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Article

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A CONTRIBUTION TO INDUSTRIAL BUYER BEHAVIOR MODEL: AN EMPIRICAL RESEARCH

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Abstract: *Today's businesses experience many uncertainties in their internal operations and environments. Manufacturing flexibility is an excellent response to these uncertainties. Volume, modification, mix, and expansion flexibilities are the manufacturing flexibilities that businesses look for when they select their suppliers. In parallel, these flexibilities are often used as a supplier selection criterion in the literature. The supplier selection decision is a strategic issue for today's businesses as a typical company is highly dependent on its suppliers to procure raw materials and parts. Sound supplier selection decision leads to competitive advantage because it is related to a positive relationship between buyer and supplier and reciprocal improvement of performance and trust between both parties. However, a literature review for this study showed a need for more empirical work on the relationship among types of flexibilities, supplier selection, performance improvement, long-term relationships, and trust. In order to fill the gap in this area, data was collected from 148 automotive companies operating in Turkey. For the data collection, the automotive industry was chosen as it is subjected to more uncertainties due to its connections to many other industries. The data were then analyzed using the structural equation model. The results showed a significant positive relationship between types of manufacturing flexibility and supplier selection. Also, positive relationships were found among supplier selection, performance, long-term relationships, and trust. Mediation and indirect effect analysis were also conducted. Long-term relationships and performance fully mediated the relationship between supplier selection and trust. An indirect relationship between supplier selection and trust was also found. The study results are expected to contribute to Sheth's buyer-behavior model by introducing manufacturing flexibility, long-term relationship, performance, and trust to the model. Also, the study's findings assist executives in making more informed decisions concerning supplier selection, depending on the level and types of flexibility they demand from their suppliers, performance, long-term relationships, and trust.*
Keywords: long term relationship, manufacturing flexibility, trust, performance, purchasing, supplier selection.
JEL Classification: M10, M11

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Introduction. Frequent changes in customer tastes and large-volume production for efficiency have made flexibility an essential goal of contemporary organizations (Wilson and Platts, 2010). Flexibility is “the ability to change or react with little penalty in time, effort, cost or performance” (Upton, 1994), and it is considered one of the criteria for supplier selection. Today's businesses depend highly on suppliers for raw materials, parts, and components to manufacture their products. Costs of items procured from suppliers constitute approximately 60-80% of the total production cost for a typical business (Wagner et al., 2018). Therefore, the supplier selection decision is considered one of the most critical issues in procurement (Schotanus et al., 2022). Supplier selection is essential for buyer and supplier performance, competitiveness, and capabilities. Positive interactions in creating a long-term relationship between a buyer and a supplier depend on the supplier selection criteria (Thiruchelvam and Tookey, 2011). Buyers trust their suppliers if they believe they are competent, willing to fulfill their promises, and capable of delivering the expected satisfactory performance (Gao et.al., 2005). Furthermore, a long-term relationship is critical in developing trust and commitment (Mofokeng and Chinomona, 2019).

Research on manufacturing flexibility primarily focuses on flexibility in uncertain environments (Moin et al, 2022), the antecedents and conditions of flexibility (Saenz et.al., 2018), and the relationship between manufacturing flexibility and performance (Avunduk, 2018). In the literature, using different methods, manufacturing flexibility was used as a supplier selection criterion. The two-stage stochastic programming model (Hu and Dong, 2019), Bayesian framework (Sarkis and Dhavale, 2015), fuzzy analytic network process, and gray VIKOR (Parkouhi and Ghadikolaei, 2017), gray DEMATEL (Parkouhi et al., 2019), fuzzy AHP (Lu et al., 2019), and fuzzy TOPSIS (Matawale et al., 2016) are among these methods. However, none of the studies have addressed the relationship between manufacturing flexibility types and supplier selection. On the other hand, there are works on the relationships between supplier selection and performance (e.g., Shin et al., 2000), supplier selection and long-term relationship between buyer and supplier (Imeri et al., 2015), supplier performance and trust between buyer and seller (Mesic et al., 2018) and long term relationship and trust (Xu et al., 2019). However, there is a lack of research addressing the above-mentioned relationships.

This study was undertaken to close this gap in the literature. In particular, this paper aims to address the following research questions:

1) Is there a relationship between types of manufacturing flexibility and supplier selection?
2) Does supplier selection have an impact on performance and long-term relationship?
3) Do performance and long-term relationship have an impact on trust?

The theoretical foundations of supplier selection and relations with suppliers go back to the framework for organizational buying behavior proposed by Sheth (1973). Over time, various additions were made to this framework. We believe that Sheth’s model can be further enriched with the addition of manufacturing flexibility, performance, long-term relationship, and trust between buyer and seller.

Literature Review. Industrial buyer behavior refers to the attitude and decision process before, during, and after the product/service purchase (Essien and Udo-Imeh, 2013). Compared to consumer buying, industrial purchasing aims to satisfy not just a single person but the entire business (Parkinsson and Baker, 1986). The purchasing decision is often more time-consuming, and different parts of the company are involved in the purchasing process. Industrial buying behavior can best be explained by models that show the dimensions of this behavior and their interrelationships. Robinson et al. (1967) laid the foundation for the industrial purchasing models by determining the steps to be followed in purchasing industrial products (Webster and Wind, 1972). These steps include need recognition, search for a supplier, supplier selection, and post-purchase evaluation. After that, buying behavior has been modeled differently by different authors (e.g., Webster and Wind, 1972; Sheth, 1973; Choffray and Lilien, 1980) because the decision to purchase industrial products differs by industry, product, and type of purchase (Parkinson and Baker, 1986; Tektaş, 2009).

Among these, Sheth's (1973) model is a general and comprehensive model that is tried to be explained by all kinds of industrial purchasing decisions and inspired many academic studies after him (Lilien et al., 1992; Tektaş, 2009). Based on the work in consumer psychology and social psychology, Sheth (1973) included dimensions covering different aspects of the psychological situation of decision-makers in the model. The model's dimensions are expectations, joint decision-making process, conflict and its resolution, and situational factors (Webster and Wind, 1972; Sheth, 1973). Expectations are the perception of an alternative supplier's and brand's ability to fulfill various explicit and implicit goals in a purchasing decision. The four most frequently used explicit objectives are pricing, supply quantity, and product quality. The model discusses whether a group or a single person will make the purchasing decisions under different circumstances (i.e., product and company characteristics).

In the model, as the output of the industrial purchasing process, the conflicts in the joint decision-making process and the resolution methods for the conflicts are discussed. The last primary dimension of the model is situational factors. According to Sheth, supplier or brand selection is sometimes a product of a systematic decision-making process, and some ad hoc situational factors affect the decision-making process. These factors include temporary economic conditions, machine breakdowns, marketing promotions, mergers, and acquisitions.

Koste and Malhotra (1999) described three levels of manufacturing flexibility:

1) machine, labor, material handling;
2) route, operation;
3) expansion, volume, modification, product mix, and new product flexibility. In this study, level three was included with one exception. New product flexibility was excluded as it closely related to the modification flexibility.

Product mix flexibility is the capacity to switch between products easily and quickly without sacrificing quality level, efficiency and effectiveness at an acceptable cost (Hallgren and Olhager, 2009). A business with mix flexibility can use its resources efficiently and effectively and can significantly increase its market share and profitability by reacting quickly to changes in the marketplace. Mix flexibility increases delivery performance and positively affects customer satisfaction and competitiveness, even though it has a slightly antagonistic relationship with production costs. Very few researchers use mix flexibility as a supplier selection criterion. (Yadav and Sharma, 2015).

H1a: There is a positive relationship between product mix flexibility and supplier selection in the industrial purchasing process.

Volume flexibility is the ability of an organization to adjust production level effectively in response to customer demand (Gupta and Somers, 1992) or the ability of a system to profitably produce the existing product/part types in different volumes efficiently, with high quality and quickly (Jain et al., 2013).

To achieve volume flexibility, businesses have found ways such as having a multiskilled workforce and a robust subcontractor network, applying just-in-time and computer-integrated production systems, and exchanging dies in single minutes. Several studies have used volume flexibility as a supplier selection criterion (Bodaghi et al., 2018).

H1b: There is a positive relationship between volume flexibility and supplier selection decision in the industrial purchasing process.

Modification flexibility is the ability to make minor changes to a product's design (Narasimhan et al., 2004, Dixon, 1992) while preserving its functional properties to better respond to the customer's needs. Narasimhan and Das (1999) showed in their study that manufacturing companies that want to reduce the cost of production in a dynamic and rapidly changing market can benefit from modification flexibility to make changes. Some earlier work used modification flexibility as a supplier selection criterion (Lee, and Drake, 2010).

H1c: There is a positive relationship between modification flexibility and supplier selection decision in the industrial purchasing process.

Expansion flexibility is the ability of a production system to easily add capacity and capability as needed (De Toni and Tonchia, 1998). For expansion flexibility, the production system should be expanded step by step and suitable for adding new features without significant changes in the design (Ranta and Alabyan, 1988). Expansion flexibility allows a business to meet long-term demand with small investments. It is important for businesses with growth strategies, such as attempts to enter new markets, and can be considered long-term or strategic flexibility (Bengtsson, 2001). Expansion flexibility provides a competitive advantage by helping companies to reduce launch time and cost for new products while increasing existing product lines or additional capacity. This type of flexibility is one of the least studied flexibility types in the literature (Singh et al., 2020). In earlier work, expansion flexibility has been used as a supplier selection criterion (Mukherjee, 2016).

H1d: There is a positive relationship between expansion flexibility and supplier selection decision in the industrial purchasing process.

Choosing suitable suppliers and collaborating with them is increasingly important due to the strong trend in outsourcing in many industrial sectors. Supplier selection is defined as one of the most critical purchasing and supply management processes and is considered a fundamental management responsibility (Wetzstein et al., 2016). Supplier selection and evaluation is the process of finding suppliers who can supply a buyer with the right quality, price, amount, and time of raw materials and products/parts (Cristea and Cristea, 2017).

Reduced purchase risk increased total value to the buyer, and the establishment of close, long-lasting relationships between buyers and suppliers are the primary goals of the supplier selection process (Taherdoost and Brard, 2019). Quality delivery, price, and flexibility have been proposed as supplier selection criteria by different researchers at different times (Chauhan et al., 2020). Supplier selection is a process based on multiple evaluation criteria and requires enormous effort (Taherdoost and Brard, 2019). Previous studies have found that supplier selection affects performance positively (e.g., Shin et al., 2000). On the other hand, according to Prahinski and Benton (2004), unless there is loyalty between the supplier and the buyer, the supplier evaluation and communication process does not improve supplier performance. In the literature, quality, delivery time, and price (Goswami and Ghadge, 2020) have been used to monitor supplier performance.

H2: There is a positive relationship between supplier selection and performance in the industrial purchasing process.

A long-term relationship is a collaboration in which the parties cooperate, share knowledge, resources, and risks while taking collaborative decisions to produce results that are advantageous to both sides. (Cao et al., 2010). In the supply chain, a long-term strategic relationship should be achieved in the partnership between the buyer and the supplier to avoid wasting resources (Thiruchelvam and Tookey, 2011). In the supply chain, the long-term relationship provides many benefits, such as cost reduction, profit growth, forecasting accuracy, and inventory control (Mofokeng and Chinomona, 2019). As opposed to a short-term partnership when both parties act independently for their own interests, in a long-term relationship, both parties act together for their mutual benefit (Al-Ma'aitah, 2018). Various supplier selection criteria should be considered to establish a long-term relationship with suppliers in contemporary organizations (Imeri et al., 2015). Suppliers should also be regarded as the best intangible assets of a business (Imeri et al., 2015). Choosing suitable suppliers and developing long-term relationships with them can reduce a business's operational costs and delivery times (Che and Wang, 2008), increase competitiveness in the marketplace, and facilitate rapid response to customer needs (Bruno et al., 2016). There is evidence in the literature that long-term relationship improves performance in many dimensions, such as delivery, customer satisfaction, and cost (Al-Doori, 2019).

H3: In the industrial purchasing process, there is a positive relationship between supplier selection and the establishment of long-term cooperation between the buyer and the supplier.

Trust is the belief that a supplier and a buyer will not take advantage of one another's weaknesses and will act in an acceptable way to both parties. (Sako and Helper, 1998). Trust has been found to increase satisfaction and reduce transaction costs (Ghosh and Fedorowicz, 2008). Buyers trust their suppliers when they believe that their suppliers are competent, willing to keep their promises, and capable of exhibiting a satisfactory performance (Gao et al., 2005). If the parts supplied have a high price-performance ratio, are of good quality, and are delivered on time and in the desired quantity, a trust called 'competence trust' in social capital theory is built. (Jambulingam et al., 2009). Earlier empirical work found a relationship between performance and trust (Mesic et al., 2018). In most studies, trust is considered an antecedent of performance (Kanani, 2020). However, trust and performance affect each other, creating a cyclical situation (Xu et al., 2019). In fact, Ha et al. (2011) found that performance affects trust.

H4: There is a positive relationship between performance and trust in the industrial purchasing process.

Social exchange (SE) theory explains relationship building by emphasizing the role of trust in a sustainable relationship (Um and Kim, 2019). Mofokeng and Chinomona (2019) confirmed in their study that there is a relationship between trust, commitment, and cooperation. Establishing trust between the buyer and the supplier transforms short-term business relationships into long-term one. It also is seen as a critical factor in retaining the buyer and a solid commercial asset (Fischer, 2013). In order for the relationship between the buyer and the supplier to be stable and long-lasting, mutual trust and dual perceptions of reliability must exist (Gao et al., 2005). Trust leads to future interaction with a supplier (Doney and Cannon,1997) and builds a base for long-term cooperation (Ganesan, 1994). Over time, repeated positive relationships between buyer and supplier develop mutual trust and turn into deeper and longer-lasting cooperation (Gulati, 1995). Trust affects long-term cooperation, while long-term cooperation affects trust, and thus a cyclical situation is created (Xu et al., 2019).

H5: In the industrial purchasing process, there is a positive relationship between long-term cooperation and trust between the buyer and the supplier.

A research model was developed based on the above discussions and hypotheses (Figure I).

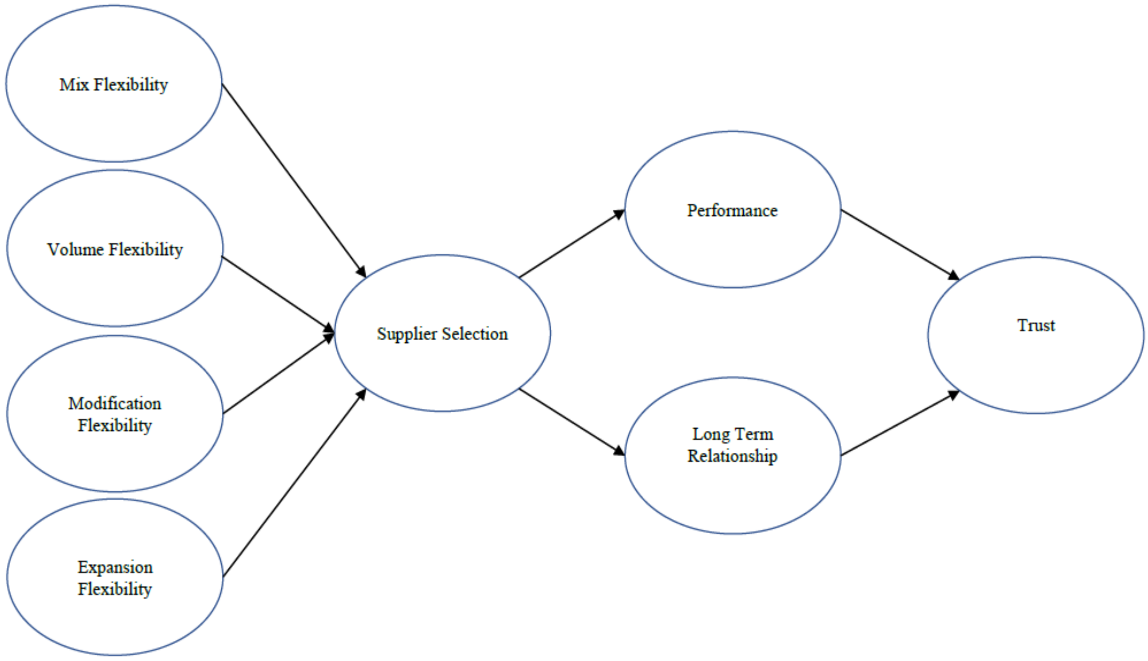

Figure 1. Research model

Sources: developed by the authors.

Methodology and research methods. In this paper, quantitative research method with a survey was adopted. Data were collected through a questionnaire that consists of two main parts. The first part contains statements about types of flexibility, supplier selection, operational performance, trust, and long-term relationships. In the second part, there are questions about the sample profile.

The Turkish automotive industry was chosen for data collection. Turkey is a significant production and engineering center for the value chain of the global automotive industry. With this capability, Turkey ranks fifth in Europe and has the fifteenth-largest automobile industry globally, according to average export rates. It is a hub for multinational brands in terms of production, export, and engineering for foreign markets. On the other hand, automotive supply chains experience more uncertainty than other chains because of their intricate structures and connections to numerous other industries, including glass, rubber, plastic, and petro-chemistry (Junaid et al., 2019). This is the rationale for selecting the automotive supply chain for this research.

All 465 companies registered with the Automotive Suppliers Association of Turkey (TAYSAD) constitute the research population. However, after a close look at the member companies of TAYSAD, it was decided to exclude 38 companies as they were not production companies and, therefore, would not have sufficient knowledge of manufacturing flexibility. In order to collect the data, the questionnaire form created on the «Online Surveys» site was shared on the e-mail and LinkedIn accounts of 427 TAYSAD members. The study's objectives were defined in the questionnaire and accompanying letter, which were e-mailed to the members along with a request for them to pass survey questions to their colleagues who have the most knowledge about the questionnaire items. In order to entice people to participate, respondents were informed that their identities would be kept confidential (Podsakoff et al., 2003) and that a summary of the results would be made available to them. Data collection took place between October 2021 and June 2022 in Turkey. It resulted in 148 usable responses and yielded a 34,66% (148/427) response rate. The response rate is quite good compared to other survey research in similar fields (Wiengarten et.al., 2010). The profiles of the respondents is given in Table1.

Table 1. Respondent's Profile

Area of Activity	n	%
Drive-Train	18	12.16
External Component	7	4.73
Electronic	6	4.05
Body	10	6.76
Raw Material	5	3.38
Internal Component	17	11.49
Engine	6	4.05

Continued Table 1

Area of Activity	n	%
Engineering	8	5.41
Chassis	17	11.49
Other	54	36.48
Number of employees		
< 9	2	1.35
10 – 49	5	3.38
50 – 249	56	37.84
> 250	85	57.43
Respondent's titles		
Plant Manager	78	52.70
Purchasing Expert	25	16.89
Purchasing Chef	19	12.84
General Manager	16	10.81
Deputy General Manager	10	6.76

Sources: developed by the authors.

Measurement. Quantitative research with survey method was adopted in this paper. Seven first-order constructs and one second-order construct was measured. First-order constructs are mix flexibility, volume flexibility, modification flexibility, expansion flexibility, performance, trust, long term relationship. One second-order construct, supplier selection decision, is measured by price, quality, delivery, and flexibility constructs. The items in each construct were developed based on a thorough assessment of the literature and the opinions of academics and practitioners working on these topics. The sources of scales, where they were taken from the literature, are shown in Table 2. A seven-point Likert scale (1=strongly disagree, 7=strongly agree) was used to measure each construct.

Table 2. Questionnaire items

	Mix Flexibility (MXF)	
MXF1	We can make a wide variety of products	Wei et al. (2017).
MXF2	We can manufacture different types of products without major changes in process design.	Wei et al. (2017).
MXF3	The product mix can be changed easily.	Patel et al. (2012).
MXF4	The quality is not affected by changes in the product mix.	Proposed
	Volume Flexibility (VLF)	
VLF1	We can increase or decrease our production volume significantly (±25%) to meet fluctuations in demand.	Jack & Raturi (2002).
VLF2	Our manufacturing process allows us to produce in high volumes.	Jack & Raturi (2002).
VLF3	The time required to change the production quantity is short.	Proposed
VLF4	When we increase (decrease) the production volume, we do not experience a decrease in quality.	Jack & Raturi (2002).
	Modification Flexibility (MDF)	
MDF1	We make modifications to a large number of products/parts each year.	Tamayo et al. (2014).
MDF2	Different modifications can be made to products/parts.	Proposed
MDF3	Modifications on products/parts can be made quickly.	Tamayo et al. (2014).
MDF4	Productivity is not adversely affected when modifications are made to products/parts.	Proposed
	Expansion Flexibility (EXF)	
EXF1	The capacity increase can be achieved with minor additions to different units.	Proposed
EXF2	The capacity increase allows the processing of many different products/parts.	Proposed
EXF3	The time required to increase manufacturing capacity is relatively low.	Gupta & Somers (1992).
EXF4	The efficiency is not affected by the capacity change.	Proposed
	Supplier Selection (SSL) (Formative scale)	
	Price (PR)	
PR2	We were chosen as a supplier for the payment term we offered.	Proposed
PR3	We were chosen as a supplier for the Product/Part Cost Analysis, which we presented transparently.	Thanaraksakul &Phruksaphanrat (2009).
	Quality (QL)	
QL2	We were chosen as a supplier because of our ability to test the product/part.	Famiyeh &Kwarteng (2018).
QL3	We were chosen as a supplier because of our quality management system.	Mohanty & Gahan (2011).

Continued Table 2

	Mix Flexibility (MXF)	
	Supplier Selection (SSL) (Formative scale)	
	Delivery (DL)	
DL2	We were chosen as a supplier for our commitment to delivering the products/parts in the desired quantity.	Thanaraksakul &Phruksaphanrat (2009).
DL3	We were chosen as a supplier for our commitment to delivering the products/parts quickly.	Thanaraksakul &Phruksaphanrat (2009).
	Flexibility (FL)	
FL2	We were chosen as a supplier because the production process can adapt to product/part design changes.	Üstündağ & Ungan (2020).
FL3	We were chosen as a supplier for our ability to develop new products/parts.	Üstündağ & Ungan (2020).
FL4	We were chosen as a supplier for our ability to adapt to product mix changes.	Proposed
FL5	We were chosen as a supplier for our ability to increase the capacity with small investments to meet the long-term demand of our customers.	Proposed
	Supplier Selection* (SSL) (Reflective scale)	
PR1	We were chosen as a supplier for our price	Tracey & Tan (2001).
QL1	We were chosen as a supplier for our ability to comply with the product/part specifications.	Tracey & Tan (2001).
DL1	We were chosen as a supplier for our commitment to delivering the products/parts on time.	Thanaraksakul &Phruksaphanrat (2009).
FL1	We were chosen as a supplier for our ability to adapt to changes in order quantity.	Üstündağ & Ungan (2020).
	Performance (PER)	
ER1	Our on-time delivery rates are satisfactory.	Üstündağ & Ungan (2020).
PER2	Our delivery of parts in the correct quantities is satisfactory.	Üstündağ & Ungan (2020).
PER3	Our correct part delivery is satisfactory.	Üstündağ & Ungan (2020).
PER4	Our undamaged part delivery is satisfactory.	Üstündağ & Ungan (2020).
PER5	The conformity of the parts to the specifications is satisfactory.	Üstündağ & Ungan (2020).
	Long Term Relationship (LTR)	
LTR1	Our customer informs us about their changing needs in advance.	Nyaga et al. (2010).
LTR2	We share information online with our customers.	Carr & Pearson (1999).
LTR3	We make mutually planned visits with our customers to improve our technical skills.	Krause et al. (2007).
LTR4	We have made significant investments (machine. mold. apparatus) to develop a relationship with our customers.	Nyaga et al. (2010).
LTR5	We usually solve the problems that arise in cooperation with our customers.	Urk (2016).
	Trust (TR)	
TR1	We believe our customer has our interests in its mind.	Nyaga et al. (2010).
TR2	We truly meet each other's expectations with our customers.	Caceres & Paparoidamis (2007).
TR3	Our customer is extremely honest and sincere.	Bharadwaj & Matsuno (2006).
TR4	We can fully trust our customers.	Bharadwaj & Matsuno (2006).

**the scale was used for redundancy analysis*

Sources: developed by the authors.

Results. The results were divided into an exploratory and a confirmatory phase. The exploratory phase was conducted using SPSS v.18. For the confirmatory phase, partial least squares structural equation modeling (PLS-SEM) was performed using SmartPLS v.3 (Ringle et al., 2015). The criteria of Hair et al. (2021) are followed for the bootstrap resampling of 500 subsamples. PLS-SEM is less sensitive to multivariate normal data and performs well with complex models utilizing small samples (Hair et al., 2021). PLS-SEM has been chosen over covariance-based SEM due to its greater statistical power in parameter estimations and capacity to maximize explained variance in the dependent variable (Hair et al., 2011).

An EFA for each construct except for supplier selection was conducted. Supplier selection was treated as a formative construct and excluded from EFA. We conducted an EFA using a varimax rotation. Prior to EFA, we conducted the Kaiser-Meyer-Olkin (KMO) test (Kaiser, 1970) to assess sample adequacy and Bartlett's test of sphericity (Bartlett, 1954) to determine if the data is suitable for factor analysis. The data were eligible to identify factors because the results had significant test statistics for Bartlett's test for sphericity, $p<0.000$, and a KMO value of 0.725.

Items that significantly loaded on more than one factor (>0.40) and items with factor loadings < 0.4 were eliminated. The results of EFA are given in Table 3. As a result, MXF4, VLF4, MDF4, EXF4, and LTR2 were dropped because they also loaded on other factors. Then another EFA was conducted for the remaining items until no other item needed to be removed. This process produced 7 factors with eigenvalues greater than 1, which accounted for 68.09% of the total variance.

Table 3. Exploratory Factor Analysis (EFA)

	PER	TR	MXF	LTR	MDF	VLF	EXF
PER1	0.762						
PER2	0.798						
PER3	0.860						
PER4	0.776						
PER5	0.763						
TR1		0.759					
TR2		0.759					
TR3		0.859					
TR4		0.887					
MXF1			0.819				
MXF2			0.858				
MXF3			0.812				
LTR1				0.598			
LTR3				0.786			
LTR4				0.689			
LTR5				0.594			
MDF1					0.824		
MDF2					0.799		
MDF3					0.654		
VLF1						0.739	
VLF2						0.676	
VLF3						0.689	
EXF1							0.835
EXF2							0.656
EXF3							0.528
Eigen value	3.66	3.41	2.66	2.04	1.88	1.76	1.62
Variance (percent)	14.66	13.62	10.64	8.15	7.50	7.03	6.48
Cumulative Variance (percent)	14.66	28.28	38.92	47.07	54.57	61.60	68.09

Sources: developed by the authors.

With an eigenvalue of 3,66 and accounting for 14,66% of the overall variance, which includes five items, the top factor is PER. With an eigenvalue of 3.41, the second factor, TR, explains 13.62% of the overall variance, which includes four items. Three items comprised the third factor, MXF, which had an eigenvalue of 2.66 and accounted for 10.64% of the overall variance. With an eigenvalue of 2.04, the fourth factor, LTR, explains 8.15% of the overall variance, which includes the four items. With an eigenvalue of 1.88, the fifth factor, MDF, explains 7.5% of the overall variance, which includes three items. Three items comprise the sixth factor, VLF, which had an eigenvalue of 1.76 and explained 7.03% of the overall variance. Lastly, three items made up the seventh factor, EXF, which had an eigenvalue of 1.621 and accounted for 6.48% of the overall variance. Harman's one-factor test was employed to see if there is a common method bias. The factor analysis produced seven components, confirming that common technique bias was not an issue in this study. (Podsakoff et al., 2003).

PLS-SEM employs two models: the measurement model and the structural model. The measurement model looks at how the latent variables and their measures relate. Achieving internal consistency (composite reliability, Cronbach's alpha), convergent validity (average variance, extracted loadings), and discriminant validity are prerequisites for the validation of a measurement model (Hair et al., 2011; Chin,1998; Hulland,1999).

According to Henseler et al. (2015), reliability and validity are related to each other. Therefore, in this study, an iteration process was performed until the validity and reliability criterions completed. Reliability means that a measure produces the same result each time it is administered, given all other factors being equal. (Hays and Revicki, 2005).

Cronbach's alpha is a measure of reliability. Cronbach alpha values range from 0 to 1, with higher values indicating higher reliability levels. Values greater than 0.60 are acceptable. Composite Reliability (CR) is the other measure of reliability. A value greater than 0,70 is acceptable (Nunnally and Bernstein, 1994). Table 4 shows that all first-order reflective constructs have higher Cronbach alpha and composite reliability values than recommended threshold.

Table 4. Psychometric properties of constructs and items

Indicator	Factor Loadings	t	Cronbach Alpha	CR	AVE
MXF			**0.831**	**0.898**	**0.746**
MXF1	0.858	26.81			
MXF2	0.851	19.33			
MXF3	0.882	27.33			
VLF			**0.609**	**0.786**	**0.553**
VLF1	0.684	4.59			
VLF2	0.843	11.86			
VLF3	0.692	5.22			
MDF			**0.691**	**0.806**	**0.589**
MDF1	0.555	3.97			
MDF2	0.851	17.47			
MDF3	0.857	16.33			
EXF			**0.659**	**0.809**	**0.587**
EXF1	0.768	11.94			
EXF2	0.828	16.88			
EXF3	0.696	8.29			
PR			**0.550**	**0.800**	**0.670**
PR2	0.690	6.29			
PR3	0.931	22.42			
DL			**0.720**	**0.880**	**0.780**
DL2	0.892	42.49			
DL3	0.875	31.14			
QL			**0.720**	**0.880**	**0.780**
QL2	0.876	32.99			
QL3	0.894	50.51			
FL			**0.800**	**0.870**	**0.640**
FL2	0.750	12.24			
FL3	0.784	18.48			
FL4	0.912	62.67			
FL5	0.805	24.99			
PER			**0.880**	**0.912**	**0.676**
PER1	0.749	15.51			
PER2	0.811	24.66			
PER3	0.898	23.07			
PER4	0.833	29.70			
PER5	0.813	16.07			
LTR			**0.740**	**0.840**	**0.570**
LTR1	0.784	15.78			
LTR3	0.818	13.57			
LTR4	0.557	6.08			
LTR5	0.839	20.65			
TR			**0.880**	**0.920**	**0.740**
TR1	0.784	16.19			
TR2	0.826	25.16			
TR3	0.891	40.98			
TR4	0.926	28.53			
SSL (second order)			**0.785**	**0.859**	**0.616**
PR					
QL					
FL					
DL					

Sources: developed by the authors.

Convergent validity is the extent to which a measure relates positively to another measure of the same constructs (Hair et al., 2011). The average variance Extracted (AVE) value for each construct is used to assess Convergent validity. The cut-off value of 0.5 is used. If the construct can explain at least 50% of the variance of related items, it can be concluded that convergent validity is achieved. As can be seen from Table 4, all AVE values are greater than 0,5, indicating convergent validity. In the last step of measurement model assessment, discriminant validity was conducted. Discriminant validity is the degree to which a construct distinguishes itself from other constructs (Hair et al., 2014a). Discriminant validity is assessed using three criteria:

1) Fornell-Larcker criterion.
2) Heterotrait-heteromethod ratio (HTMT).
3) Cross loadings.

Fornell andLarcker's (1981) criterion is considered one of the best tests to measure discriminant validity. The idea here is to compare the square root of the average variance extracted (AVE) for each construct with its correlation with other constructs in the structural model. A favorable result can be achieved when the average variance extracted (AVE) value for each construct is greater than its correlation values with other constructs (Hair et al., 2014b).

The evaluation of indicators' correlations across concepts measuring different phenomena is known as the HTMT. When two different constructs' indicators have HTMT values that are less than 0,9, this indicates that the two constructs are distinct from one another (Henseler et al., 2015). Table 5 shows the results of the Fornell-Larcker criterion and HTMT scores. As seen from the table, the AVE values for each construct are higher than its correlated values with other constructs, and the HTMT scores are less than the standard value of 0.90 for all constructs (Henseler et al., 2015). In addition to the Fornell-Larcker criterion and HTMT scores, it was observed that items were loaded highly on their suggested constructs. All these three findings confirm that discriminant validity is achieved.

Table 5. Discriminant Validity Results

Fornell-Locker Criterion							
	MDF	**EXF**	**TR**	**VLF**	**MXF**	**PER**	**LTR**
MDF	**0.772**						
EXF	0.360***	**0.768**					
TR	0.138*	0.178**	**0.858**				
VLF	0.181**	0.335***	0.229***	**0.746**			
MXF	0.232***	0.303***	0.151*	0.291***	**0.864**		
PER	0.191***	0.081	0.413***	0.273***	0.205**	**0.822**	
LTR	0.192**	0.199**	0.564***	0.137*	0.096	0.403***	**0.758**
SSL	0.355***	0.389***	0.338***	0.265***	0.325***	0.491***	
Heterotrait-Monotrait Ratio (HTMT)							
MDF	**MDF**	**EXF**	**TR**	**VLF**	**MXF**	**PER**	**SSL**
EXF	0.470						
TR	0.197	0.227					
VLF	0.320	0.600	0.297				
MXF	0.257	0.374	0.175	0.403			
PER	0.257	0.135	0.462	0.333	0.236		
SSL	0.447	0.499	0.377	0.357	0.376	0.537	
LTR	0.237	0.295	0.659	0.222	0.148	0.472	0.553

*Note: * p <0.10, **p <0.05, ***p <0.01, SSL was only included to show the correlation.*

Sources: developed by the authors.

Supplier selection has been hypothesized as a reflective-formative second-order construct. According to Hair et al. (2014b), the validity measures of a reflective construct cannot be used for formative constructs. The formative items could have a negative, positive, or even no correlation between them (Wong, 2013). Thus, evaluating formative constructs using consistency, reliability, or discriminant validity would not be appropriate because any latent variable that uses uncorrelated measurements would render outer loadings, CR, and AVE useless (Wong, 2013). Given that there were different numbers of indications for each dimension of supplier selection, a two-stage approach was used (Hair et al., 2014b). The two-stage approach requires that first-order indicators be examined using the repeated indicator approach to get the latent scores for the first-order dimensions of the supplier selection. Supplier selection was examined using those latent scores as a second-order formative concept. (Becker et al., 2012). The three conditions recommended by Hair et al. (2014b) for analyzing a reflective-formative model are:

– redundancy analysis to examine the formative construct's relationship with an alternate construct with reflective item(s);

– an evaluation of indicator (or first-order dimension) collinearity;

– evaluating the outer weight and outer loading of each indicator.

For this research, these were met under the two-stage approach. The formative scale statistics are given in Table 6. Besides the proposed scale for supplier selection, four (one for each dimension) alternative reflective items (PR1, DL1, QL1, FL1) for supplier selection were included in the questionnaire for the redundancy analysis (Hair et al., 2014b). The Crobach alpha for the alternative scale is 0,712.

Table 6. Second-order factor statistics

2nd Order Construct	1st Order Construct	Weight/ Loading	VIF	t	P
SSL	FL	0.474	2.039	21.970	0.000
	QL	0.306	1.702	16.856	0.000
	DL	0.323	2.414	15.190	0.000
	PR	0.121	1.120	3.954	0.000

Sources: developed by the authors.

The redundancy analysis indicated the convergent validity of supplier selection (formative measure) because the path coefficient between supplier selection (formative measure) and supplier selection (reflective measure) being 0,821 (R^2 of 0,67) was higher than the threshold of 0.70 (R^2 of 0,5) (Hair et al., 2019). Second, formative indicators need not necessarily correlate, unlike reflective indicators, where significant correlations are anticipated. The dimensions of supplier selection had no problem with multicollinearity since the VIF values of flexibility, quality, delivery reliability, and price were less than 5 (i.e., 2,039, 1,702, 2,414, 1,12, respectively) (Diamantopoulos and Siguaw, 2006). Third, the outer weights of the dimensions of flexibility, quality, delivery reliability, and price (i.e., 0,474, 0,306, 0,323, 0,121, respectively) were significant ($p<0.01$). Based on this evidence, it can be concluded that supplier selection is a reflective-formative construct. Composite reliability scores and Cronbach's alphas (see Table 4) were checked for flexibility, quality, delivery reliability, and price. It was found that all of these scores except for PR's Cronbach alpha value meet the thresholds. The PR's Cronbach alpha value of 0,55 is relatively poor. However, its composite reliability score of 0,8 is greater than the recommended minimum of 0.70 (Chin, 1998; Nunnally and Bernstein, 1994). According to some researchers, Composite Reliability (CR) should be preferred over Cronbach Alpha because Cronbach Alpha is criticized because its lower bound value overestimates the true reliability (Peterson and Kim, 2013).

The researchers can assess the degree of correlation between latent variables thanks to the structural model. (Hulland, 1999). Based on path analysis, the structural model examines all potential dependencies. (Hoyle, 1995). Geisser (1974) and Stone (1974) suggested the blindfolding method in 1974 to determine the predictive significance of the model (Henseler and Sarstedt, 2013). The Q^2 statistic is employed to evaluate the path model's quality before testing the hypotheses. The Q^2 statistic measures the model's predictive significance by having the model reproduce the observed values. $Q^2>0$ indicates that the model has predictive significance (Fornell and Cha, 1994). Two kinds of Q^2 statistics are estimated. The cross-validated communality (CV-communality) measures the model's capacity to project the manifest variables directly from their latent variables (LVs). CV-communality uses a measurement model. As this analysis's CV-community and CV-redundancy scores are both positive, the measurement and structural models show good quality (Table 7).

Table 7. Model quality

Construct	CV- Communality	CV -Redundancy
MDF	0.245	-
EXF	0.124	-
TR	0.549	0.251
VLF	0.152	-
MXF	0.463	-
PER	0.513	0.152
SSL	0.337	0.108
LTR	0.309	0.113

Sources: developed by the authors.

A model's explanatory capacity can be evaluated using the coefficient of determination (R^2) in addition to the CV-communality and CV-redundancy indices. R^2 scores show that flexibility types explain 24,8% of the variance of SSL, SSL explains 23,4% of the variance of PER, SSL explains 19% of the variance of LTR, and PER and LTR together explain 35,8% of the variance of TR (Figure II). The R^2 values are moderate or high.

As a goodness-of-fit metric for Smart PLS, Henseler and Sarstedt (2013) present the standardized root mean square residual (SRMR). The difference between the observed and expected correlations is known as the SRMR. A SRMR value less than 0.10 is regarded as a good fit (Hu and Bentler, 1999). The SMRM score of 0.086 for this study shows that the goodness of the model fit is acceptable. Since the variance inflation factors of all items were between 1.000 and 1.232, which is far below the threshold of 5-10, there are no significant multicollinearity issues across the independent variables (Kleinbaum et al., 1988). The results provide support for all hypotheses (Figure 2).

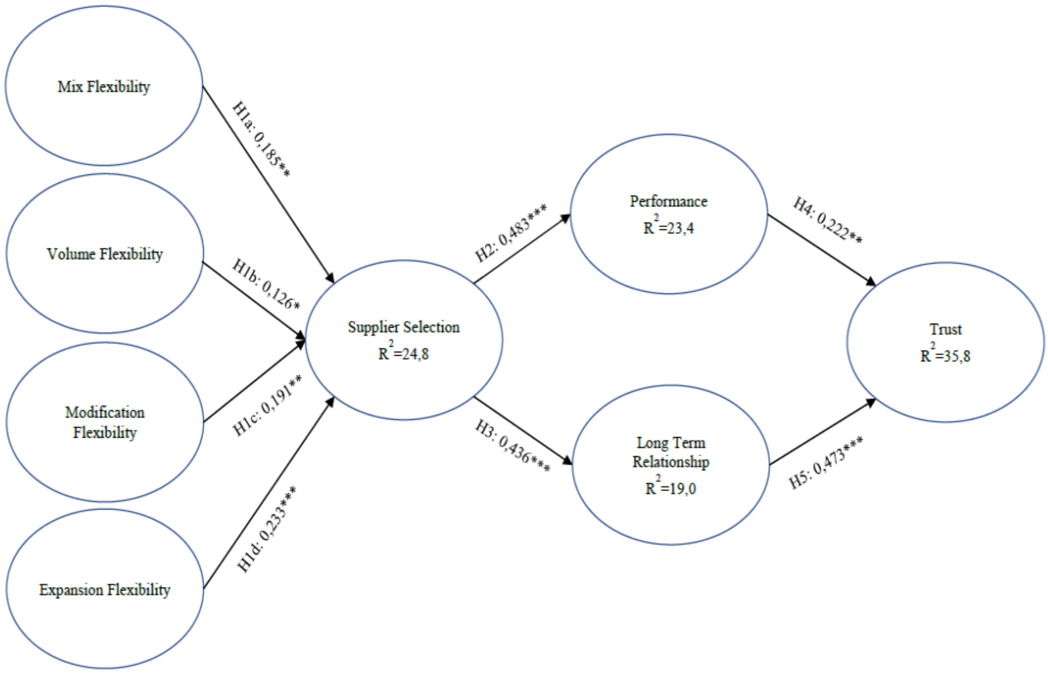

Figure 2. Research model with results

*Note: *p<0.10; **p<0.05;***p<0.01*

Sources: developed by the authors.

More detail about the hypothesis testing is presented in Table 8. We see stronger support for H2, H3, and H4.

Table 8. Hypothesis testing results

Link	Hypothesis	Path Coefficient	t-value	p-value	Accepted?
MXF-SSL	H1a	0.185	2.462**	0.015	Yes
VLF-SSL	H1b	0.126	1.837*	0.068	Yes
MDF-SSL	H1c	0.191	2.342**	0.020	Yes
EXF-SSL	H1d	0.233	2.889***	0.004	Yes
SSL-PER	H2	0.483	6.191***	0.000	Yes
SSL-LTR	H3	0.436	4.677***	0.000	Yes
PER-TR	H4	0.222	2.520**	0.013	Yes
LTR-TR	H5	0.473	4.994***	0.000	Yes

****α = 0.01. ** α = 0.05. * α = 0.10*

Sources: developed by the authors.

Mediating effects of PER and LTR on the relationship between SSL and TR were also assessed. The associations between mediating factors and SSL and TR were first confirmed. Accordingly, the correlation analysis shows that the prerequisites for the mediation effects are met (Table 5). SSL and TR have a relationship with PER and LTR. We constructed two distinct SEM models in the manner advised by Little et al. (2007) to investigate the mediation effect. By excluding the mediators of PER and LTR, we assessed the significance of the coefficients on direct routes from SSL to TR in our initial model. The path coefficient is significant, as seen in Table 9. To evaluate the mediation effects, we included the mediators and looked at the significance levels of path coefficients. The direct path's coefficient (SSL to TR) becomes insignificant. On the other hand, the path coefficients were significant from SSL to LTR, SSL to PER, LTR to TR, and PER to TR. Together, we came to the conclusion that PER and LTR fully mediate SSL's effects on TR.

Table 9. Results for mediating and indirect effects

IV	DV	Mediator	Path Without Mediator	Coefficient	SRMR	Link With Mediator	Coefficient	RMSR	Result
SSL	TR	PER	SSL-TR	0.35^{**}	0.085	SSL-TR	0.027	0.087	Full
		LTR				SSL-PER	0.502		
						SSL-LTR	0.448		
						PER-TR	0.212		
						LTR-TR	0.466		

Sources: developed by the authors.

In addition, we evaluated the indirect effects of SSL on TR through LTR and PER and found that the it is significant at p <0.050 (Table 10).

Table 10. Significance of indirect effects

IV	Mediator	DV	Indirect Effect	t-value	p-value
SSL	PER	TR	0.112	2.367	0.019
SSL	LTR	TR	0.212	3.688	0.000

Sources: developed by the authors.

Conclusions and Discussion. The results of the statistical analysis support all the hypotheses suggested in the model. There is a relationship between mix flexibility and supplier selection. Contrary to popular belief, there is a positive relationship between mix flexibility and quality (Das, 2001). The mix flexibility reduces the cycle time (Das, 2001) and ensures efficient and effective use of resources (Gerwin, 1993). In addition, mix flexibility provides an increase in customer satisfaction by responding to customer demands in a short time (Mishra, 2020).

There is a positive relationship between volume flexibility and supplier selection. Changing the production volume to meet the changing demand allows a business to keep the stock level low, thereby increasing its competitiveness in terms of price (Gerwin, 1993; Mishra, 2020). There is a positive relationship between modification flexibility and supplier selection. Modification flexibility saves time and cost by allowing a business to accommodate minor design changes (Das, 2001). Modification flexibility makes a significant contribution to supplier selection by improving quality (Das, 2001), delivery performance (Narasimhan et al., 2004), and decreasing price (Premsankar, 2020). It has been found that expansion flexibility has a significant and positive effect on supplier selection decisions in the industrial purchasing process. Expansion flexibility is essential for buyer businesses pursuing growth strategies such as entering new markets (Bengtsson, 2001). In other words, expansion flexibility is a strategic one. The results show that supplier selection significantly and positively affects performance. As companies become tedious for supplier selection, the performance and competitiveness of both the buyer company and the supplier improve significantly. This finding is in line with the findings of Koufteros et al. (2012). The results confirmed that choosing a supplier impacts the length of the buyer-supplier relationship. This finding contributes to the limited empirical evidence (e.g., Al-Doori, 2019). Positive interactions between the buyer and the supplier in creating a long-term relationship depend on the supplier selection criteria (Thiruchelvam and Tookey, 2011).

Performance was found to have a positive effect on trust. These finding parallels previous studies' findings (Mesic et al., 2018). Low price-high value, acceptable quality, and on-time delivery ensure building 'competency trust' in social capital theory (Jambulingam et al., 2009). The long-term relationship was found to have a positive impact on trust. This finding is consistent with Xu et al. (2019) findings. Most researchers agree that trust develops over time (e.g., Doney and Cannon, 1997). In a long-term relationship between the buyer and the supplier, as the length of time increases, the investment made by both parties in the relationship increases, and the predictability of each party's behavior in the face of emerging problems increases. Although trust is important at all stages of the relationship between the buyer and the supplier, considerable trust emerges when there is enough long-term relationship (Powers and Reagan, 2007).

The findings of this study have some theoretical implications. Mix flexibility, volume flexibility, modification flexibility, and expansion flexibility as supplier selection criteria were added to Sheth's buyer behavior model. In addition, buyer performance, long-term cooperation, and trust factors were also added to Sheth's model. The findings of this research also have some implications for practitioners. Practitioners must consider production flexibility a critical factor in supplier selection. Expansion flexibility relates to facility location, process choice, natural and human resources. It should be noted that most of these factors take time and require serious investment. Therefore, an excellent feasibility study should be done at the project stage, and a modular production system should be adopted.

Mix flexibility concerns physical capital (e.g., machinery, mold), human resources, and technology. In the case of suppliers increasing the quality or quantity of the production output during the establishment phase or later, machines with range-heterogeneity (R-H), range-number (R-N), mobility (M), and uniformity (U), as well as modular molds and transfer systems should be preferred. Also, adopting SMED (Single Minute Exchange of Dies) helps achieve mix flexibility. Modification flexibility is more related to product design. The product designs should be modular, and the physical capital, human resources, and technology should suit this modularity. Volume flexibility is related to the production level. For volume flexibility, modeling should be carried out for different production levels during feasibility studies. Physical capital, human capital, and technology choices should also be made accordingly.

Supplier selection is a critical process that shapes the future of both the buyer and the supplier. During the supplier selection process, suppliers must inform their potential buyers about their flexibility potential. Also, they must provide reliable information to their potential buyers on their quality and delivery capabilities and competitive prices. Findings show a positive and significant relationship between supplier selection, buyer performance, and long-term cooperation between buyer and supplier. The supplier's high production flexibility, delivery capacity, quality level, competitive price policy, and sustainability of these qualities will ensure the performance of the buyer and the continuity of long-term cooperation with its supplier.

Establishing trust between a supplier and a buyer company and increasing trust is closely related to the sustainability of the supplier's performance. For the supplier business to achieve the desired performance level, the undamaged parts must be delivered in the correct quantity and at the desired time. Notifying the changing needs of each other in advance, sharing information online, and mutual technical visits are essential to building a long-term relationship between buyer and supplier. Also, a long-term relationship may require significant investments (machine, mold, apparatus) and efforts for joint problem-solving. It is crucial for a mutual trust that the supplier and the buyer are open, honest, and sincere with each other. In order to maintain the environment of trust, it is also essential that the supplier and the buyer believe that each other's interests are considered and that they meet their expectations.

Like any other research, this work has several limitations that need to be considered in future research. First, future studies may include more types of flexibilities to improve the buyer behavior model. Second, this study's sample consists of only automotive member companies in Turkey. Our sampling choice may constrain the generalizability of our findings. By using our research model in other countries and business environments, future research can solve this problem. This would help determine whether the relationships between the variables in the model are robust. Third, this study considers the supplier's perspective. As there is lack of studies that look at the supplier's point of view in the literature, this one makes a substantial contribution. It could also be useful to see if the findings hold true from the standpoint of the customer or buyer. Readers should consider that the conclusions that arise from a seller's point of view could be slightly different. Future studies might take dyadic perspectives into account.

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Моделі поведінки індустріальних споживачів: емпіричне дослідження

Невизначеність зовнішнього та внутрішнього середовища підприємств значною мірою впливає на ефективність їхньої діяльності. Невід'ємною складовою стратегічного розвитку в умовах невизначеності є використання гнучкості виробництва. Для досягнення виробничої гнучкості бізнес-організації шукають постачальників, які задовольняють основні критерії: широкий обсяг, модифікація, асортимент та гнучкість у розширенні необхідних ресурсів. Вибір постачальника є стратегічним питанням для ефективної діяльності сучасного бізнесу, оскільки вартість закупівлі сировини та деталей впливає на цінову політику підприємства, а отже і на споживчий попит. Метою даного дослідження є обґрунтування взаємозв'язку між типами гнучкості виробництва, вибором постачальників, підвищенням продуктивності, довгостроковими відносинами та довірою до підприємства. Вихідну базу сформовано на основі даних опитування респондентів 148 автомобільних компаній, що працюють у Туреччині. Об'єктом дослідження обрано автомобільну промисловість з огляду на високий рівень невизначеності її функціонування, що обумовлено наявністю великої кількості контрагентів з різних секторів економіки. Для досягнення поставленої мети використано інструментарій структурного моделювання. Емпіричні результати засвідчили про наявність позитивного статистично значущого зв'язку між типами гнучкості виробництва та вибором постачальника. Крім того, виявлено позитивні зв'язки між вибором постачальників, продуктивністю, довгостроковими відносинами та рівнем довіри до підприємства. Авторами встановлено непрямий взаємозв'язок між вибором постачальника та довірою до підприємства. Отримані результати дослідження можуть слугувати базисом для прийняття обґрунтованих рішень менеджментом підприємства при виборі постачальників залежно від рівня та типів їх гнучкості, продуктивності, довгострокових відносин і довіри до них.

Ключові слова: довгострокові відносини, виробнича гнучкість, довіра, продуктивність, закупівля, вибір постачальника.