

Does Market Information Processing Improve Product Innovation Success of Small and Medium Enterprises?

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Abstract

Does market information processing improve product innovation success of small and medium firms? Innovation is inherently an information processing activity. An important element of information processing is the use of market information. While some researchers argue that entrepreneurs do not need formal processes to collect, disseminate and use market information, others suggest that the use of formal market information processes is positively related to product innovation success. Therefore, the main objective of this study is to assess whether market information processing improve product innovation success of small and medium enterprises. To achieve the objective, a triangulation method (qualitative, quantitative and descriptive) was employed in the investigation. Instruments used to collect data were pre-test, post-test, interviews and questionnaires. A series of hypotheses are posited to explore the relationships of the variables. A field survey administered to 425 small and medium enterprises in the manufacturing and services sector are used to gather the data. Out of the 425 surveys sent, hypotheses are empirically tested using structural equation modelling software's (AMOS) and regression analysis on a data set of 388 firms.

Based on the analysis, all hypotheses are supported. According to the findings of this study, all market information processing activities, acquisition, dissemination and utilization are positively significantly correlated. As general market information processing activities positive significant ($p < .001$) effect on product innovation success of SMEs. The results revealed that the higher effect of market information processing determines high level of product innovation success. Therefore, we suggest that the development of market information processing activities is an important instrument for the small and medium enterprises to achieve a high level of product innovation success.

Keywords: Product innovation success; Market information processing; Small and medium enterprise

Theoretical Background and Statement of the Problem

Small-to-medium sized enterprises have been for long recognized as the major engine of economic growth. Understanding the factors affecting the growth of these firms is of high relevance both politically as well as economically due to the major role of these firms both in job creation as well as in revenue generation. Different studies have suggested that strategic orientation is critical for the long-term survival of the firm with higher level of product innovation success [1-3]. Strategic management and marketing researchers have over the years introduced several market orientation that are said to contribute to innovative success.

A market orientation leads to the market oriented behaviours of acquiring, disseminating and responding to market information (which in this study is referred to as market information processing) [4-6]. Marketing information processing is the process of acquisition, disseminate; utilization of about both current and future customer needs as well as factors that may influence those needs in different phases of innovation processes) [7-8]. While product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. Which underlies new products, may include improvements in features, materials and components, the development of new product, enhanced user friendliness, and other aspects [9]. While product innovation success in this study refers to the number of innovative products that a firm has introduced onto the market, achieve success in both market and financial success. Market success (its market share size in the market, acceptance of new product by customers) and financial success (sales volume and net profit growth) [10-12].

Several studies have shown that the use of external information has a positive effect on the success of new products [13,14]. Knowledge and information are strategic assets for the success of enterprises and nations worldwide. The utilization of, and access to, a versatile pool of information sources is necessary in developing unique and novel ideas or inventions that differ essentially from existing and already invented ones that help to improve innovative success of firms [8]. However, how information is utilized, as well as its nature and when it is collected (acquired) may affect the innovation success of firms. Furthermore, small firms often fail to use network ties and market information processing that is available to them. Effective market information processing has been identified as a source of new knowledge [11,12], but many firms did not actively incorporate market information into their new products. This raises the question "Does market information processing improve product innovation success of small and medium firms?"

Therefore, the main goal of this study is to assess the role that market information processing plays to improve product innovation success of SMEs (study in Ethiopia).

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Literature Review and Hypothesis Development

Innovation: theoretical and conceptual framework

Innovative or die. As per Rogers [15] an innovation is defined as an idea or object that is perceived as new by an individual or an agency. "The perceived newness of the idea from the individual's point of view determines his or her reaction to it. If the idea seems new to the individual, it is an innovation" [16]. The innovativeness of a new product and firm innovation capability is important for several reasons. Furthermore, innovation by itself is defined as the generation, acceptance, and implementation of new ideas, processes, products or services. The innovation process includes the acquisition, dissemination and use of new knowledge [17] and successful implementation of creative ideas within an organization [18].

Since the beginning of the recent decade when the competitive environment went through a major transformation due to globalization, business organizations have intensified their search for strategies that will give them a sustainable competitive advantage and improve their success. Such strategies generally require that the firm continuously differentiates its products and process, that is, firms must constantly be innovative [19]. In such condition, where product innovation regarded as an essential prerequisite for the organizational survival and success, attention to entrepreneurship orientation and change to success of firms attracted the much attention of academic researchers and organizational members [20].

In the present global knowledge economy, technology and innovation are important determinants of economic growth [21]. Innovation is important for economic growth because it contributes to increased productivity and higher employment rates. Thus, the degree to which firms are able to product innovation and bring them to the market successfully determines the economic prosperity of many nations.

Product innovation is probably one of the most important processes for many firms as it influences the revenues and margins that a firm can achieve and it has a positive impact on firm value (e.g., on growth and survival of individual firms). The product innovation literature has consistently shown that product innovation success is positively related to organizational success [22-24]. The most recent best practice study showed that, among the best performing firms, 48% of sales are derived from new products introduced in the last five years [25].

Product innovation: Product innovation is, by definition, deemed to be novel, but the degree of novelty differs by product. OECD [26] classifies firm's product innovation into two types; "the introduction of a product only new to the firm" and "the introduction of a product new to the market." The latter innovation is newer and more drastic than the former (OECD [26]), and is considered to be novel. It is an important research agenda to examine product innovation in light of its novelty in three counts. First, new-to-market product innovation may contribute to firm performance, as it can provide a firm with temporary market power. Second, new-to-market product innovation exhibits possible technological spill overs in firm's innovation activities. Spill overs associated with firm's innovation activities have attracted much attention in both theoretical and empirical studies.

In our study, we focus on product innovation, which is "new product or services introduced to meet an external user or market need" distinguished between the initiation and implementation stages of the adoption of innovations. Following Zmud's approach, we further distinguish among three constructs associated with product

innovation. They are innovation orientation, resources commitment in product innovation and product innovation success.

From a collective perspective, innovation orientation is defined as openness to new ideas as an aspect of a firm's culture [27,28], and it reflects the organization's willingness to innovate its offerings. Innovation resources refer to the actual investment activities while implementing innovation strategy and product innovation success is the outcome and consequence of innovation activity [29]. Obviously, these three constructs are interrelated but quite different concepts, and innovation orientation and innovation resources can be considered as innovation-related resources.

Product innovation success: Innovation is traditionally understood to mean the introduction of new goods, the use of new materials, the development of new methods of production, the opening of new markets, or the implementation of a new approach to organization. Since, both academics and practitioners agreed that measuring innovation success is important [10]. However, measuring new product success is not easy. Several researchers have suggested that innovative success is multidimensional and that success can be measured in different ways [10,30-31]. There are many success criteria available to determine whether a new product is a success or a failure [10,23].

According to, the ability of firms to develop new products is considered as a measure of innovative success. New products are an important indicator of innovative success because they reflect a firm's ability to adapt to changes in markets and technologies and they exert a significant impact on market share, market value, and firm survival [31]. New product success is the degree to which organizational goals involving new product profit, sales volume, and market share have been reached.

Innovation success defined, as it is the success in new products is occurring when a large number of the target customers adopts the product and the organization is able to achieve target sales figures [10,27].

In addition, they define new product success as the degree to which the new product being evaluated meets that product's success goals [10,32-33]. For example, Sarah and Stock [30] proposed that success in product innovative could be assessed at three different levels: project level (e.g., time, cost efficiency and functional success), product level (e.g., profitability, market share and revenues of the new product) and firm level (returns to the firm generated by the new product).

In a meta-study on NPD success factors, found three broad categories of new product success measures: (1) financial objectives, (2) market share objectives, and (3) technical objectives. The financial and market share objectives both were considered to be measures of commercial success. It turned out that all studies in their review considered measures of commercial success, and only four of the forty-seven studies considered technical objectives. Therefore, the authors used only studies based on commercial measures of product innovation success in their meta-analysis. Based on a review of 77 publications and a survey of 50 practitioners, identified 75 different measures of new product success used by academics or practitioners. Expert grouping by a group consensus process and factor analysis resulted in five general independent categories of success and failure measures: (1) measures of firm benefits, (2) program-level benefits, (3) product-level measures, (4) measures of financial success, and (5) measures of customer acceptance.

A comparison of the measures that academics use with the measures practitioners use or would like to use resulted in 16 core measures that everyone uses or wants to use to assess the success of a single product development. Three independent dimensions were identified underlying these measures: consumer-based, financial-based, and technical or process-based measures of success. Based on these empirical findings, this research project defines innovative success at the project level as the extent to which a new product has achieved its market success or consumer-based and financial based objectives.

Market information processing: theoretical and conceptual framework

The current section discusses how many theories and previous studies have considered market information processing as the acquisition, dissemination and use of market information. In detail market information, processing can be described as a set of market information processing activities. Finally, section provides an overview of studies that have investigated market information processing behaviours in product innovation.

Market information: The term 'information' can be defined as data that has been placed in context and endowed with meaning. Market information refers to information about customer needs and preferences, and includes an analysis of how those needs and preferences may be affected by exogenous factors such as government regulation, technology, competitors, and other environmental forces [32]. Furthermore, market information pertains to both current and future customer needs. According to Kohli and Jaworski [32] this latter distinction is important because it often takes years for an organization to develop a new product. Thus, market information is defined here as information about both current and future customer needs as well as factors that may influence those needs.

Similar to market information, Kohli and Jaworski [32] use the term market intelligence. In field interviews with managers these authors found that market intelligence refers to customer needs and preferences, and includes an analysis of how those needs and preferences may be affected by exogenous factors such as government regulation, technology, competitors and other environmental forces. Furthermore, the authors found that market intelligence pertains to both current and future customer needs, which is an important distinction for developing new products because a focus on current customer needs may lead to the development of new products that are less attractive to future customers [33].

Market information processing: The market information processing is suggested that in different literatures as the overall of three main tasks: acquiring information, disseminating it, and finally using the information [34-36]. Moreover, these studies indicate the importance of market information processing in product innovation to achieve success. Despite its importance, market information processing in product innovation may be difficult to achieve and is often missing in new product development [29,37-40]. The problems with market information processing in small enterprises are more complicated than in high-tech new product development because of lack of capability.

Market information acquisition: These processes refer to the collection of primary or secondary information from organizational stakeholders. Information acquisition may occur, for example, through formal market research surveys, competitive intelligence activities, or customer satisfaction studies; through informal collection of information from salespeople who interact with customers; or

from competitors who share information at industry association meetings. Information acquisition has been as attention or awareness that has direction and intensity. In various organizational literatures, information acquisition has also been termed intelligence generation [30], information search, and initiation. All this literature indicates that organizational process involve bringing information acquisition process information about the external environment into the organization.

The construct Information Acquisition (IA) in our study is measured in terms of its sources: personal and impersonal; because in practice, entrepreneurs collect information from both of these sources. Personal sources of information are defined as those involving direct contact with people on a regular basis, and include family, friends and customers. Some entrepreneurs prefer such intimate sources as they are viewed to be more directly relevant and reflective of their immediate operating environment.

Market information dissemination: These processes refer to the degree to which information is diffused among relevant users within an organization. Information dissemination/transmission may transmission is any type of organized occur formally or structured dissemination, including policies, training sessions, research presentations, company memoranda, meetings, and cross-functional teams. Informal transmission occurs during interpersonal interactions, such as casual conversations involving market information, or when organizational members educate one another on market issues. Transmission may be top-down, down-up, or horizontal.

Market information utilization: Information utilization (IU) is particularly important to firms' final decisions; because information is deemed worthless unless it is put to good use. They suggest that information utilization be conceptualized in terms of type and extent of usage in the decision-making process.

The use of market knowledge within firms is discussed in different articles Menon and Varadarajan [40] provided a review of different approaches to the measurement of market knowledge utilization, but conclude the article with a call for a clear identification and definition of market knowledge utilization. Menon and Varadarajan [40], develop a new knowledge utilization typology, conceptualized along three dimensions:

Action-oriented use: demonstrated in changes in the user's activities, practices or policies that can be linked to the findings in the study.

Knowledge-enhancing use: resulting in changes in the user's knowledge and understanding of the issues and themes of the study.

Affective use: relating to general levels of satisfaction, confidence, and trust.

This could be expressed as the use of research with the intent (italics in original) of "feeling good".

Menon and Varadarajan [40] discuss a variety of factors influencing market knowledge utilization. A factor of specific interest is perceived credibility and usefulness of the information. Underlying credibility dimensions are realism of research, accuracy, level of specificity of the problem addressed, consistency of the research output and implications, comprehensiveness and completeness of the research, and validity of research from both theoretical and methodological standpoints [41]. Underlying usefulness dimensions are meaningfulness (of personal interest and making sense to users), goal relevance (relating to the tasks

facing the users), operational validity (action-oriented and such that something can be done with it), and innovativeness (degree of non-obviousness).

The relationships of market information acquisition, dissemination and utilization: Research on the learning organization has shown that before information can be used, it first must be acquired and then disseminated to the right people. According to the effective learning about markets is a continuous process that pervades all decisions [42]. Continuous market learning helps managers repeatedly anticipate market opportunities and respond before their competitors, providing the opportunity to create competitive advantage for the firm. Modelled learning processes in organizations, such as those involved here with market information learning processes, as a three-stage process [43]. The first stage is “scanning,” or data collection. The next stage required before learning can occur is “interpretation,” or giving meaning to the data collected. The final stage is “learning,” taking action on the information and actually using it. This model specifically orders these three stages temporally, suggesting that information cannot be used unless it is first collected, and then given meaning.

In a similar way, new product development activities can be considered as information processing activities aimed at reducing uncertainty [44]. Since the nature of the innovation process is essentially informational, innovation teams can be viewed as information processing subsystems: a team obtains market information from others both inside and outside the firm, disseminates it to those who need it, and uses this information to create a product design. Temporally, information must be acquired before it can be disseminated, and disseminated to the appropriate people (those who need it), before it can be used [45]. Based on the responses from 92 marketing managers in advertising companies, found that the acquisition, dissemination and use of market information were positively correlated. These all discussion raises the following hypothesis.

H₁: Market information acquisition is positively related to the dissemination and utilization of market information.

Role of market information processing in product innovation success: Instrumental use of market information refers to the direct application of market information in making, implementing and evaluating marketing strategy-related decisions. Conceptual use, on the other hand, refers to the indirect use of market information by recognizing the value of information or giving meaning to information [46]. All organizational market information processes were expected to have a positive influence on new product success.

Furthermore, only market information use was positively associated with new product success suggesting that the effect of acquisition and dissemination processes on new product outcomes is mediated by the instrumental and conceptual use of market information [47]. More recent, investigations are the relationships between the instrumental and conceptual use of information at the firm level and new product outcomes of firms. Based on data from 150 software development firms in India, the authors found that information use should be congruent with a firm’s strategic orientation in order to innovate successfully [48].

So far, most studies have examined the components of market information processing at the firm level. Only a few researchers have investigated market information processing behaviours at the new product level. For example, conducted case-study research on 40 new product development projects in 15 small firms to find out which barriers hinder an organization’s ability to learn about markets. The authors defined the market learning process of product innovation

as the acquisition, dissemination and use of market information and identified organizational learning barriers for each of these three sub-processes [49-50]. Study effects market information processing behaviours in product innovation on new product success. The authors conceptualized market information processing in product innovation as the amount of gathering, sharing and using of market information in a specific product innovation project. Market information referred to information about the overall size of the market, specific customer needs and wants, and characteristics of market segments. Based on survey-data from multiple respondents (marketing, R&D and manufacturing) in 58 product innovation projects it was found that the use of market information was the only significant predictor variable of product innovation success [14,51]. In addition, the authors constructed a multiple equation regression model and found that information use was most strongly related to the amount of information shared, which in turn was a function of the amount of information gathered. Thus, their findings indicate that the effects of information gathering and sharing on new product success are mediated by the use of market information in the product innovation process.

They proposed a conceptualization of customer orientation at the project level based on information processing activities in the new product development process [42,52]. The authors studied the effects of customer intelligence generation, dissemination and responsiveness in innovation projects on new product success. The generation of customer intelligence was operationalized as customer research activities, customer intelligence dissemination as the integration of customers, and responsiveness as market preparation and launch activities in the new product development process. Furthermore, there was some support that the effects of information generation and dissemination on new product success increased with the degree of product innovativeness [53].

Market information processing activities could affect the success in product innovative various different levels: project level (e.g., time, cost efficiency and functional success), product level (e.g., profitability, market share and revenues of the new product) and firm level (returns to the firm generated by the new product). Investigated the impact of market information processing on innovation success and suggest that stronger market information processing of a firm is reflected in a higher innovation success (such as both market and financial success). The hypothesizes from this discussion is formulated as follows.

H₂: There is positive relationship among market information processing activities (acquisition, dissemination utilization and product innovation success (financial success and market success).

Moreover, various studies indicate the importance of market information processing in product innovation to achieve success. Despite its importance, market information processing in product innovation may be difficult to achieve and is often missing in new product development [54]. The problems with market information processing in small enterprises are more complicated than in high-tech new product development because of lack of information. Because previous studies have shown that several cultural characteristics of SMEs may influence various aspects of market information processing.

The traditional literature based on the resource based theory posits that firms with superior firm market information processing achieve superior product innovation success because they have a greater understanding of customers expressed wants and latent needs, competitors capabilities and strategies, channel requirements and developments, and the broader market environment requirements than their rivals [55].

In sum, from all these arguments we can state that market information processing is an organizational resource which can lead to the development of marketing capabilities and as a result impacts innovation success. Evidently, market information processing plays this role together with other organizational resources. The hypothesized from this discussion is formulated as follows.

H₃: The higher the level of market information processing of the firm is the higher product innovation success.

Methodology

Research design and data collections method

The primary objective of this research is to assess the role of market information processing to improve product innovation success of small and medium enterprises in Ethiopia for specifying the relationships in the conceptual framework and through a series of theoretically justified research hypotheses. To test the posited hypotheses, a cross-sectional field study was used. To test the posited hypotheses, a cross-sectional field study was used. Furthermore, for this study, with triangulation potential problems of construct validity and reliability were addressed [56]. Triangulation refers to the use of two or more data sources, methods (data collection etc.), investigators, theoretical perspectives and approaches to analysis in the study of a single phenomenon and then validating the congruence among them. Hence, for this study, triangulation methods (both quantitative and qualitative) were employed.

According to field studies are non-experimental scientific inquiries designed to discover the relations among variables in real social structures, such as communities, institutions, and organizations. Cross-sectional and specifically sample survey field studies are particularly useful for gaining a representation of the reality of a social structure utilizing a single administration research instrument [57]. Here defines a survey as a “methodological technique that requires the systematic collection of data from populations or samples through the use of the interview or the self-administered questionnaire”. In current study, for qualitative data collection semi-structured interview and for quantitative approach self-administered questionnaire survey, were used to collect data.

First, a survey research instrument through face-to-face interviews with nine small and medium enterprises’ owner-managers were held. The goal of these interviews was to add the theories and to clarify ambiguities.

Next, data were collected from four hundred twenty five participants to test the hypothesis developed and model specification through self-administered questionnaires [58]. Self-administered survey research method is an efficient approach to specify the conceptual framework empirically; are relatively inexpensive and are useful for describing the characteristics of a large number of small firms. For these reasons, direct questionnaires distribution approach was employed for gathering data in this study.

Data analysis method

To test the relationships between various variables of market information processing and innovative success, statistical technique for hypothesis testing specifically, simple regression analysis and structural equation modelling (SEM) were used [59]. SEM offers the possibilities of distinguishing between measurement and structural models and explicitly considering measurement error. As per point out, SEM has become de rigueur in validating instruments and testing linkages

between constructs. SEM can be further distinguished between two families of SEM techniques: covariance-based techniques and variance-based techniques [60]. For testing of structural equation and goodness fit of model, Analysis of Moment Structures (AMOS) was used.

Simple regression analysis was used to test the changes in a dependent variable by simultaneously accounting for the impact of various independent variables via their weighted combination (that is R).

Sample size and sampling techniques

Correlation coefficient fluctuate from sample to sample, much more so in small samples than in large sample size. Therefore, the reliability of factor analysis dependent on the sample size. Many researchers suggested about sample size necessary for factor analysis and reliability and conclude it depends on many things [61]. More than 250 respondents recommended applying factor analysis for less than 30 variables (questionnaires). In general over 300 cases probability adequate but communalities after extraction should be above 0.5. To generate the required information with relatively good precision for infinite or large populations 386 or over cases important.

A multi stage clustering and stratified sampling were used for the survey. In the first stage, we conveniently selected region, in second stage, we selected industry area/zone in region as representative of the SMEs in Ethiopia [62]. Accordingly, at the first stage Oromia region has been selected. At the second stage, in Oromia region industrial zones (particularly, Finfinne Area) have been selected as sample representative. The selection criteria of these areas was based on high density of small and medium enterprise location in Ethiopia.

Accordingly, for a current study, a database with executive names, company names, and addresses of the firms were obtained from the office of trade and industry of Oromia region, Ethiopia of the selected areas/zones.

A final sample, consisting of about 425 participants from both manufacturing and service firms were used to administer the questionnaire. These samples were selected by using proportional stratified sampling techniques. A large sample size was adopted for this study in order to offset an anticipated low response rate of 15 to 20 percent, and to maximize the generalizability of the results.

Empirical Value

Reliability tests of a construct

In this study, to test the reliability of the constructs, Cronbach's alpha was used. One of the most commonly used indicators of internal consistency is Cronbach's alpha coefficient. Reliability can be measured with Cronbach's coefficient alpha which should surpass the 0.70 threshold. High Cronbach's alphas refer to patterns of high inter-correlations among the items in a scale, indicating that they constitute a coherent whole in measuring a construct. However, other scholars have suggested that Cronbach's alpha as low as 0.60 are acceptable for hypothesis testing. Moreover, inter item to total correlation values 0.3 or greater is acceptable for data analysis that indicates of the degree (strength) to which each item correlates with the total score [17,63-66].

In the current study the Cronbach alpha coefficient of all constructs are greater than 0.7. This shows almost all constructs of current studies have good the internal consistency (inter-correlations) scale for hypothesis testing. Furthermore, to obtain uni dimensionality of constructs, we checked the inter-item correlation for all the scale items by using the confirmatory factor analysis; the values of item to

total correlation of all items are greater than 0.3 here indicated that the items have strong inter-correlation with their constructs and then factor analysis is appropriate. Table 1 displays each construct, item to total correlation and its associated reliability coefficient.

Moreover, two statistical measures are also generated by SPSS to help assess the factorability of the data (i.e., suitability of the dataset for factor analysis): Bartlett’s test of sphericity should be significant ($p < 0.05$) for the factor analysis to be considered appropriate and Kaiser Meyer Olkin (KMO) measure of sampling adequacy the value of KMO should be greater than 0.5 if sample is adequate and to proceed with factor analysis.

For current study, the KMO test values for all of the factors was greater than 0.6 and the Bartlett’s test was significant ($p = 0.000$) as mentioned in Table 2, indicated that the data were suitable for factor analysis.

Convergent validity

Factor loadings are significant and greater than 0.5 and Average Variance Extracted (AVE) for each of the factors > 0.5 indicates good convergent validity assumption. They suggest that factor analysis provides a suitable means to examine convergent validity. In factor analysis, loadings are used to detect whether or not an item appropriately loads on its predicted construct. It shows the reliability of individual items (indicators). Typically, loadings of 0.50 or greater are considered very significant. KMO values > 0.60 indicated that the data were suitable for factor analysis [67]. Then, Principal components analysis explored the unidimensionality of each scale using an eigenvalue of 1.0 as the cutoff points. Using SPSS, all constructs have been forced into five factors and rotated using the VARIMAX rotation method to assess their loadings.

Accordingly, as result of current final study in Table 3 below shows; all of items have greater than 0.50 load on their predicted construct that demonstrate a higher degree of association between the latent items and that constructs; thus, convergent validity is confirmed. For this data set, the evidence suggests support for convergent validity [68].

In addition, Average Variance Extracted (AVE) is used as measure

Constructs	No of items	Item to total correlation	Cronbach alpha (reliability)
Mkt information processing	12		0.824
Mkt information acquisition	4	0.494	0.707
Mkt information dissemination	4	0.585	0.753
Mkt information utilization	4	0.471	0.743
Product innovation success	5		0.76
Market success	3	0.469	0.872
Financial success	2	0.495	0.865

Table 1: Construct reliability.

Factors developed in factor analysis	KMO	Bartlett’s	
		P-value	Sig.
Mkt information processing			
Mkt information acquisition	0.703	0	Sig
Mkt information dissemination	0.71	0	Sig
Mkt information utilization	0.746	0	Sig
Product innovation success			
Market success	0.695	0	Sig
Financial success	0.673	0	Sig

Table 2: Factor analysis test of KMO and Bartlett’s test of sphericity.

of convergent validity in AMOS method. AVE was proposed as a measure of the shared or common variance in a Latent Variable (LV), the amount of variance that is captured by the LV in relation to the amount of variance due to its measurement error. Their average variance extracted (AVE) for X with indicators x_1, x_2, \dots, x_n is

$$AVE = \frac{\sum r_i^2}{n}$$

r_i = regression weight of standardized estimate of LV to each indicators i.e., X to (x_1, x_2, \dots, x_n) .

n = number of indicators of one latent variable (X).

Σ denotes a sum.

Thus, a compelling demonstration of convergent validity would be an AVE of 0.5 or above.

The details of the current studies’ results are provided in Table 4. According to this data the AVE of all latent variables are greater than 0.5 (AVEs > 0.5) that shows the convergent validity is good. In other word, there is no violation of convergent validity for this data.

Generally, by loading factors and AVE the convergent validity assumption is confirmed. All predicted constructs’ factor loadings are significant and greater than 0.5 and the Average Variance Extracted (AVE) for each of the factors close to 0.5 and above indicates that approximately good convergent validity assumption is achieved.

Hypothesis testing

Correlation analysis is used to describe the strength and direction of the relationship between two variables. The size of the absolute value provides information on the strength of the relationship. Therefore, to analysis hypotheses (H_1 and H_2) correlation was applied while multiple regression analysis was carried to ascertain the joint effects on the variables for hypothesis H_3 .

H_1 : Market information acquisition is positively related to the dissemination and utilization of market information.

Predicted constructs	Indicators (items)	Loading
Market information processing	Acquisition	0.516
	Dissemination	0.851
	Utilization	0.654
Product innovation success	Level of customer acceptance of new product	0.926
	Growth rate of product market share	0.919
	New product causes’ level of customer satisfaction	0.829
	Growth rate of firms’ net profit	0.905
	Growth rate of total sales	0.904

All loadings are significant at the $p < 0.01$

Table 3: Convergent validity based on loading factors on constructs (Using SPSS).

LV	Standardized regression weights			AVE
		Estimate (R)	R^2	
MIP	Uti <--- MIP	0.633	0.4	0.45
	Diss <--- MIP	0.848	0.72	
	Acqui <--- MIP	0.488	0.24	
PIS	MS <--- PIS	0.837	0.7	0.5
	FS <--- PIS	0.845	0.71	

MIP: Market Information Processing; Acqui; Acquisition; Uti: Utilization; Diss: Dissemination; PIS: Product Innovation Success; MS: Market Success; FS: Financial Success.

Table 4: Convergent validity by Average Variance Extracted (Using AMOS).

The above result on Table 5 indicates that the mean value of 14.42, 14.17 and 14.10 for market information acquisition dissemination and utilization, respectively. The result also shows a low standard deviation of 3.162, 3.345 and 3.359 for market information acquisition dissemination and utilization respectively. However, the result from the correlation table indicates that correlation is significant at ($p < 0.01$) level with two tail test. The result indicates $P < 0.05$ since $P = 0.01$ hence it is significant at 5%. Based on the outcome of an analysis, it can be concluded that there is a significant positive relationship between market information acquisition and dissemination as well as between market information acquisition and utilization. The hypothesis H_1 is therefore accepted.

H_2 : There is positive relationship among market information processing activities (acquisition, dissemination and utilization and product innovation success (financial success and market success).

The above result on Table 6 indicates that the mean value of 14.42, 14.17 and 14.10 for market information acquisition dissemination and utilization respectively and mean value product innovation success indicators; financial success and market success 6.35 and 9.96, respectively [69]. The result also shows a low standard deviation of 3.162, 3.345 and 3.359 for market information acquisition dissemination and utilization respectively while the standard deviation of product innovation success indicators; financial success and market success 2.297 and 2.598, respectively.

Furthermore, the result from the correlation table indicates that correlation between all variables are significant at ($p < 0.01$) level with two tail test [70]. The result indicates $P < 0.05$ since $P = 0.01$ hence it

Variables	Mean	Std Deviation	N	Acqui	Diss	Uti
Acquisition	14.42	3.162	388	1	.400**	.298**
Dissemination	14.17	3.345			1	.547**
Utilization	14.1	3.359				1

**Correlation is significant at the 0.01 level (2-tailed).

Table 5: Summary of Pearson's correlation among market information dissemination, utilization and acquisition.

Variables	Mean	St.Deviation	1	2	3	4	5
1.Acquisition	14.42	3.162	1				
2.Dissemination	14.17	3.345	.400**	1			
3.Utilization	14.1	3.359	.298**	.547**	1		
4.Financial Success	6.35	2.297	.223**	.467**	.264**	1	
5.Market Success	9.96	2.598	.217**	.429**	.287**	.708**	1

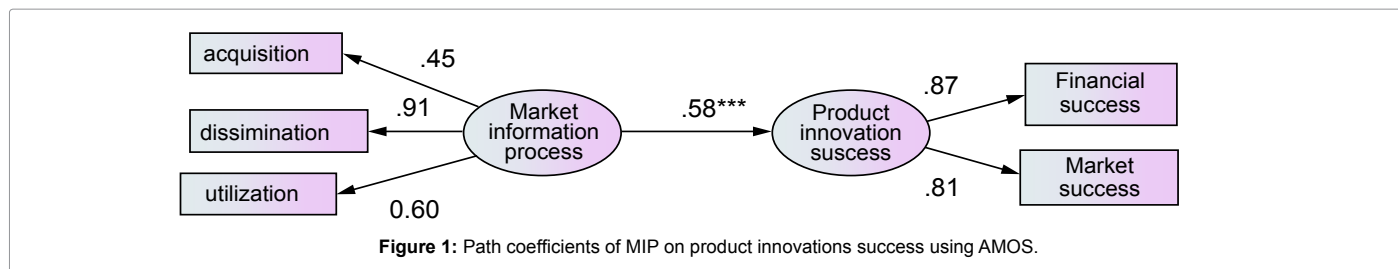
**Correlation is significant at the 0.01 level (2-tailed) at N=388

Table 6: Hypothesis H_2 summary: Correlations analyses.

Hypo.	Dependent variable	ANOVA F's value	R	R2	Unstandardized beta	t	Signif
H3	Product innovation success	96.982***	.448	.201	.261	9.848***	Sig.

Significant - *** $p < .001$

Table 7: Hypothesis 3: Results Summary of Regression Analysis.



is significant at 5%. Based on the outcome of an analysis, it can be concluded that there is a significant positive relationship among market information processing activities: acquisition, dissemination and utilization and product innovation success indicators; financial success and market success. The hypothesis H_2 is therefore accepted.

H_3 : The higher the level of market information processing of the firm is the higher product innovation success.

Regression analysis was carried out with the market information processing as the independent variable for dependent variable product innovation success. The various statistics results are reported in the following (Table 7).

The results (Table 7) show that market information processing ability of firms in the development of new product has direct positive impact on product innovation success of SMEs ($\beta = 0.261$, $p < 0.001$). Also the model is good fit ($F = 96.982$, $p < 0.001$). Thus, hypothesis 3, concerning the ability of market information processing of firms has positive impact on product innovation success of SMEs, is significantly supported by the data.

Testing the sub model: impact of market information processing on product innovations success using AMOS

Figure 1 depicts the model comprising market information processing and product innovations success using. The model is a very good fitting model and supports the hypotheses H. The values of the fit indices are high. The structural path estimate is significant. The loading estimates are significant and consistent with the theoretical expectations (Table 8).

Table 9 shows, the overall fit statistics of resulting from testing the model. The chi square is ($X^2 = 3.389$; $df = 4$, $X^2/df = 0.847$; $P > 0.05$). The RMSEA = 0.000 that indicate exact fit. The model CFI is 1.000 and GFI is .996 all values are greater than the recommended 0.90 that indicate a good fit [71].

General discussion

Hypothesis 1: Supports the market information acquisition is positively related to the dissemination and utilization. Similarly, found that the acquisition, dissemination and use of market information were positively correlated.

However, according to the responses quoted from interview made with owner- "One major problem with regard to the acquisition of market information for new products of SMEs is that it may be difficult for customers to tell in advance, what they think about a new product. For example, one interviewee from wood and metal manufacturing

	Estimate	S.E.	C.R.(t)	P
Product_innovation success <--- Market_information_process	0.403	0.052	7.712	***
Utilization <--- Market_information_process	0.662	0.072	9.136	***
Dissination <--- Market_information_process	1			
Acquisition <--- Market_information_process	0.462	0.062	7.411	***
Financial success <--- Product_innovation_success	0.945	0.082	11.534	***
Market Success <--- Product_innovation_success	1			

Table 8: Various outputs of model MIP to PIS using AMOS.

CMIN					
Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	11	3.389	4	0.495	0.847
Saturated model	15	0	0		
Independence model	5	586.519	10	0	58.652
RMR, GFI					
Model	RMR	GFI	AGFI	PGFI	
Default model	0.117	0.996	0.987	0.266	
Saturated model	0	1			
Independence model	2.897	0.595	0.393	0.397	
Baseline Comparisons					
Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.994	0.986	1.001	1.003	1
Saturated model	1		1		1
Independence model	0	0	0	0	0
RMSEA (Root Mean Square Error of Approximation)					
Model	RMSEA	LO 90	HI 90	PCLOSE	
Default model	0	0	0.071	0.829	
Independence model	0.386	0.36	0.413	0	
Independence model	1.541	1.346	1.756	1.542	

Table 9: Model fit summary.

enterprise explained that ‘People can hardly say what they will do with something new and are very bad in predicting their own behaviour. ‘It is difficult to ask people whether they are going to use something or not.’ This example shows that it is sometimes difficult to determine which type of information is necessary at which stage of the development process. All respondents have not agreed with using formal research survey.

Hypothesis 2: Supports that, as there is positive relationship among market information processing activities (acquisition, dissemination and utilization and product innovation success indicators (financial success and market success) [72]. This finding is consistent with past findings that market information processing activities could affects the success in product innovative at three different levels: project level (e.g., time, cost efficiency and functional success), product level (e.g., profitability, market share and revenues of the new product) and firm level (returns to the firm generated by the new product) suggested that stronger market information processing of a firm is reflected in a higher innovation success (such as both market and financial success).

Hypotheses 3: Supports that high market information processing ability of firms has high positive significant effect on product innovation success of small and medium enterprises. A higher market information processing ability leads to a higher level of information collection, dissemination and response capability or information utilization ability. The traditional literature based on the resource based theory posits that firms with superior firm market information processing ability achieve superior product innovation success because they have

a greater understanding of customers expressed wants and latent needs, competitors capabilities and strategies, channel requirements and developments, and the broader market environment requirements than their rivals. A higher market information processing leads to a strong impact on the various components of the product innovation success [73]. Firms with higher market information processing lead to strong ability to adapt to changes in markets and technologies and they exert a significant impact on profit, high sales volume, market share, market value, and firm survival.

Research limitations and future research directions

Our study is not without limitations, but also throws open opportunities for future research. One of the limitation is that the data we used, although original and derived from field research, is cross-sectional. This has prevented us from examining the effect of changes over time in firm behaviour on product innovation success. Similarly, the lack of longitudinal data reduces confidence in causal effects, especially in the case of such relationships, which have not been so extensively examined in the literature, such as the relationship between financial success and market information utilization [74]. Therefore, an important step for further research is the collection and analysis of longitudinal data to rule out alternative explanations.

The other limitations of this study are that it incorporates a limited number of strategy, market information processing activities. For further research, other important strategies and external factors should be considered in the model.

Moreover, we examined product innovation success of small and medium firms those may use low technology using the number of new products introduced in market and their profit, sales volume, and market share have been gained. It would be interesting for further researchers to differentiate between radical vs. incremental innovation, but also generation vs. adoption and examine how different configurations of market information processing affect these, especially in the context of a more technologically advanced industry in developing countries.

In addition, type of sample firms may have an effect on how/types of information applied. In this study, we used some various types of firms from both manufacturing and service sectors. This may limit the homogeneities of information and generalizability of the results to other industries [75]. Nevertheless, the lessons drawn from this study may be relevant for similarly SMEs; it is recommended that for further studies using single sectors to get homogeneous information. Similarly, another sample-based limitation of this dissertation is the survivorship bias, as this study only examined entrepreneurs currently in business. An assessment of those entrepreneurs who were not successful would enhance the understanding of market information processing activities and its relationship with failures of firms.

Another limiting issue is the geographical limits of the study. The firms selected for this research are from the Ethiopia, Finfinne area. Therefore, small and medium firms in other parts of the country and

the world shall also be studied to verify and generalize the results in this study.

General conclusions

This study has made a conceptual and empirical contribution to the research on SMEs in developing countries as general and Ethiopia as particular by examining the fundamental factors and strategies that increase product innovation success of SMEs. Accordingly, we conclude as; to enhance the product innovation success of SMEs; market information acquire, disseminate and utilize are interrelated. Furthermore, the findings of this research suggest that gathering, disseminating and using market information in development of new product are associated with product innovation success.

Generally, we found that high market information processing activities have high positive effect on product innovation success both internally and externally based success. That means external based or market success (e.g., market share, sales growth) and internal based or financially success (profitability, sales volume growth).

Therefore, we suggest that the development of market information processing activities is an important instrument for the small and medium enterprises to achieve a high level of product innovation success.

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