Reliability and Validity Analysis

Ref. [87] state that the critical value for reliability is 0,7. In Table 4, the results of reliability analysis determined for internal integration between logistics, marketing and production, time-oriented performance of SC and IT dimensions are seen using the SPSS 21 package program within the scope of measurement reliability. Accordingly, Cronbach's alpha coefficient was determined above 0,7 in the results of the reliability analysis in question, indicating the reliability of the measurement. As part of the validity analysis, first of all, an explanatory factor analysis was performed. In social science applications, it is sufficient that the matter factor loads are not less than 0.3 and the variance rate described in multifactor structures is between 40-60% [88]. In the study, it is accepted that the variance ratio described is sufficient because internal integration and supply chain performance are among the values expressed and IT are close to the reference values in question.

Table 4. Measurement model

Factor	Item	Factor Loading	Cronbach Alpha	Explained Variance
Internal Integration	IN1	0,35	0,73	0,41
	IN2	0,54		
	IN3	0,67		
	IN4	0,66		
	IN5	0,75		
	IN6	0,73		
	IN7	0,68		
Information Technologies	IT1	0,45	0,86	0,37
	IT2	0,75		
	IT3	0,31		
	IT4	0,58		
	IT5	0,65		
	IT6	0,45		
	IT7	0,60		
	IT8	0,68		
	IT9	0,72		
	IT10	0,69		
	IT11	0,71		
	IT12	0,71		
	IT13	0,65		
	IT14	0,68		
	IT15	0,58		
SC Performance	SC1	0,76	0,77	0,61
	SC2	0,83		
	SC3	0,74		
	SC4	0,77		

CFA forms the basis of the SEM. In this context, the situations in which the measurement model is well established and compatible with the data set are made by validating factor analysis, which is the first stage of the SEM [89]. Accordingly, the state of measurement of latent variables observed in the theoretical measurement model created is determined. The relationship between latent and observed variables is expressed using factor loads. When the factor load value is 0.5 or higher, it acts as a validity coefficient [90]. CFA was carried out in order to determine whether the internal integration between logistics, marketing and production, expressed as latent variables, is explained by the observed variables related to SC's time-oriented performance and each of IT. At the CFA stage, it is recommended to remove items in the measurement model if the factor

loads are 0.4 and below [91]. In this direction, IN1, IN2, INF1, INF2, INF3, INF6 and SC1 items were removed from the working model. After item extraction, the internal integration dimension consists of five items, IT dimension consists of 11 items, and supply chain performance consists of three items. $X^2(148)=402$, $X^2/df=2{,}71$, CFI=0,96, SRMR=0,055, NFI=0,94 and RMSEA=0,65 are the compliance indices obtained by the measurement model. If Ref. [85] measurement model has CFI>.90, SRMR<.08, NFI>.95 and RMSEA>.08 values, it means that the measurement model is well adapted. It is observed that the compliance indices obtained are in the range in question, except for NFI. The proximity of the NFI to the relevant value and the fact that all other compliance indexes are in the desired reference range is proof that the measurement model is well adapted.

Table 5. CFA results

Factors and Items	Std. Values	R^2	Error Variance	T Value	AVE	CR
Internal Integration						
IN3	0,52	0,27	0,73	9,89	0,40	0,77
IN4	0,56	0,32	0,68	10,98		
IN5	0,68	0,46	0,54	13,72		
IN6	0,74	0,54	0,46	15,16		
IN7	0,66	0,44	0,56	13,37		
Information Technologies						
INF4	0,53	0,28	0,72	10,84	0,31	0,95
INF5	0,60	0,37	0,63	12,69		
INF7	0,56	0,32	0,68	11,57		
INF8	0,64	0,41	0,59	13,63		
INF9	0,69	0,48	0,52	15,16		
INF10	0,67	0,45	0,55	14,49		
INF11	0,70	0,48	0,52	15,23		
INF12	0,70	0,48	0,52	15,32		
INF13	0,63	0,39	0,61	15,30		
INF14	0,64	0,42	0,58	13,68		
INF15	0,56	0,33	0,67	11,63		
SC Performance						
SC2	0,56	0,65	0,35	15,53	0,29	0,61
SC3	0,54	0,40	0,60	12,27		
SC4	0,48	0,45	0,55	12,92		

Table 5 shows standardized factor loads, R2 values, error variances, and T values for substances obtained with CFA. When the T values are examined, it is seen that all items are significant at the level of p<0.01. AVE and CR values were examined to assess whether the measurement model has convergence validity [92]. Ref. [93], [94] stated that the model has convergence validity if the AVE value is less than 0.5 but the CR value is greater than 0.6. When the AVE and CR values for the measurement model are examined, it is seen that the model provides the conditions for convergence validity.

4.3. Testing the Model

The working model, which examines the role of IT as a mediator in the impact of internal integration on time-oriented SC performance, is seen in Figure 1. SEM and bootstrap method were used together in testing the model.

Ref. [95] state that prerequisites must be met in order to talk about mediating influence. These prerequisites are that (1) the independent variable must have a significant effect on the dependent variable, (2) the mediating variable must have a significant effect on the dependent variable, and (3) the independent variable must have a significant effect on the mediating variable. In this direction, H1a created for the 1st prerequisite, H3 created for the 2nd prerequisite and H2 created for the 3rd prerequisite were tested. As stated in Table 6, there is a significant relationship between internal integration between logistics, marketing and production and the IT mediating variable of 0.36, and internal integration at p<0.001 positively affects IT. Accordingly, the H2 hypothesis has been accepted. The relationship between IT and time-oriented SC performance was found to be significant at p<0.001 and positively affected by the path coefficient of 0.20. With this information, the H3 hypothesis has been accepted. The results have been found to be significant at p<0.001 level.

Table 6. Testing hypotheses within the scope of SEM results

Hypotheses	Standard Value	T Values	Result
H1a. Internal Integration ⟶ Time-Oriented SC Performance	0,26	6,53	Accept
H1b. Internal Integration **X** IT ⟶ Time-Oriented SC Performance	0,19	4,63	Accept
H2. Internal Integration ⟶ IT	0,36	6,96	Accept
H3. Information Technologies ⟶ Time-Oriented SC Performance	0,20	5,29	Accept

The mediating model created with hypothesis 1b has been tried to be verified with 5000 bias-corrected bootstrapping in the 95% confidence range. Confidence intervals are not required to contain zeros to indicate a significant indirect effect in the model created as a result of the analysis [96]. The fact that the results obtained using the bootstrap method do not include zero indicates that IT has a mediating effect on the

impact of internal integration on time-oriented SC performance. The direct effect of internal integration on time-oriented SC performance (H1-0.26) is reduced by the inclusion of IT in the model with the mediating role it takes on (H2-0.19). The result is consistent with the only empirical study conducted by Ref. [72] on the IT mediating variable affecting the relationship between SC integration and performance. In addition, good compliance indices $X^2(147)$=326, X^2/df=2,21, CFI=0,97, SRMR=0,055, NFI=0,94 and RMSEA=0,061 were achieved with the SEM.

5. Discussion

Considering the relations of businesses with other businesses such as suppliers, manufacturers, wholesalers, retailers, distributors and customers in the SC in which they operate, it is seen that their ability to compete independently as a single business in the markets where they operate is weakened. The issue of how effectively the management of the SC, which is also defined in the form of value chain, is used and to what extent the activities are carried out can be done by evaluating the SC performance. In the literature, many performance criteria have been created by making different classifications for the evaluation of SC performance so far, but the criteria that are frequently used for time-oriented performance are; new product development time, manufacturing delivery time, delivery speed, and responsiveness to customers. The time-oriented performance of the SC in question constitutes the dependent variable of the research.

In the context of the competitive situation caused by globalization, the concept of integration is called SC integration for SC and classified in the form of internal integration and external integration. At this point, the needs demanded by customers are realized by ensuring a collaborative synchronization of organizational strategies, practices and processes with internal integration between departments that are considered to be important in today's conditions. Within the scope of this research, the internal integration between logistics, marketing and production, which realizes interrelated activities as areas of interest in the form of revealing and presenting to customers in line with customer demands, constitutes the independent variable of the research. Accordingly, within the framework of the research, it is aimed to determine the effect of internal integration between logistics, marketing and production on the perception of SC's performance focused on time.

As part of the results obtained in the study; it is necessary to divide the effect of internal integration between logistics, marketing and production on the perception of time-oriented performance of SC into two as being direct and through the mediating variable. When businesses achieve a high level of internal integration between logistics, marketing and production departments, they achieve good performance both as a direct impact and through the mediating effect of it. In other words, the time-oriented performance of the SC in which businesses are located increases with the services and service level performance to be offered to the customer, production delivery time performance, product development and innovation performance, and delivery speed performance. The determination in this study that internal integration leads to perception of good performance as a direct effect may cause business managers to turn to activities that support internal integration between departments, considering competitive conditions and possible performance increase. Accordingly, interaction and cooperation issues such as non-formal teamwork, sharing resources, joint planning for solving problems, joint creation of goals and responsibilities will come to the fore. In addition, the results obtained in the study are consistent with the findings of different academics in the literature on this subject. Moreover, internal integration, when evaluated together with the IT mediating variable within the scope of the research, will again perform well as an impact, which will lead business managers to focus more on IT-based sub-structural elements in developing the relationship between their departments.

6. Conclusion

This research makes some contributions to the literature as a theoretical and practical point of view, but also includes some limitations. Accordingly, in addition to the fact that internal integration is an area open to development and change over time, it was not focused on the extent to which this change affects the perception of time-oriented performance. Again, the data obtained in this study was obtained from the responses of a single participant in each business, and it is thought that it would be appropriate to provide multiple participation from businesses to the extent possible in future studies aimed at eliminating the deviation of the common method.

As research constraints, internal integration

between logistics, marketing and production departments within the business has been evaluated, but it is thought that more and more departments may be included in other studies on internal integration. Again, it is evaluated that the study can be expanded to include other performance criteria specified in the literature, as well as time-oriented performance criteria evaluated within the framework of the research.

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