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Market Sensing Capability Practices and its Effect on Manufacturing Firms' Competitiveness. Evidence from Ethiopia

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Abstract

This study examined Ethiopian manufacturing enterprises' competitiveness and market trend detection. An explanatory research design using a quantitative approach was used to investigate the causal relationships between the dependent variable (manufacturing firm competitiveness) and the independent variables (market sensing capabilities, which include market information scanning, interpretation, and response). To collect primary data, the Addis Ababa and Oromia Sheger municipal administrations, which are at the heart of Ethiopian industrialization, sent structured questionnaires to randomly selected manufacturing enterprises. The measurement and structural models were validated using SPSS v26 and AMOS v23. Significant factor loadings (c>0.5) are present in both independent and outcome variables, matching reliability and validity requirements. Testing hypotheses with structural equation modeling and multiple regressions. Ethiopian manufacturing firms practice two of the three market sensing competence dimensions above average, while market reaction was poor. Marketing competence traits increased Ethiopian manufacturing firms' competitiveness, according to data research. Market information interpretation had the greatest favorable impact (β=0.397, p<0.01, t = 7.51), followed by scanning (β=.367, p<0.01, t = 10.48). Market response had the lowest positive impact (β=.246; p<0.01; t=6.47). Manufacturing enterprises in Ethiopia should practice all the above market sensing capabilities skills and focus on adapting to market changes to stay competitive.

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INTRODUCTION

A company's market sensing capability is a component of its outside-in marketing capability, which offers the information structure required to modify its functional marketing skills in order to better serve shifting markets (Mu et al., 2018). Market sensing is defined as the capacity to recognize and respond to shifts in the consumer's preferences and needs, technological advancements, innovation, and value proposition (Bayighomog Likoum et al., 2020). The relevance of market sensing capability is recognized in business organizations as it serves several purposes,

including categorizing customers into different classes, reducing operating costs while increasing expected profits, producing market knowledge, and its innovative understanding may contribute to the formulation of effective strategies (Forrest et al., 2023). Many earlier studies (Ardyan, 2016; Sugiyarti & Ardyan, 2019; Gong et al., 2020) have shown that market-sensing capabilities, or an organization's capacity to use market intelligence to identify the needs and preferences of the market, are essential for all businesses, regardless of size. For businesses to maintain a sustainable competitive advantage and identify opportunities and threats, they must possess the capacity to quickly identify the needs of emerging markets, evaluate customer responses, and develop market-entry strategies. The capacity to sense and respond to the market environment and changes in terms of various facets, including technological advancement, consumer tastes, and preferences, is generally called market sensing (Bayighomog et al., 2020).

Because of rapid change and technological advancements, many organizations are lagging behind, and the only companies that can maintain survival are those that can effectively utilize marketing skills by sensing customers desires to anticipate future trends (Dias & Lages, 2021). Coming to the manufacturing sector in Ethiopia, even though previous empirical findings contended that their performance is sluggish due to numerous factors, the current operational setup is very competitive and dynamic due to the entry of numerous smallholder manufacturers (Beshir & Zelalem, 2022). It is therefore, vital for underutilized manufacturing plants to execute competitive strategies in order to outperform their competitors and ensure their continued existence and sustainability in the marketplace, as most of them lack clearly defined plans (Endalew, 2020). In a globalized market, customers have a multitude of choices to make, and businesses need to produce goods and services that are superior to their competitors and this is called competitiveness (Tomalá& Olives, 2022). Competitiveness explains the capability to produce and sell products in order to function effectively to meet what the competition needs (Shirinyan et al., 2021).

The presence of competition between enterprises will drive firms to produce more and better quality items, which will benefit consumers as well as companies and generate larger profits, grow market share, and attract more clients (Vîrjan et al., 2023). Productivity, market share, profitability, efficiency, product variety, value creation, and customer satisfaction are some of the numerous interconnected firm factors that determine competitiveness. Kiveu et al. (2019), and most of these indicators were also used in this study to measure competitiveness at the firm level. In addition, Flak &Głód (2020) established that competitiveness is relative and multidimensional in nature, as there is no absolute measurement for all situations and it might indicate the relationship of firms in the market. In underling the relevance of competitiveness, previous empirical and literature reviews by Farhikhteh and Farhikhteh (2023) revealed that there is no universally applicable definition that works across organizations but in most definitions, the competence of organizations to develop higher profitability;

and market share are common. Competitiveness is a concept that shows up in all aspects of human life, regardless of the size and type of organizations both at the micro level and the broader and larger macro level, and even in personal and social life, as its chain spans over global, national, local, and strategic business units (Farhikhteh & Farhikhteh, 2023). Hence, assessing the competitiveness of firms in both larger and medium sized enterprises and how market sensing capability practices help firms better succeed in a market filled with competition is the aim of the current study.

A review of previous empirical works confirms that market sensing capability has been one of the most significant dynamic capability elements that influence organizations' competitiveness. While earlier research (Wulandari & Herman, 2019; Kankam-Kwarteng et al., 2021) examined the impact of market sensing capability dimensions on firms' performance in diverse industries and verified a remarkable positive correlation, other studies (Ardyan, 2015; Ardyan & Sugiyart, 2017) have indicated a non-significant correlation between market sensing capability dimensions and sustainable competitive advantage. In addition, there are discrepancies in the findings of different scholars regarding the role of market sensing capabilities in boosting a firm's performance and competitiveness. In addition, the majority of these studies were conducted in countries other than Ethiopia, resulting in a geographic gap and being context specific because they concentrated on a certain industry. The current study fills in the geographic and contextual gaps by focusing on a large number of manufacturing enterprises in Ethiopia through stratified random sampling. An additional unique feature of this study was that it tested the developed hypotheses using both multiple regression modelling and structural equation odeling. Depending on the above research problem, this article answers the following research questions..

Research questions

1. *What is the effect of market information scanning/sensing on firm's competitiveness in Ethiopia?*
2. *What is the effect of market information interpretation/ sense making on firm's competitiveness in Ethiopia?*
3. *What is the effect of market response on firms competitiveness in Ethiopia?*

Empirical Literature Review and Hypothesis Formulation

Market Sensing Capability dimensions and Competitiveness of Manufacturing Firms

Many previous studies have confirmed the role of market sensing capability in its various dimensions in enhancing organizational performance from different perspectives, like financial performance, salesperson performance, profitability, and customer-related achievements. In line with this, Teece (2018) states that a company's ability to sense encompasses a number of tasks, including scanning, seeking, and opportunity exploration across markets and technology. It also covers research activity investments and the investigation and validation of technical potential in the environment. Khan et al. (2022) confirmed that market sensing capability played a mediating role between socio emotional wealth and new product

performance when studied on market sensing and family controlled boards in the new product development performance of emerging family markets. Alshanty & Emeagwali (2019), who studied market sensing capability, knowledge creation, and innovation in micro and small scale enterprises in Jordan, concluded that market sensing capability had a positive and significant effect on knowledge creation and firm innovation. Wong and Ngai (2023) reveal that both sensing capabilities and analytical capabilities have a positive and significant effect on the operational performance of medium- and small-scale enterprises. Kankam-Kwarteng et al. (2021) confirm that differences in the marketing performance of service businesses are mostly explained by market sensing abilities and interaction orientation.

H_{01}. There is no relationship between market information scanning or sensing and the competitiveness of manufacturing firms in Ethiopia (1)

Nurudin et al. (2021) conclude that both market sensing capability and innovation positively affect competitive advantage. In the same way, Kembro et al. (2017) found a positive correlation between responsiveness, information sharing, and performance. Khan et al. (2023), after studying hybrid market offerings in the medical technology sector in both developed and emerging markets, conclude that the success of hybrid market offerings depends on dynamic capabilities like sensing and client involvement. Khan, Mavondo, et al. (2022) investigated on the outside and inside out entrepreneurial marketing capability and marketing capabilities for entrepreneurial performance, which indicates that while marketing agility only positively moderates the link between resource-mix inimitability and product creation capability, it moderates the association between resource-mix flexibility and market driving skills. Capabilities for product creation and marketing drive serve as simultaneous mediators between resources and business performance. Liang et al. (2022), after studying firm performance and marketing analysis's in a Chinese context, demonstrate that a firm's market agility is positively impacted by marketing analytics, which enhances firm performance. Nurhayati and Hendar (2021) investigated the role of market sensing capability in terms of competitor and customer based on business performance in retail fashion on small and medium scale enterprises in Indonesia and found that both of the market sensing capability dimensions significantly affect business performance.

Ho2. There is no relationship between market information interpretation and the competitiveness of manufacturing firms in Ethiopia (2)

Similarly, many studies have focused on how marketing capability in responding to customer needs plays a role in enhancing performance. Accordingly, Ejrami et al. (2016) investigated the role of marketing capability in the competitive advantages of 100 companies engaged as exporters and importers and established that marketing capability in various dimensions has a significant role in the performance of those companies. In more advanced marketplaces, it

is necessary to respond to new risks and opportunities due to the dynamic market conditions, which include changing client demands and competition (Khan, 2020). Only the most adept in using market sensing to regulate consumer desires or anticipate trends will be able to reappear and maintain their competitive edge (Dias & Lages, 2021). Gong et al. (2020) underlined that market sensing capability enhances companies ability to categorize customers, lower operational costs, and increase profits. Siam et al. (2022), who studied the relationship between organizational competition and marketing capability in achieving seller achievement, confirm that marketing capability has a significant effect on a salesperson's effectiveness. Khan and Khan (2021), who studied the efficacy of marketing skills and market responsiveness on the marketing performance of emerging market exporting firms in advanced markets among 98 exporting firms in Pakistan, concluded that marketing skills-related responsiveness plays a role in improving marketing performance.

Ho3. There is no relationship between market response and the competitiveness of manufacturing firms in Ethiopia (3)

Conceptual framework of the study

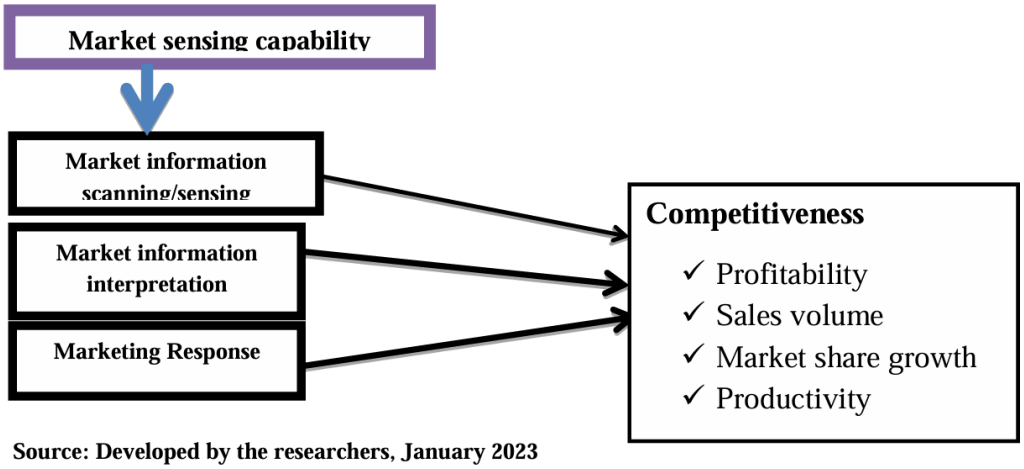

Figure 1. *Conceptual framework of the study*

MATERIALS AND METHODS

The research design

This analysis used cross-sectional data, which presupposes a certain period across all various firms in Ethiopia and also allows equal opportunity for enterprises in the manufacturing sector in the study to test the proposed hypotheses. Planning for future in-depth studies can benefit from the preliminary data gathered from cross-sectional studies, which use observation to look at data from a population at a certain point in time (Wang & Cheng, 2020). According to Maier et al. (2023), cross-sectional data is pertinent because it offers a comprehensive and transparent investigation that identifies the methodologies and conclusions applicable to theoretical or practical issues. It also lessens

bias by offering strategies for addressing missing values in the data. For this investigation, data collection took place in 2023.

Population and sample size

Legally registered large and medium-sized manufacturing enterprises in Ethiopia were the study's target demographic. As of January 2023, the Investment Commission of Ethiopia has released an official report stating that out of the approximately 3687 lawfully registered large and medium sized industrial enterprises, 3500 are presently operating. The list of those manufacturing companies, complete with addresses, was given to us, which made the procedure of gathering and sampling data easier. The ministry of Trade and Industry's classification, which is used in various reports and empirical investigations throughout Ethiopia, was the basis for the classification of enterprises into different sizes. The study's aims and the proximity of the documentation of market sensing activities are the reasons for concentrating on large and medium-sized firms.

Thus, using Kothari's (2004) sample size determination formula, a structured questionnaire was used to gather primary data from 300 organizations. Of these, 270 correctly completed forms were returned for data analysis, accounting for almost 90% of the sample. 139, or 52%, of these 270 companies were large, and 131, or roughly 48%, were medium-sized industrial companies. Since the Investment Commission had fully disclosed the addresses of the manufacturing companies, access to them was justified. Although the number of targeted enterprises is higher, the bulk of these firms are located in Addis Ababa and the surrounding Sheger city administrative towns in Oromia, which served as the primary location for data collection. To ensure inclusivity, a stratified random sample technique is now employed. Ethiopian enterprises are involved in a number of industrial types. Structural closed-ended questionnaires were employed to gather primary data from those manufacturing enterprises through a stratified random sampling technique.

Procedure for data collection

A set of procedures was followed to guarantee the technical and ethical soundness of the research conclusion because this study was based on primary data sources from managers and/or delegated staff from manufacturing enterprises. A committee of qualified specialists who were university professors ensured the validity of the first questionnaires, which were produced based on earlier research. A group of five experts were given the planned questionnaire items together with all study objectives and conceptual frameworks to ensure that content validity was checked to ensure that the research instrument meant to collect data was full of all the required objects in the research. The opinions of the experts were all expressed, and changes were made in response to their feedback. Subsequently, a pilot test was conducted with 20 manufacturing enterprises to ensure that all pertinent information had been included. Guidance was given regarding the appropriateness, clarity, and alternative wordings of the statements. Furthermore,

without abandoning their initial goal, the questionnaire items were changed in response to input from the pilot study. Ultimately, data collection was carried out using questionnaires directed at the top managers and as assigned by the companies, with the help of skilled enumerators hired for this study's purpose. The authorization letter from Wollega University was used to approach all manufacturing companies in order to carry out this investigation.

Instruments and data collection methods

The cross-sectional study that served as the basis for this research exclusively used primary data sources, and the five-point Likert scale questionnaire that was used to collect responses from the participants was standardized. The market sensing capability was measured using a structured questionnaire with 12 items divided into three sub-dimensions. (1) market information scanning/sensing; (2) market information interpretation; and (3) market response. This questionnaire was first used by Lindblom et al. (2008) and Ardyan (2016), and it has since been widely used in market literature.

These sub-dimensions were measured using multi-item scales, where 1 represented strong disagreement and 5 represented strong agreement. According to Kiveu et al. (2019), market share and profitability were also indicators of competitiveness and business performance Furthermore, financial performance in terms of profitability, market share growth, productivity, growth in terms of product sales volume, and productivity were taken as the generic measures of competitiveness and were adopted in this study, according to the European Commission's report on measuring competitiveness according to the European Union's report (EU, 2018).

Furthermore, it was mentioned that competitiveness is a multifaceted attribute of a business that stems from both internal and external circumstances and the ability to adapt to changes; as such, it is a relative and non-absolute scale for assessing ii and can be used to characterize the relationships between businesses in the market (Flak & Głód 2020). The fact that many other studies have employed the same measures to gauge how competitive manufacturing firms are in their manufacturing business performance relative to their competitors justifies the use of self-reported data from managers or other representatives of the manufacturing firms in this study.

Empirical model specification

The following model was used to examine the direct association between market sensing capabilities types and firm's competitiveness using multiple regression modeling and structural equation modeling. Yi is the dependent variable for the i^{th} observation; β0 is the intercept; xi is the independent variable; βn are the regression coefficients; and ei is the error term for the ith observation.

$Yi = \beta_0 + \beta_{1x1i} + \beta_{2x2i} + \ldots\ldots. \beta nxni + ei$

The fundamental regression model is reconstructed using the variables used in this investigation in order to demonstrate the relationship between the variables, as illustrated by the conceptual framework displayed in Figure 1.

$FC = \beta 0_1 + \beta 1 MIsca + \beta 2 MIInt + \beta 3 Mk\text{response} + \varepsilon 1$

Where, $\beta 0_{1=}$ the intercept, FC= firms competitiveness,
MIsca = Market information scanning/sensing
MI_{Int} = Market information interpretation
$Mk_{response}$= Market response

Data Analysis Approach

This study's goal was developed using a variety of data analytic methods, primarily structural equation modelling, multiple regression analysis, and descriptive statistics. The attributes of the study variables, such as the type of manufacturing firms in the survey, the characteristics of the respondents, and the application of market sensing capabilities dimensions being employed in the manufacturing sector, were illustrated using descriptive statistics. Several statistical correlations between latent and observable variables were explained by structural equation modelling through model validation and visualization. It also produced a single complex model with various interdependencies among variables, as advised by Dash and Paul (2021). Out of the two primary structural equation modelling approaches, covariance-based structural equation modelling (CB-SEM) was found to be more favorable than partial least squares structural equation modelling (PLS-SEM) CB-SEM was the statistical method that structural equation modelling researchers employed the most frequently (Shao et al., 2022), in contrast to partial least squares structural equation (PLS-SEM), which is used to build theory rather than confirm or dispute it (Hair & Alammer, 2022). With a range of indicators drawn from well-established theories, the current study aims to determine if the external, endogenous, and mediating variables are connected. Because the objective is theory testing and confirmation rather than theory formation and prediction, covariance-based SEM (CB-SEM) is a better fit. Confirmatory factor analysis (CFA), a statistical procedure that looks into item validity and reliability as well as model goodness of fit, is used in covariance-based structural equation modelling (CB-SEM) to examine the measurement model quality (Hair et al., 2020). Researchers expected to test the hypothesis that the proposed theoretical relationship among the observed and latent variables exists, and the application of confirmatory factor analysis indicates that at least some theories are available indicating the relationship between the hypothesis (Hair Jr. et al., 2020).

There are two methods to measure the relationship between observable and latent variables in this process. formative and reflective. Formative measuring scales, as opposed to reflective scales, invert the causal relationship between the latent construct and the indicators because, in reflective measurement models, the indicators are quantified as a function of the latent variable, whereas the latent construct is measured as a function of the indicators (Rose et al., 2023). In this study, the reflecting measurement method is employed, wherein the latent construct is the source of the indicators, and the original meaning of the latent construct is unaffected by the addition or subtraction of the indicators. Multiple regression modelling and correlation modelling were also employed in addition to structural equation modelling to supplement the outcome of the former.

RESULTS AND DISCUSSION

Descriptive statistics

In order to shed light on the respondents' overall characteristics and research variables, particularly those pertaining to innovation capability practices within and between business types and sizes, descriptive statistics were used. As a result, 270 out of the 300 closed-ended questionnaires that were sent to manufacturing enterprises in Addis Abeba and the surrounding Sheger city administrations in Ethiopia were correctly completed and used for data analysis, yielding a 90% response rate. Through the use of stratified random sampling, the questionnaires were sent to various industrial enterprises. Table 1 shows that data was gathered from ten distinct categories of manufacturing companies. All of the firms had to be in business for at least three years in order to be eligible to take part in the research.

Table1

I*ndustry Type and Demographic Characteristics of respondents*

S. No	Manufacturing category	Frequency	Percent
1	Basic And Fabricated Metal Products	20	7.4
2	Manufacture Of Wood And Wood	7	2.6
3	Chemical And Chemical Products	26	9.6
4	Manufacture Of Food And Beverage	52	19.3
5	Manufacture Of Furniture	38	14.1
6	Manufacture Of Leather And Leather	12	4.4
7	Manufacture Of Other Nonmetallic Mineral Products	39	14.4
8	Manufacture Of Paper And Paper	3	1.1
9	Manufacture Of Rubber And Plastic	35	13.0
10	Manufacture Of Textile	38	14.1
Total		270	100.00
Sex Of Respondents’			
	Male	183	67.8
	Female	87	32.2
	Total	270	100.0
Educational Background Of Respondents			
	Diploma	26	9.6
	Bachelor’s Degree	154	57.0
	Masters	87	32.2
	Above Masters	3	1.1
	Total	270	100.00
Position Of Respondents In The Enterprise			
	General Manager	52	19.3
	Operation Manager	74	27.4
	Production Engineer	45	16.7
	Assistant Production	33	12.2
	Marketing Manager	48	17.8
	Total	270	100.00

Market Sensing Capability Practices in the Ethiopian Manufacturing Sector

The level to which market sensing capability is practiced in the manufacturing firms in Ethiopia was presented using descriptive statistics. The objective of the analysis was to clarify how capable firms in the manufacturing sector of Ethiopia are related to market information acquisition, interpretation, and market response. All those three subdimensions were measured using 12 items with five-point Likert scale questions, with 1 = strongly disagree and 5 = strongly agree, to assess respondents attitude towards their manufacturing firms market sensing capability. Table 2 displays the details.

Table 2

Market sensing capability practices in Ethiopian manufacturing sector

Descriptive statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Market information scanning	270	1.00	5.00	3.502	1.36095
Market information interpretation	270	1.00	5.00	3.618	1.43923
Market Response	270	1.00	5.00	3.411	1.38741
Valid N (list wise)	270				

The degree to which manufacturing companies are utilizing each of the three elements of market sensing capabilities is displayed in Table 2. As indicated in the research methodology section above, a five-point Likert scale was used to measure each variable's level of agreement or disagreement with each question. Table 2 indicates that the respondent's assessment of market information scanning and sensing was given an overall value of M = 3.502, indicating that the respondent agreed with the preceding classification regarding the significance of market information scanning in their manufacturing firms. Regarding the interpretation of market information, the respondents provided an overall rating of M = 3.618, falling within the agreed-upon classification range. Lastly, the market response rating of respondents was scored at 3.411, which, based on the classification above, fell into the agree category but had a low mean value in relation to the other independent variables.

Reliability and validity assessment results

In the current study, the variables' validity and reliability were evaluated. The constructs' level of reliability was evaluated using both internal and composite reliabilities. According to (Hair et al., 2021), internal consistency is the degree to which indicators measuring the same idea are related to one another. According to Sideridis et al. (2018), Cronbach's alpha is considered the most dependable measure of consistency; a score of

0.70 or above is considered sufficient. Therefore, validity and reliability issues were identified based on the factor loadings displayed in Figures 2 and 3 in the section that follows.

All of the variables in Table 3 have Cronbach alpha coefficients between 0.782 and 0.878, suggesting strong dependability, in accordance with the cutoff point set by Sideridis et al. (2018). Furthermore, composite reliability is preferred over Cronbach's alpha because it takes into account the correlation between the structures rather than relying solely on an absolute dependability metric. For the purpose of determining composite dependability, high factor loading signals are necessary. A value greater than 0.70 indicates that the composite dependability is suitable (Kamranfar et al., 2023). Hair et al. (2020) have indicated that composite reliability results ranging from 0.70 to 0.95 indicate adequate to good reliability levels, while Kamranfar et al. (2023) emphasize that the prerequisites for construct reliability assurance are indicators with higher factor loadings. An acceptable result for composite reliability would be greater than 0.7. Table 3 shows that for every study variable, the composite reliability result is at a good level. Additionally, Table 3 shows the research variables' validity test results, which were determined using the confirmatory factor analysis's factor loading data.

The average variance extracted (AVE) and its square root were computed to establish convergent validity. This also helped to assure discriminant validity, which was then compared with the inter-factor correlation between the variables. The average variance extracted (AVE) approach is used to determine the construct's convergent validity measures, which include how well a given latent variable explains the variance of its indicators (Sujati et al., 2020). As a result, the grand mean value of the AVE (i.e., the total squared loadings divided by the number of indicators) is determined by dividing the squared loadings of the indicators by the construct. This value is also known as the communality of the factors (Hair et al., 2021).

According to Hair and Alamer (2022), a measurement tool's acceptable convergent validity is contingent upon its loadings being greater than 0.5 and having a significant corresponding p value ($p<0.05$). This implies that the factor must be able to capture a minimum of 50% of the indicators when its loadings are greater than 0.5. The convergent validity of this study indicates that all factor loadings and the average variance extracted (AVE) are above 0.5 based on the findings of the confirmatory factor analysis shown in Figures 2, 3, and Table 3. confirming that there are no convergent validity problems in the study since, in accordance with Hair and Alamer (2022), items with lower factor leadings—typically less than 0.4—are likely to be eliminated from the model.

The AVE was greater than 0.5 for the study variables, which were 0.56 for market information scanning, 0.76 for market information interpretation, 0.66 for market response, and 0.8 for the firm's competitiveness. These results, along with the confirmatory factor analysis results shown in Figures 2 and 3, indicate that there is no issue with convergent validity in the study.

Table 3

Reliability and Validity Test Result

Variables	Item-Total Correlation	Cronbach's Alpha	Composite Reliability	Average variance extracted	Square root of average variance extracted
Market Information Scanning/Sensing	0.686	0.873	0.84	0.56	0.76
Market Information Interpretation	0.705	0.782	0.95	0.76	0.87
Market Response	0.77	0.878	0.921	0.66	0.81
Competitiveness	0.564	0. 875	0.933	0.8	0. 89

Table 3 also shows the item-to-total correlation, which provides additional evidence of an item's consistency with the test's overall score. With a total correlation for all items ranging from r = 0.707 to r = 0.564, all research variables show a strong and positive association, suggesting that the indicators had a good relationship with the scale overall.

The degree to which a particular construct or variable is empirically distinct from the other constructs in the measurement model is measured by discriminant validity, another evaluation criterion for the measurement model in structural equation modelling (Hair & Alamer, 2022). Comparing one variable to another is one way to assess discriminant validity. According to Sujati et al. (2020), discriminant validity is guaranteed if the interconnection between two factors in the relationship is smaller than the average variance extracted squared. When the two criteria were compared, the results of the current study are shown in Table 4, which also supports the finding of Basco et al. (2022) that discriminant validity would be attained if the square root of the average variance extracted was greater than the factor relation. Furthermore, discriminant validity would not be a problem in this study because all of the constructs passed the convergent validity assessment. It is true that achieving convergent validity is the first step towards establishing discriminant validity, as was discussed in the literature.

Table 4 demonstrates that there is no issue with discriminant validity because the result of the square root of the AVE shown diagonally with bolded values was much higher than the inter-correlation between the variables. When compared to first-generation methods, structural equation modelling is considered a novel measuring option among multivariate data analysis techniques because it allows researchers to simultaneously examine correlations among these variables and examine associations between observed and latent/unobserved variables (Dash & Paul, 2021). Scholars have discussed these techniques as sophisticated extensions of statistical modelling techniques such asanalysis of variance (ANOVA) and multiple regressions. Here are a few of the prerequisites that must be met.

Table 4

Discriminant validity using cross correlation and square root of AVE

	Competitiveness	Market information scanning	Market information interpretation	Market Response
Competitiveness	0.89			
Market information scanning	.508**	0.75		
Market information interpretation	.534**	.517**	0.87	
Market Response	.592**	.653**	.609**	0.81

Multivariate Normality

The procedure for calculating multivariate normality in the current study involved calculating the values of skewness and kurtosis. In particular, there is concurrence within the ranges for the absolute value, skewness, and Kurtosis values, which should be within -+1.96 and -+7, respectively, as suggested by Hair et al. (2014). Table 5 demonstrates that all of the study's variables have values that are normally distributed and fall between the suggested limits of different.

Table 5

Skewness and kurtosis analysis for Multivariate normality

	N Statistic	Skewness Statistic	Std.Error	Kurtosis Statisti	Std. Error
Market information scanning	270	-0.939	.148	-0.407	.295
Market information interpretation	270	-1.068	.148	-0.343	.295
Market response	270	-0.959	.148	-0.493	.295
Profitability	270	-1.325	.148	.572	.295
SalesVolume	270	-1.574	.148	1.266	.295
Market Share growth	270	-1.155	.148	.563	.295
Productivity	270	-1.555	.148	1.777	.295

Multi-collinearity diagnostics

This study uses a variety of techniques, including the variance inflation factor, tolerance, and inter-factor association, to identify the presence of multicollinearity. According to Hair et al. (2021), tolerance <0.25 and variance inflation factor >= 5 are requirements that must be met for multicollinearity to exist. Similarly, a variance inflation factor larger than five would suggest the presence of

multicollinearity. Furthermore, inter-factor correlation can also be used to discover multicollinearity; the stronger correlation between variables is likely to lead to collinearity, especially when the correlation coefficient between variables is greater than >0.8. Thus, multi-co-linearity is not present, as indicated by the correlation matrix below 0.80, VIF <3, and tolerance >0.25, according to the study's multi-co linearity test results, which are displayed in Figures 2 and 3 and Table 6.

Table 6

Multicollinearity diagnostics using Pearson Correlation, Tolerance and VIF

	Factors	1	2	3	4	Tolerance	VIF
1	Competitiveness	1				.992	1.008
2	Market information scanning	.62**	1			.680	1.471
	Table. 6 Continues…						
3	Market information interpretation	.425*	.53*	1		.869	1.150
4	Market response	.52**	.464	.48*	1	.747	1.338

***= Correlation is significant at 0.000*

Sufficiently Large Sample Size

The manufacturing sample size of 270 in the current study is sufficient for the analysis, in accordance with the previously established assumptions in structural equation modeling. Additionally, the Kaiser Mayor Olkin (KMO) technique was used to determine the adequacy of the sample size, requiring a minimum result of 0.50. A KMO value of.748 was obtained, which is significantly higher than the lowest threshold for factor analysis, and a Chi2= (χ2=466.275.709, DF=6, P <.001) indicated that the study's sample size sufficiency was met.

Confirmatory Factor Analysis (CFA) For Measurement Model

The measurement model would be completed first in order to evaluate how the observed variables are connected to their latent variables, and the structural model, which determines the relationship between the hypothesized models, is often involved in the analysis and interpretation of structural equation modeling (Zyphur et al., 2023). Confirmatory Factor Analysis (CFA) was employed to validate the measurement model of latent components in this investigation. Therefore, confirmatory factor analysis was used to evaluate the measurement model for all variables in order to determine concept validity prior to proceeding with the structural phase of the investigation (Sovey et al., 2022). Model goodness of fit test was assessed using certain criteria well established in literature like the chi-square statistic, with insignificant p-value, the goodness-of-fit index (GFI) greater than 0.90; the adjusted goodness-of-fit index (AGFI) greater than 0.90; and the root mean squared error of approximation (RMSEA) of less than 0.08 value with insignificant p close values and standardized root mean square residual (SRMR) are all recommended by the literature

as an absolute fit metric while Tucker-Lewis index (TLI) of greater than 0.90; and comparative fit index (CFI) with greater than 0.90 values are incremental fit indices (Kang & Ahn, 2021). Additionally, the researchers would think about changing the model to better suit the data if the suggested structural equation model exhibits below the necessary model-fit indices. The statistical significance of each indicator loading to its latent variables was taken into account, and any results that were deemed insignificant were removed. Another technique involved adding variables by taking into account larger modification indices that would improve the model fit and rerunning the model. The measurement model in Figures 2, and 3, demonstrates that all of the parameters had significantly sufficient loadings, and none of them were removed from the model, therefore the parameters with larger modification indexes were included first in this study.

Validation of measurement model of independent variables (market sensing capability types)

In this study, the measurement model was performed on the three types of market sensing capability (market information scanning, market information interpretation, and market response) as independent factors and firm competitiveness as a dependent variable to validate the measures intended to capture the latent variable. Figure 2 illustrates how the 12 items designed to measure the three independent variables were sufficiently loaded on their latent variable. Initially, the model did not fit well, even though the factor loading of individual items on their respective indicators was adequately good. This was especially true since the model's Ch2 p-value was significant ($P<0.05$) as the significance value of alpha (p label associated with chi2) indicates a lack of difference between the default model and the real model which is not supported in Structural equation modeling.

After co-variating error terms, the model goodness of fit test result (GOF) was found to be a perfect fit because all factor loadings were significant and ≥ 0.5 none of them were removed from the model building. Therefore, as predicted by (Hair et al., 2018; Sarstedt et al., 2022), the Structural equation modeling factor analysis result in Figure 2 shows that the 12 indicators meant to measure the three sub-constructs of the exogenous variable (market sensing capability) scored an overall factor loadings >=0.5 and the model was in general in a satisfactorily model fit standard (refer to Table 7 for the details of model fit standards).

Table 7

Summary of model fit for independent variables

Indicators Of Model Fit	Cut Off Point	Test Result
CHI2 /DF	≤ 5	1.260 (Good Fit)
GFI	≥ 0.90	0.971 (Good Fit)
TLI	≥ 0.90	0.990(Good Fit)
CFI	≥ 0.90	0.994 (Good Fit)
RMSEA	≤ 0.08	0.031 (Good Fit)
P Value And Pclose	≥ 0.05	P = .128, Pclose 0.890 (Good Fit)

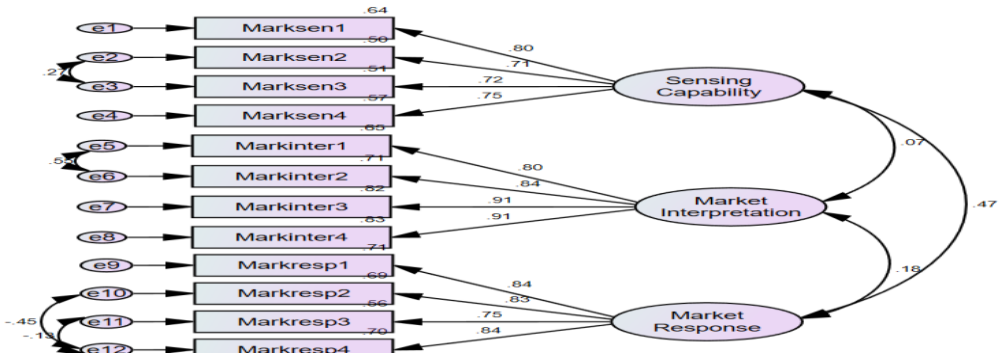

Figure 2. *Measurement Model for the independent variables*

Validation of measurement model for firm competitiveness

Similarly, all four measurement items in the measurement model result in firm competitiveness as first-order factors fit well and fall within the acceptable model fit mode. The outcomes demonstrate how well the hypothesis and the data agree. Each item loaded well on its latent variable, as evidenced by the results in Table 8 and Figure 3, with factor loadings ranging from 0.7 to 1.00. Table 8 shows that the model's goodness of fit was also determined, and all cutoff criteria were more than enough.

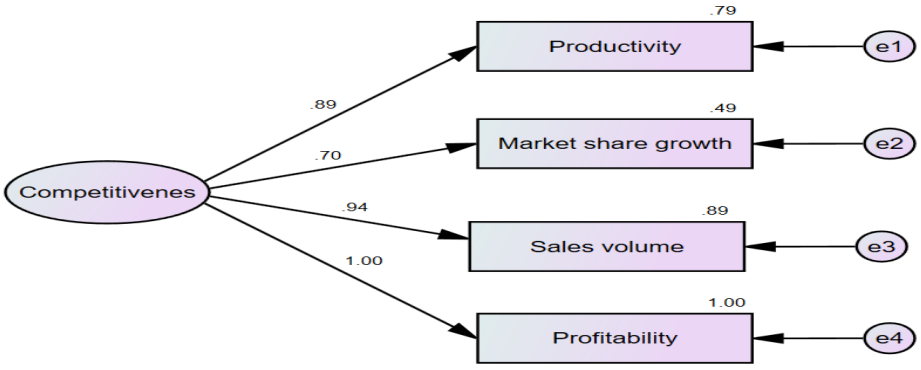

Figure 3. *Measurement Model for Firm Competitiveness*

Table 8

Model fit indices for Firm competitiveness based on CFA result

Model Fitness Standard	Benchmark	Outcome
Chi2 /Df	≤*5*	2.06 (satisfactory)
GFI	≥ 0.90	0.992 (Satisfactory)
AGFI	≥ 0.90	0.962 (Satisfactory)
TLI	≥0.90	0.998 (Satisfactory)
CFI	≥ 0.90	0.998 (Satisfactory)
RMSEA	≤ 0.08	0 .041 (Satisfactory)
P value and PClose	≥ 0.05	P=.113; P close 0.310 (perfect fit)

Result from Structural Equation modeling (SEM)

The researchers need to incorporate these constructs into a structural model after completing the confirmatory factor analysis (CFA) for the validation of the measurement model for each latent construct (Sarstedt, et al., 2022). As a result, the structural model for this study was developed as shown in Figure 4, with the three independent variables (market information interpretation, market response, and scanning/sensing) on the left and the endogenous construct (firm competitiveness) and its measuring items at the right. Table 9 and Figure 4 demonstrate that the model was an excellent fit, with all factor loadings being ≥ 0.5 and significant.

Table 9

Model fit summary of the structural model

Model Fit Criteria	Bench Mark	outcome
Chi2 /Df	<=5	1.814 (satisfactory)
GFI	>=0.90	0.982 (satisfactory)
AGFI	>=0.90	0.949 (satisfactory)
TLI	>=0.90	0.984 (satisfactory)
CFI	>=0.90	0.992 (satisfactory)
RMSEA	<=0.08	0 .055 (satisfactory)
P value and PClose	>=0.05	P=.053;Pclose0.372 (satisfactory)

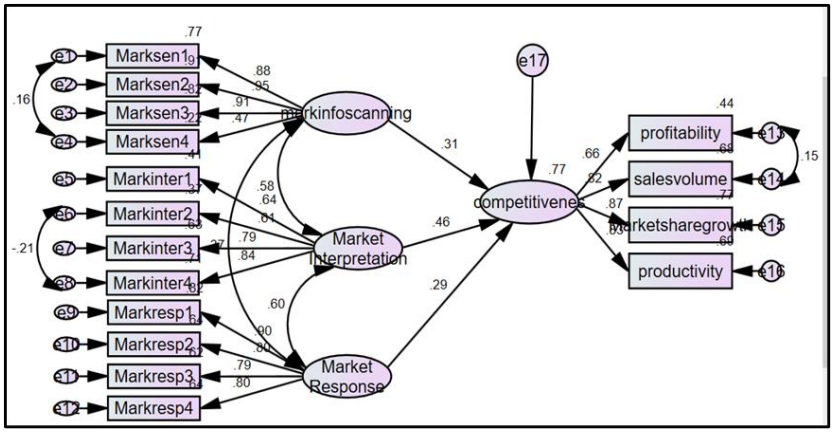

Figure 4. *Full structural model of the relationship between dependent and independent variables*

Table 10 displays the overall result of the structural model, which shows that independent variables have a significant direct impact on competitiveness. The significance evaluation in this work was determined using bootstrapping of standard errors, which yields confidence intervals as an alternative to t-values of path coefficients (Streukens & Leroi-Werelds, 2016). This means that "if the value zero does not fall into the 95% confidence interval, a path coefficient is deemed statistically significant at 5%" (Aguirre-Urreta et al., 2018). Path coefficients, together with the corresponding significance levels, were displayed to demonstrate the predictive ability of the different variables in the structural equation modeling. Consequently, the outcomes of the explanatory variables—market information scanning and sensing, market information interpretation and sense-making, and market response—were all noteworthy and positive. Standardized regression coefficients were used to evaluate all path and regression coefficients because, in contrast to unstandardized regression weights, which reflect changes in units, they make regression coefficients more comparable (Nieminen, 2022).

Table 10

Standardized Regression Weights. (Group number 1 - Default model)

			Estimate	S.E	C.R.	P Label
Competitiveness	<---	Market information scanning	.308	.035	6.085	.005
Competitiveness	<---	Market information interpretation	.459	.092	6.836	.000
Competitiveness	<---	Market response	.286	.054	4.185	.044

Therefore, the direct effect of market information scanning on competitiveness is.308; In other words, a 0.308 standard deviation gain in competitiveness translates into a one standard deviation rise in market information scanning. At .093 and.350, respectively, the lower and upper limit confidence intervals show importance since they are not bounded by zero.

At the 0.05 level, this standard direct effect differs statistically from zero (p=0.01 two-tailed). The interpretation of market information has a standardized direct impact on competitiveness.456 demonstrating a significant difference from zero at the 0.01 level (p=.000 two-tailed) of 0.456 standard deviations in competitiveness for every standard deviation increase in market information interpretation. At .435 and.824, respectively, the lower and upper bound confidence intervals not bound by zero show significance. Similarly, the standardized direct effect of market response on competitiveness is 0.286. This means that a one standard deviation increase in market reaction equates to a 0.286 standard deviation improvement in competitiveness since market response directly influences competitiveness. With values of.047 and.434 respectively, the bottom and upper confidence intervals of this normalized direct effect of market response on competitiveness deviate significantly from zero. At the 0.05 level, the effect is significant (p=.044 two-tailed). This result confirms that a firm's competitiveness was significantly and favorably impacted by all independent variables. market information scanning/sensing, market information interpretation, and market response.

According to Hair et al. (2022) and Ozili (2022), R-square values exceeding 0.75 are deemed substantial, those falling between 0.50 and 0.25 are considered moderate, and those falling between 0.25 and 0.75 are weak. The model's explanatory power is demonstrated by its R2 value of 0.77, indicating that the three independent variables collectively account for approximately 77% of the variations in the competitiveness of Ethiopian manufacturing firms. Market information interpretation, market information scanning, and market response have the greatest positive effects on competitiveness when comparing the independent variables' relative relevance. This is also the case for the multiple regression model result that is covered in the section that follows.

Result from Multiple Linear Regressions

The cumulative impact of independent variables (market information scanning, market information interpretation, and market response) over the dependent variable (competitiveness of companies) was evaluated using multiple linear regressions. While taking into consideration the effects of all independent factors on the dependent variable, multiple linear regressions quantify the effects of each independent variable on the dependent variable (Sarstedt & Mooi, 2019). The coefficient of determination, or R2, shows how well the model explains the observed variance in the dependent variable with respect to the mean, according to (Sarstedt and Mooi, 2019). This study demonstrates a strong association (R=.844) between the three market sensing capability characteristics and the competitiveness of

manufacturing businesses. Additionally, the study yielded an adjusted R-squared value of 0.708, meaning that market information scanning, market interpretation, and market response account for around 70.8% of the variance in the competitiveness of big and medium-sized manufacturing enterprises in Ethiopia. To put it another way, variation in those independent factors explains 70.8% of Ethiopian manufacturing businesses' competitiveness, leaving 29.2% unaccounted for. This is consistent with the results of Hair et al. (2022), who suggested that excessive R2 values signify model over fit but that R2 values of 0.75, 0.50, and 0.25 are considered substantial, moderate, and weak, respectively. As a result, Table 11's result indicates that the model has a substantial capacity for explanation.

Table 11

Model summary from multiple linear regressions

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.84[a]	.712	.708	.55900.

a. Predictors. (Constant), Market information scanning, market information interpretation, market response

Analysis of variance (ANOVA)

The ANOVA test result produced a significant p-value, which is a required point to further proceed with the regression analysis. Had it produced a p-value result that is more than 0.05, it would not have been possible to continue data analysis, as an insignificant p-value suggests that the model as a whole is not statistically significant. However, the regression model in this study indicates that it is the best option for determining how the three dimensions of market sensing capabilities affect a firm's ability to compete since it fits the data well and has a big F ratio (F = 218.678) and a significant p-value of 0.000. As a result, the model satisfied the criteria for statistical acceptance, and the amount of variance it explained was not coincidental.

Regression coefficients

Beta coefficients quantify the amount that the outcome variable changes for each unit change in the predictor variable, as opposed to the coefficient of determination, which accounts for the percentage variation in the dependent variable explained by the three independent variables used in this study. market information scanning, market information interpretation, and market response. The B column displays the prediction equation's unstandardized β coefficient. As noted before, standardized beta coefficients were used to analyze the outcome. Additionally, Table 12's sig. column reveals that all of the β coefficients are positive, meaning that a rise in any of the

independent variables' values—market response, market information interpretation, and market sensing/scanning—will boost the firms' competitiveness.

Table 12

The Coefficient Table

Coefficients'[a] Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.471	.173		2.716	.007
	Market information scanning	.205	.035	.367	10.48	.000
	Market information interpretation	.446	.053	.397	7.51	.000
	Market response	.350	.038	.246	6.473	.000

[a]. *Dependent Variable. Competitiveness*

All of the explanatory variables in this model have significance levels of less than 0.05, showing relevance, as a p-value bigger than 0.05 implies a value that is not statistically significant. The proportion of company competitiveness thus varies by.367 standard deviations for each standard deviation change in the percentage of market information sensing or scanning; the percentage of firm competitiveness changes by.397 standard deviations for each standard deviation change in the percentage of market information interpretation; and the percentage of firm competitiveness changes by.246 standard deviations for each standard deviation change in the percentage of market response.

Drawing from an examination of the parameter coefficients of the three explanatory variables and their corresponding impacts on the competitiveness of Ethiopian manufacturing
firms, the following conclusions can be drawn. Consistent with the SEM result previously mentioned, market information interpretation ($\beta = 0.397$, $p<0.01$, $t = 8.484$) has the greatest positive influence on competitiveness, with market information scanning/sensing ($\beta = 0.367$, $p<0.00$, $t = 10.48$) coming in second.

Hypothesis testing

Pearson's correlation, structural equation modelling, and multiple linear regression models were used to examine the three hypotheses presented in this study. Path coefficients and the corresponding significance levels were presented to demonstrate each variable's predictive ability in the case of structural equation modelling at the predictor's level. In accordance with Hair et al. (2022), the bootstrapping approach was applied to assess the significance and applicability of the route coefficients depending on t, and confidence intervals were utilized to determine significance. The results of the explanatory variables (market

information scanning and sensing; market information interpretation and sense-making; and market response) in both models were significantly different from zero and positive, as indicated by the results of the multiple linear regression model parameter coefficients in Table 12 and the path coefficients of the structural equation modelling in Figure 4. Furthermore, if the confidence range for an estimated coefficient did not contain zero, then Hair et al. (2022) state that the null hypothesis would be rejected and we would infer a significant effect. The null hypotheses were rejected in light of the results of the multiple regression model, the path coefficient result of >=1.960, and the significant result from the Pearson correlation. Hence, alternative hypotheses were accepted, as the three independent variables were having a significant impact on the competitiveness of manufacturing firms in Ethiopia.

H01. There is no relationship between market information scanning and the competitiveness of manufacturing firms in Ethiopia.

Ha2. There is a relationship between market information scanning and the competitiveness of manufacturing firms in Ethiopia (β = 0.367, p<0.01, t = 10.48) = Supported

Ho2. There is no relationship between market information interpretation and the competitiveness of manufacturing firms in Ethiopia. Rejected

Ha2. Market information interpretation has a significant effect on firms competitiveness (β =.397, p<0.01, t = 7.51). Supported

Ho3. Market response has no impact on the competitiveness of manufacturing firms in Ethiopia = Rejected

Ha3. Market response has a significant impact on the competitiveness of manufacturing firms in Ethiopia (β =.246, p<0.00, t= 6.473) = Supported

The regression equation was produced by the researchers, which demonstrated the impact of the three independent factors on the outcome variable.

Competitiveness =β0+0.367 Markin fosca + 0.397 MIinte+0.246markresp

CONCLUSION

This study was intended to investigate the direct effects of market sensing capabilities in their three commonly known dimensions (market information scanning/sensing, market information interpretation, and market response) on the competitiveness of large and medium sized manufacturing firms in Ethiopia. Both structural equation modelling and multiple regression models were employed to test the hypotheses. According to the result, the explanatory variables in both models had a significant impact on the competitiveness of manufacturing firms in Ethiopia. Using standardized parameter estimates for the sake of making parameter comparisons easier, market information interpretation had the strongest positive effect on competitiveness in all data analysis results from correlation coefficients, multiple regression models, and structural equation modeling. Similarly, the results of the data analysis from those models indicated that market information scanning has a positive effect next to market information interpretation, with the least effect coming

from the market response. In conclusion In order to increase their competitiveness, manufacturing companies in Ethiopia should prioritize implementing all aspects of market sensing capability discussed in the current study.

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DECLARATION

The authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

All data are available from the corresponding author upon request.

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