

The Impact of Entrepreneurial Orientation on Innovation Performance

“An Empirical Study on SMEs in Egypt”

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Abstract

The Purpose of this study is to investigate the influence of entrepreneurial orientation (**EO**) on innovation performance (**IP**) in Egyptian manufacturing small and medium-sized enterprises (**SMEs**). It examines how **the three EO dimensions (innovativeness, proactiveness, and risk-taking)** affect product, process, and marketing innovation, and explores whether firm characteristics moderate these relationships.

A structured questionnaire was developed, refined through a pilot study, and distributed to a sampling frame of **953 manufacturing firms in Qalyubia Governorate** using stratified random sampling, supplemented by snowball techniques and online distribution. A total of **110 responses** were received stratified random. **The final dataset comprised 70 valid responses** from senior executives. **The target respondents** were senior executives such as CEOs, founders, and managers *to ensure the accuracy and relevance of the data.*

The results demonstrate that EO significantly enhances **IP in Egyptian manufacturing SMEs**. *Innovativeness* emerged as the strongest driver for *product and marketing innovation*, while *risk-taking* proved most critical for *process innovation*. Significant differences in **EO** and *innovation perceptions* were found based on firm size and experience, though no variations were detected across managerial positions.

Keywords: Entrepreneurial Orientation (EO), Innovation Performance (IP), Egyptian Manufacturing SMEs

1. Introduction

Innovation is a key driver of sustained competitive advantage, enabling firms to create new products, improve processes, and adapt to dynamic markets (Alzuod and Dalain, 2023). **Despite its importance**, many SMEs struggle to maintain strong IP, which limits their competitiveness and long-term sustainability. **EO** (which includes innovativeness, proactiveness, and risk-taking) is widely recognized as a strategic capability that equips firms to pursue opportunities, improving performance in challenging environments (Zighan et al., 2022; Aloulou, 2024).

IP reflects the effectiveness of a firm's innovation activities, including product, process, and marketing innovation, all of which directly influence competitiveness and growth (Perera & Samarakoon, 2021; Shaher & Ali, 2020b).

In Egypt, SMEs account for over **90%** of enterprises and employ nearly **75%** of the workforce (UNIDO, 2020, P. 7). *Manufacturing SMEs*, in particular, are critical to national economic development, contributing **14.9%** to **GDP** and **57%** to exports. However, *they continue to face challenges* such as financial constraints, limited market access, weak export capabilities, and managerial shortcomings (Zaazou and Salman Abdou, 2022).

The exploratory study conducted for this research revealed that while many *Egyptian manufacturing SMEs* demonstrate innovativeness and proactiveness, their risk-taking tendencies are cautious, and innovation outcomes are often incremental. **This highlights the need to strengthen EO to improve IP and ensure sustainability.**

Accordingly, **this study aims to** determine and measure the impact of **EO** on **IP** in *Egyptian manufacturing SMEs*, with a focus on *product, process, and marketing innovation*. **It also investigates** whether differences exist in perceptions of **EO** and **IP** across demographic and organizational factors such as firm size, firm experience, and current position. **By addressing this gap**, the research contributes to the limited body of literature linking **EO** and **IP** in the **Egyptian context** and provides practical insights for managers and policymakers seeking to enhance **SME** competitiveness.

2. Literature review

The literature review is divided into **four main sections** as follows

Section 2.1 Literature review of entrepreneurial orientation.

Section 2.2 Literature review of innovation performance.

Section 2.3 The relationship between entrepreneurial orientation and innovation performance.

Section 2.4 Summary of the literature review.

Section 2.5 Research gap.

2.1 Literature review of entrepreneurial orientation

EO is essential for fostering innovation within SMEs. However, the absence of EO remains a primary reason for SMEs' frequent failure to innovate effectively (Kim & Hur, 2024). Understanding EO helps firms adapt and remain resilient in dynamic markets (Zighan et al., 2022). According to Aloulou (2024), EO refers to "the strategic orientation adopted by senior management, reflecting a firm's willingness to engage in entrepreneurial behaviors to ensure its sustainability and performance in challenging environments".

The concept of EO has evolved over time, starting with early connections between entrepreneurship and innovation. Schumpeter (1934, 1942) was one of the first to explore how innovation plays a role in entrepreneurship and economic growth. He defined entrepreneurs as innovators who disrupt existing market structures by introducing new products, production methods, and business models. His work laid the foundation for later scholars to define entrepreneurship in the context of business strategy.

The following *table 2.1.1.* presents a selection of the most relevant definitions of EO from the literature.

Table 2.1. Definitions of Entrepreneurial Orientation

Selected Past Definitions of (or pertaining to) EO	
Author (s)	Definition of EO
Mintzberg (1973, p. 45)	"In the entrepreneurial mode, strategy-making is dominated by the active search for new opportunities" as well as "dramatic leaps forward in the face of uncertainty."
Khandwalla (1976/1977, p. 25, [] added)	"The entrepreneurial [management] style is characterized by bold, risky, aggressive decision-making."

Miller & Friesen (1982, p. 5)	"The entrepreneurial model applies to firms that innovate boldly and regularly while taking considerable risks in their product-market strategies."
Miller (1983, p. 771)	"An entrepreneurial firm is one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with 'proactive' innovations, beating competitors to the punch."
Morris & Paul (1987, p. 249)	"An entrepreneurial firm is one with decision-making norms that emphasize proactive, innovative strategies that contain an element of risk."
Merz & Sauber (1995, p. 554)	"...entrepreneurial orientation is defined as the firm's degree of proactiveness (aggressiveness) in its chosen product-market unit (PMU) and its willingness to innovate and create new offerings."
Lumpkin & Dess (1996, pp. 136-137)	"EO refers to the processes, practices, and decision-making activities that lead to new entry" as characterized by one, or more of the following dimensions: "a propensity to act autonomously, a willingness to innovate and take risks, and a tendency to be aggressive toward competitors and proactive relative to marketplace opportunities."
Covin & Slevin (1998, p. 218)	"Entrepreneurial firms are those in which the top managers have entrepreneurial management styles, as evidenced by the firms' strategic decisions and operating management philosophies. Non-entrepreneurial or conservative firms are those in which the top management style is decidedly risk-averse, non-innovative, and passive or reactive."
Zahra & Neubaum (1998, p. 124)	EO is "the sum of a firm's radical innovation, proactive strategic action, and risk-taking activities that are manifested in support of projects with uncertain outcomes."
Voss et al. (2005, p. 1134, [] added)	"...we define EO as a firm-level disposition to engage in behaviors [reflecting risk-taking, innovativeness, proactiveness, autonomy, and competitive aggressiveness] that lead to change in the organization or marketplace."

<p>Avlonitis & Salavou (2007, p. 567)</p>	<p>"EO constitutes an organizational phenomenon that refers to a managerial capability by which firms embark on proactive and aggressive initiatives to alter the competitive scene to their advantage."</p>
<p>Cools & Van den Broeck (2007/2008, p. 27)</p>	<p>"Entrepreneurial orientation (EO) refers to the top management's strategy in relation to innovativeness, proactiveness, and risk-taking."</p>
<p>Pearce, Fritz, & Davis (2010, p. 219)</p>	<p>"An EO is conceptualized as a set of distinct but related behaviors that have the qualities of innovativeness, proactiveness, competitive aggressiveness, risk-taking, and autonomy."</p>
<p>Covin & Lumpkin (2011, p. 857)</p>	<p>"EO, then, could be understood as a usually general or lasting direction of thought, inclination, or interest pertaining to entrepreneurship."</p>

Source: Adapted from [Covin & Wales \(2012\)](#).

Based on the reviewed literature, **EO** has been defined as both a *unidimensional and multidimensional construct*. This research adopts the widely recognized definition by [Miller \(1983\)](#) and further developed by Covin and Slevin (1989, as cited in [Javadian et al., 2018](#)) which focuses on three core dimensions: **innovativeness**, **proactiveness**, and **risk-taking**. This three-dimensional approach is preferred for its robustness and frequent application in empirical studies, particularly in the context of SMEs ([Aloulou, 2023](#); [Zighan et al., 2022](#); [Hossain et al., 2022](#); [Sorama & Joensuu-Salo, 2023](#); [Meekaewkunchorn et al., 2021](#); [Al-Hakimi et al., 2022](#)).

Innovativeness means applying creativity to find new ways to solve problems and create new opportunities. It includes introducing new products and services of the right quality and cost and investing in operational improvements. According to [Aloulou, \(2024\)](#), **innovativeness** refers to a firm's tendency to pursue novel ideas, foster creativity, and engage in the experimentation of new products, services, or processes, while also integrating and refining established practices and technologies. [Zighan et al. \(2022\)](#) emphasized the importance of **innovativeness** in entrepreneurship, particularly for SMEs operating under high uncertainty and with

limited resources. For SMEs in emerging markets, **innovation** often focuses on cost-effective solutions and operational improvements that enhance resilience and competitiveness, thus driving **IP**.

Proactiveness reflects a firm’s capability to anticipate and capitalize on market opportunities before competitors. It includes making changes rather than simply waiting for things to happen. According to **Odoro (2023)**, this dimension is defined by the firm’s capability to be the first to act, either by introducing new products or entering new markets, driven by a forward-thinking strategies. **Proactive SMEs** can strengthen their competitive position and drive sustainable growth.

Risk-taking means being willing to invest substantial resources into ventures with uncertain outcomes. It is not reckless decision-making but involves a calculated assessment of the risks involved and an ability to manage those risks effectively. **Cowden & Tang, (2021)** emphasized two perspectives of risk-taking as follows:

1. **Causation perspective:** Firms evaluate risks through cost/benefit analysis, taking on risks that help achieve specific goals while avoiding highly uncertain projects.
2. **Effectuation perspective:** Firms take risks based on "affordable loss," focusing on what can be spent rather than predictable outcomes. This approach supports experimentation, allowing firms to explore new opportunities without significant financial harm if the project fails.

This conceptualization of risk-taking is essential for understanding how **Egyptian SMEs** balance potential gains and losses when innovating.

In light of the previous studies, table 2.1. summarizes the most relevant studies on EO.

Table 2.1. Literature review of entrepreneurial orientation

No.	Author (s)	Objective (s)	Findings
1.	(Zighan et al., 2022)	This study investigates how EO contributes to develop or enhance the capabilities that SMEs need to strengthen their organizational resilience.	The study found that EO plays a vital role in enhancing SMEs' resilience to withstand major disruptions and threats.
2.	(Hossain et al., 2022)	The purpose of this research is to examine how different	The study revealed a strong correlation

		dimensions of EO including innovativeness, risk-taking, and proactiveness, impact a company's ability to successfully export goods and services.	between innovativeness and proactiveness and export performance
3.	(Meekaewkunchorn et al., 2021)	The purpose of this research is to examine how learning orientation impacts the connection between innovativeness, proactiveness, and risk-taking as dimensions of EO and the performance of SMEs in Thailand.	The study found that the innovativeness, proactiveness, and risk-taking ability of SMEs have a positive impact on the learning orientation and business strategy of firms.
4.	(Anwar and Shah, 2021)	This research examines the impact of the different dimensions of EO including innovativeness, risk-taking, and proactiveness, on the financial and non-financial performance of emerging SMEs.	The results indicated that innovativeness, proactiveness, and risk-taking significantly enhance financial performance.
5.	(Dewantia et al., 2020)	The aim of this study is to explore and assess the impact of EO on the market orientation, technological capability, and performance of SMEs.	The findings indicated that EO has a strong impact on market orientation, technological capability, and the performance of SMEs.
6.	(Okangi, 2019)	This study examines how the EO's dimensions of innovativeness, proactiveness, and risk-taking affect the profitability growth of regional Tanzanian construction companies.	The results demonstrated that proactiveness has a significantly negative impact on the growth of profitability for local Tanzanian construction firms, whereas both innovativeness and risk-taking dimensions have a significantly positive impact.

Source: Prepared by the researcher.

2.2 Literature review of Innovation Performance

Innovation is critical for socio-economic development, driving productivity, economic growth, and quality of life. The focus of innovation has expanded from firm-specific efforts to include regional and global perspectives, highlighting its increasing importance as a research area (Coutinho and Au-Yong-Oliveira, 2024).

IP involves the outcomes of a firm's innovation activities. According to Aloulou (2024), **IP** refers to the results of introducing new or differentiated products and services to the market quickly and successfully. Gupta et al. (2023) broaden this view, emphasizing the generation of new ideas in various areas such as product, process, organizational, technical, business, and marketing innovations.

Globally, the OECD defines the concept of innovation as "*innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)*" (the Eurostat, 2018, p. 20). Drucker (2012, p. 173) characterizes innovation as "*the application of knowledge to produce new knowledge... and requires systematic effort, and a high degree of organization.*"

IP can be classified into several dimensions such as product innovation, process innovation, organizational innovation, marketing innovation, and strategic innovation. Our study adopts the three core dimensions of IP: **product innovation, process innovation, and marketing innovation.**

Product innovation is a key dimension of IP that **involves creating and introducing new products or improving existing ones** to enhance their characteristics, usability, or components to address market demands more effectively. Gupta et al. (2023) describe it as a process that enhances goods and services, creating offerings with greater value for customers. These enhancements improve product appeal and functionality, contributing to the firm's market differentiation.

Process innovation is a crucial dimension of IP, **focusing on improving manufacturing methods, delivery processes or supporting activities** such as purchasing, accounting, and maintenance for greater efficiency and effectiveness. Gupta et al. (2023) highlight its role in significantly improving production, logistics, and supporting functions such as purchasing, accounting, and maintenance.

Kafetzopoulos et al. (2019) define **process innovation** as changes in production methods that positively impact costs and efficiency. While its influence on sales growth or market share may be less pronounced than product innovation, it is crucial for improving a firm's competitiveness and profitability.

Marketing innovation involves adopting new marketing strategies including changes in packaging, design, advertising, and pricing strategies to attract customers and expand market segments. Cheah et al. (2023) define **marketing innovation** as the implementation of new marketing strategies involving significant changes in marketing mix elements such as product design, packaging, placement, promotion, and pricing.

These innovations aim to better understand customer needs, penetrate new markets, reposition products, and ultimately increase sales. A key outcome is shifting customer focus from "price" to "perceived value," thereby driving higher sales volumes. However, *SMEs* often face challenges in implementing marketing innovation due to limited expertise and financial resources.

In light of the previous studies, previous studies, table 2.2. summarizes the most relevant studies on EO

Table 2.2. Literature review of Innovation Performance

No.	Author (s)	Objectives	Findings
1.	(Zan et al., 2024)	This research aims to explore how open innovation strategies contribute to enhancing innovation efforts and developing new products or services in SMEs, and to understand the relationships between knowledge sharing, open innovation, and IP in SMEs.	The findings indicated that open innovation acts as a mediator between knowledge sharing and IP in SMEs, with knowledge sharing positively impacting both open innovation and IP.
2.	(Ismail, 2023)	This research seeks to find out how small businesses in Tanzania can improve their IP by fostering a culture of innovation, and how this is impacted by their ability to utilize knowledge effectively.	The results showed that different dimensions of knowledge-based dynamic capabilities have a notable impact on the culture of innovation, which in turn has a significant effect on IP.
3.	(Carvache-Franco et al., 2022)	This study aimed to investigate the association between barriers to innovation development	The findings revealed that companies encounter substantial barriers to innovation including financial constraints, high

		and innovative performance.	innovation costs, and a shortage of skilled personnel. Additionally, product innovation faces challenges such as limited market information, while process innovation is hindered by insufficient external funding and technology access, within a market dominated by established companies.
4.	(Cui & Song, 2022)	The main aim of this study is to investigate the interrelationships between entrepreneurship, enterprise IP, enterprise dynamic ability, and organizational innovation environment within SMEs in China.	The study revealed that entrepreneurship positively impacts enterprise dynamic ability, organizational innovation environment, and IP.
5.	(Naushad, 2022)	This research seeks to identify the characteristics associated with EL that contribute to fostering creativity and innovation specifically within SMEs operating in Saudi Arabia.	The study findings reveal that EL positively impacts organizational innovation and employee creativity in SMEs. While no mediating role of creativity was observed between EL and organizational innovation.
6.	(Kafetzopoulos et al., 2019)	The objective of this paper is to investigate how different dimensions of innovation, such as Product Innovation, Process Innovation, Organizational Innovation, and Marketing Innovation, influence the performance of manufacturing firms.	The findings showed that in environments characterized by high market uncertainty, dimensions of innovation such as product, process, and marketing innovations have a significant influence on FP.

Source: Prepared by the researcher.

2.3 The relationship between entrepreneurial orientation and innovation performance.

Research consistently demonstrates a **positive relationship between EO and IP**, particularly in *SMEs*. The dimensions of EO (**innovativeness, proactiveness, and risk-taking**) empower firms to **identify market opportunities, manage uncertainties, and drive innovation**. This orientation enables individuals, teams, and organizations to engage in high-risk entrepreneurial projects and capitalize on innovative opportunities (Aoulou, 2024).

Aoulou (2024) emphasized that innovative firms foster new ideas and increase involvement in developing new products and processes, showcasing EO's role in advancing innovation. Gupta et al. (2023) highlighted the strategic importance of innovativeness and proactiveness in enhancing IP. Similarly, Oduro (2023) demonstrated the significant influence of EO dimensions on IP. Studies by Alzuod and Dalain (2023), Iqbal et al. (2021), and Shaher and Ali (2020a, b) further confirmed EO's critical impact on IP in SMEs.

Perera and Samarakoon (2021) found that EO as a whole significantly impacts IP, with each dimension playing a pivotal role. In the context of SMEs, Zhai et al. (2018) and Ato Sarsah et al. (2020) observed positive effects of EO on IP, particularly in *manufacturing SMEs* focusing on radical innovation (Ato Sarsah et al., 2020).

These findings together highlight EO's importance in driving innovation and helping *Egyptian SMEs* compete effectively in dynamic markets.

2.4 Summary of the literature review

Based on the previous literature review, it has been demonstrated that:

- 1) Previous studies have looked at EO in different ways. Some have defined it as having **three dimensions**: proactiveness, innovativeness, and risk-taking, in the context of SMEs, while others have represented it as having **five dimensions**: innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness, in the context of **large enterprises**.

- 2) Previous research has examined the dimensions of **IP** from a **multi-dimensional perspective**, defining it through a **variety of dimensions** including quality innovation, organizational innovation, product development, product improvement, product innovation, process innovation, marketing innovation, management innovation, efficiency innovation, flexibility innovation, and strategic innovation.
- 3) **Previous studies including those by (Seo, 2019; Shafer & Ali, 2020a, b; Perera & Samarakoon, 2021; Iqbal et al., 2021; Al-Shami et al., 2022; Pozzo et al., 2023; Gupta et al., 2023; Oduro, 2023; Kim & Hur, 2024) identified a positive relationship between EO and IP. However, our research distinguishes itself from these studies for the following reasons:**
 - a) **The population and sample** differ from those of previous studies, as the current study target managers and owners within the **Egyptian manufacturing SMEs** business environment in **Al-Qalyubia Governorate, Egypt**. This contributes to the ongoing evolution of literature on **EO** and **IP**.
 - b) Our study focuses on examining **the impact of each EO's dimensions** including innovativeness, proactiveness, and risk-taking **on each IP's dimensions** such as product, process, and marketing innovation within the business environment of **Egyptian manufacturing SMEs**. We expect that our future findings may differ from those of previous studies.

2.4 Research gap

Based on the literature review and the researcher's knowledge, the following gap in the research have been identified: **There has been no prior research investigating the impact of EO on IP of manufacturing SMEs in Egypt.**

3. Exploratory Study

The purpose of this stage was to obtain preliminary insights into EO practices and IP among **Egyptian manufacturing SMEs**, and to **refine the research instrument** for greater clarity and validity.

In April 2025, a pilot questionnaire was distributed to **(10) Senior executives** from manufacturing SMEs in the **industrial zones of Qalyubia Governorate**. The respondents consisted of **(7) CEOs/owners/founders** and **(3) department or line managers (e.g., sales managers)**. The survey was designed to measure **the three EO dimensions** (innovativeness, proactiveness, and risk-taking) and **the three IP dimensions** (product, process, and marketing innovation).

The preliminary analysis revealed clear signs of **entrepreneurial behavior and innovation outcomes**:

1. Entrepreneurial Orientation:

- ✓ **Innovativeness:** A strong majority (**70%**) emphasized **R&D and technological leadership**, while (**60%**) reported significant product or service changes in the past three years.
- ✓ **Proactiveness:** About (**60%**) stated that their firms initiate competitive actions, though only (**50%**) reported consistently adopting an aggressive “undo-the-competitors” posture.
- ✓ **Risk-taking:** Around (**50%**) showed a propensity for high-risk projects, but only (**40%**) adopted a bold posture under uncertainty, indicating a degree of caution.

2. Innovation Performance:

- ✓ **Product innovation:** (**70%**) claimed an advantage over competitors in new products, and (**60%**) reported frequent product development, though only (**40%**) indicated that products incorporated new technological knowledge.
- ✓ **Process innovation:** (**80%**) reported improvements in speed and efficiency, and (**70%**) confirmed the use of advanced technologies, highlighting the importance of process efficiency.
- ✓ **Marketing innovation:** (**70%**) had introduced new promotion techniques and product design renewal, while only (**50%**) reported using new pricing methods.

The exploratory study also helped refine the questionnaire items to ensure cultural suitability and address respondent concerns. Some respondents initially hesitated to complete the online questionnaire, fearing data misuse. To address this, the researcher clarified the academic purpose of the study, provided his academic position, and attached a stamped questionnaire approved by the supervising professors and faculty. **This transparency built trust and improved response quality.**

4. Research problem

Egyptian manufacturing SMEs often face numerous challenges including financial constraints, marketing limitations, obstacles related to exporting, and a lack of business management skills. These challenges stem from factors such as a lack of collateral, poor communication with lenders, limited market networks, insufficient resources, and a lack of awareness about international product specifications. **As a result**, many SMEs struggle to innovate effectively, which weakens their competitiveness and long-term sustainability.

In this context, fostering **EO** (through innovativeness, proactiveness, and risk-taking) emerges as a critical pathway for enhancing product, process, and marketing innovation within SMEs. Strengthening **EO** may enable SMEs to overcome resource limitations, respond more effectively to market changes, and improve their innovation performance, ultimately driving competitiveness and sustainability.

In light of the review of the previous studies and the exploratory study, **the research problem** can be formulated in the following research questions, which are summarized in *table 1.3* as follows:

Table 1.3. Research Questions

Main Research Question (RQ)	Sub-Questions
RQ1: What is the impact of EO on IP in Egyptian manufacturing SMEs?	RQ1.a: What is the impact of the three dimensions of EO (Innovativeness, Proactiveness, and Risk-Taking) collectively and individually on IP?
	RQ1.b1: What is the impact of Innovativeness on Product Innovation?
	RQ1.b2: What is the impact of Proactiveness on Product Innovation?
	RQ1.b3: What is the impact of Risk-taking on Product Innovation?
	RQ1.b4: What is the impact of Innovativeness on Process Innovation?
	RQ1.b5: What is the impact of Proactiveness on Process Innovation?

	RQ1.b6: What is the impact of Risk-taking on Process Innovation?
	RQ1.b7: What is the impact of Innovativeness on Marketing Innovation?
	RQ1.b8: What is the impact of Proactiveness on Marketing Innovation?
	RQ1.b9: What is the impact of Risk-taking on Marketing Innovation?
RQ2: Are there significant differences in respondents' perceptions of EO and IP and their dimensions according to demographic and organizational variables?	RQ2.a: Are there significant differences according to Firm Size?
	RQ2.b: Are there significant differences according to Firm Experience?
	RQ2.c: Are there significant differences according to Current Position?

Source: Prepared by the researcher.

5. Research model and hypotheses:

5.1 Research Hypotheses

To empirically test the research questions, the following **main and sub-hypotheses** were developed, as presented in *table 1.5*:

Table 1.5. Research Hypotheses

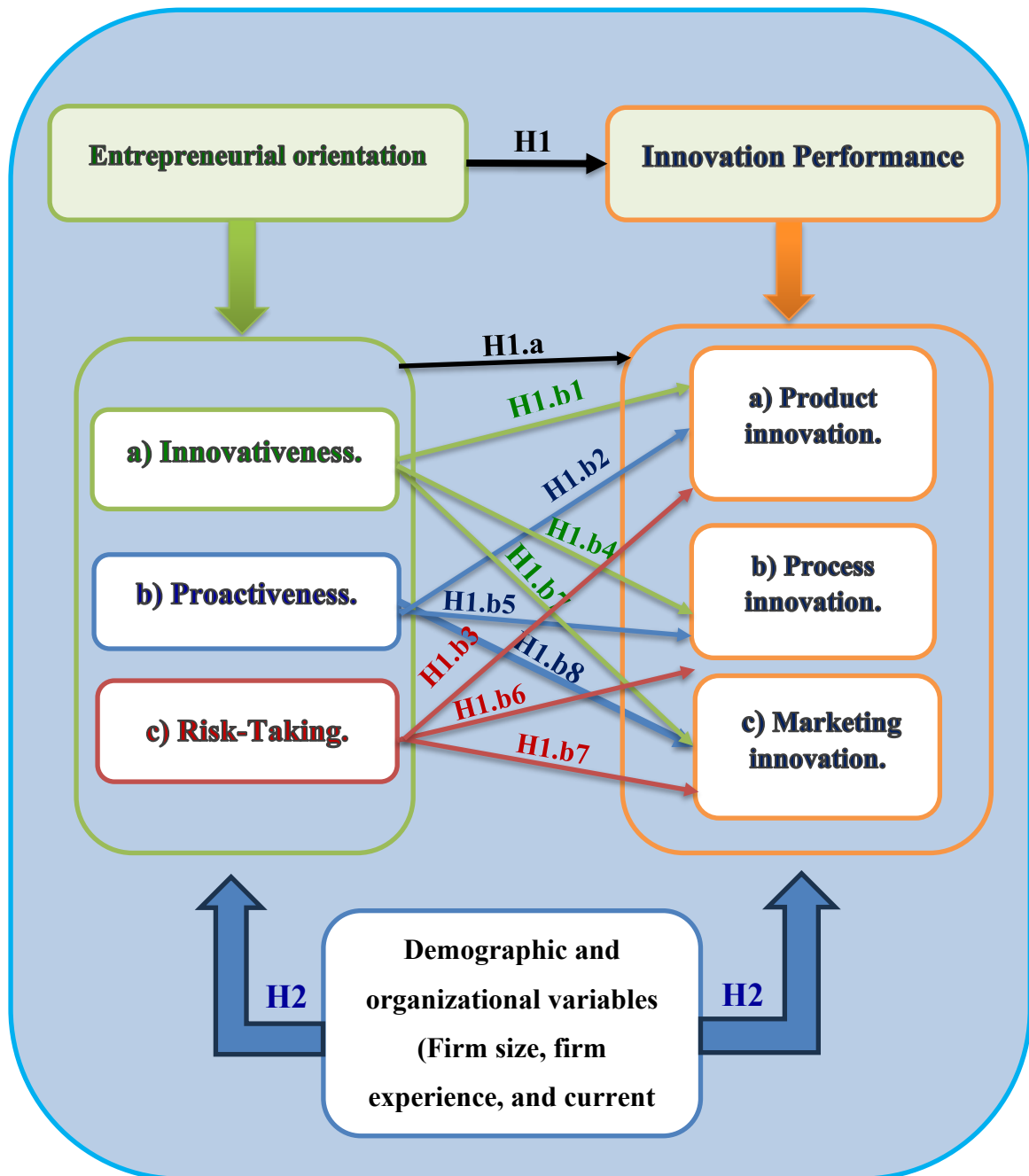
Main Hypothesis (H)	Sub- Hypotheses
H1: EO has a positive impact of statistical significance on IP in Egyptian manufacturing SMEs under study.	H1.a: The three dimensions of EO (Innovativeness, Proactiveness, and Risk-Taking) collectively and individually have a positive impact of statistical significance on IP.
	H1.b1: Innovativeness has a positive effect on Product Innovation.
	H1.b2: Proactiveness has a positive effect on Product Innovation.
	H1.b3: Risk-Taking has a positive effect on Product Innovation.
	H1.b4: Innovativeness has a positive effect on Process Innovation.

	H1.b5: Proactiveness has a positive effect on Process Innovation.
	H1.b6: Risk-Taking has a positive effect on Process Innovation.
	H1.b7: Innovativeness has a positive effect on Marketing Innovation.
	H1.b8: Proactiveness has a positive effect on Marketing Innovation.
	H1.b9: Risk-Taking has a positive effect on Marketing Innovation.
H2: There are no significant differences in respondents' perceptions of EO and IP and their dimensions according to demographic and organizational variables.	H2.a: There are no significant differences according to Firm Size.
	H2.b: There are no significant differences according to Firm Experience.
	H2.c: There are no significant differences according to Current Position.

Source: Prepared by the researcher.

5.2 Research Model

Figure 1.1. The Research model



Source: Prepared by the researcher.

6. Research Methodology

6.1 Research Population

The research population consisted of **3,610 Manufacturing SMEs** in the industrial zones of **Qalyubia Governorate** (Bakhit, 2024, p. 39). The **target respondents** were senior executives (e.g., CEOs, founders, owners, and managers) because they possess comprehensive knowledge of their firms' strategies and activities.

6.2 Research Sample

In line with the research objectives and hypotheses, and given the limitations of cost, time, and effort, the study relied on a sampling frame of **1,603 firms** with reliable contact information in **Qalyubia Governorate**. The frame was collected from **two sources**: the [Egyptian Office for Industrial Development \(2025\)](#) and the [Directory of Egyptian Industries \(2025\)](#). These sources provided updated and comprehensive listings of active **Egyptian manufacturing firms**, ensuring the credibility of the selected frame.

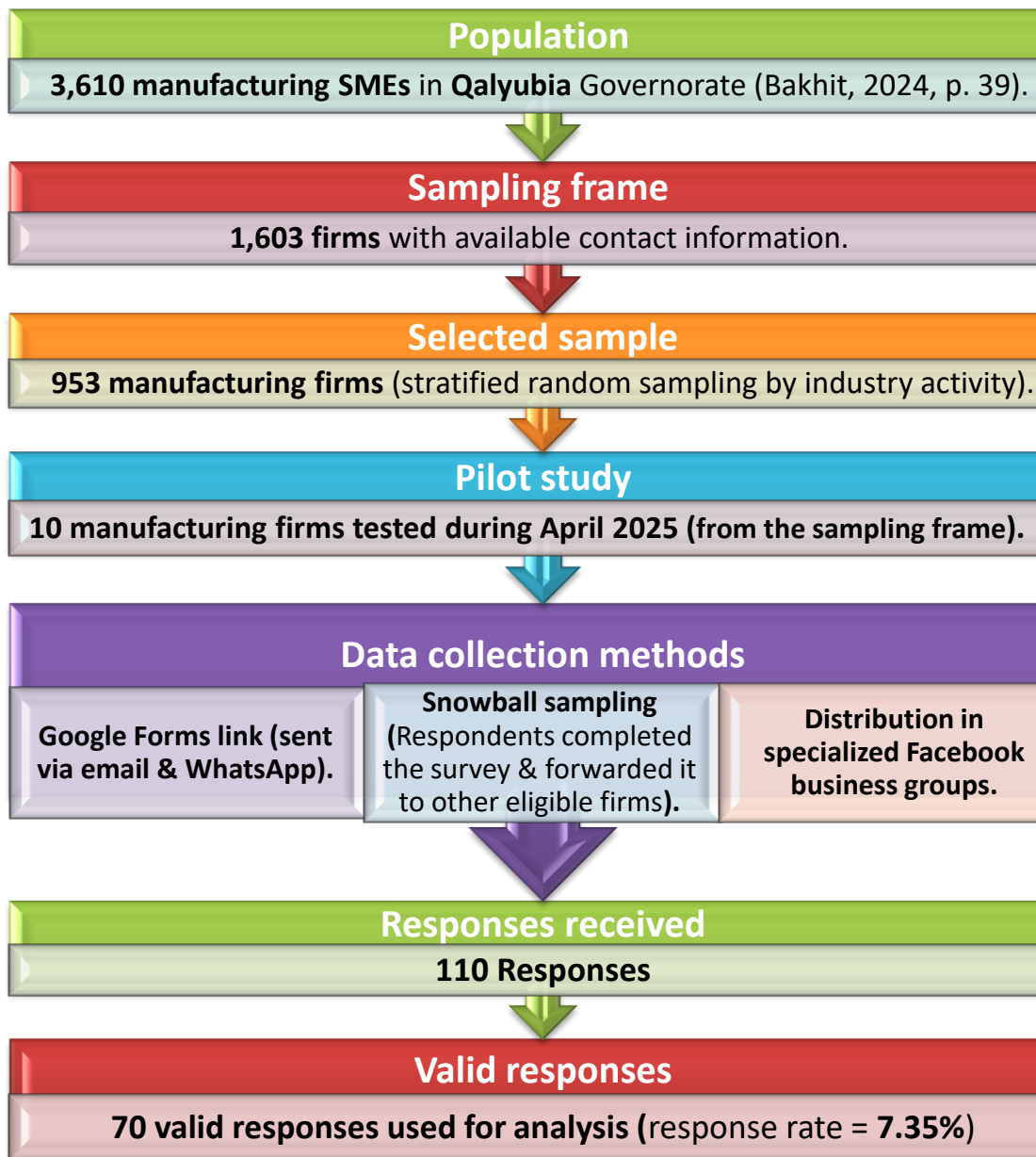
From this frame, **953 manufacturing firms** were **selected** using a **stratified random sampling technique to form the final sample**. To ensure representativeness, firms were grouped by industry activity (e.g., food and beverages, textiles, machinery, furniture, chemicals, pharmaceuticals, plastics, and paper) before applying random selection within each stratum.

The questionnaire was distributed through multiple channels, including **email**, **WhatsApp**, and **specialized Facebook groups**. In addition, the **snowball technique** was applied by encouraging initial respondents to forward the survey to other eligible firms.

A total of **110 responses** were received. After excluding cases that did not meet the criteria (**non-manufacturing firms**, firms **outside the SME size range**, or **respondents** who were **not senior executives**), **70 valid responses** were retained for analysis, resulting in a response rate of **7.35%**. Although the final number of valid responses was relatively small compared to the population, the focus on senior decision-makers improved the quality and relevance of the data. Moreover, a study of **70 Egyptian SMEs** by [Adam, Mahrous, and Kortam \(2017\)](#) successfully employed a similar sample size, confirming the methodological acceptability of the present study.

The overall process of sampling and data collection is presented in *Figure 4.1*.

Figure 6.1. Flow of sample and data collection



Source: Prepared by the researcher.

6.3 Measurements

After reviewing previous studies, the researcher developed a **questionnaire** to collect the required data. A **five-point Likert scale** was used, ranging from **strongly disagree (1)** to **strongly agree (5)**. The questionnaire included **23 items** divided into **two main parts**: the **first part** contained **9 items** measuring the dimensions of **EO (Innovativeness, Proactiveness, and Risk-taking)**, while the **second part** included **14**

items measuring the dimensions of IP (Product Innovation, Process Innovation, and Marketing Innovation).

In addition, the questionnaire contained 4 items related to demographic and organizational variables, specifically firm size, firm experience, industry sector, and current position. Table 6.1 The Questionnaire design.

Table 6.1. The Questionnaire Design

Variables	Dimensions	Number of Items	Source of Measure	Measurement Scale
Entrepreneurial - Orientation	Innovativeness	3	Covin and Slevin (1989)	Five-point Likert scale
	Proactiveness	3		
	Risk-Taking	3		
Innovation - Performance	Product Innovation	5	Kafetzopoulos et al. (2019)	Five-point Likert scale
	Process Innovation	4		
	Marketing Innovation	5		
Demographic and Organizational	Firm Size	1	Developed for this study	Multiple choice (10–49, 50–99, >99 employees)
	Firm Experience	1		Multiple choice (<5, 5–9, 10–14, 15–20, >20 years)
	Industry Sector	1		Multiple choice (Manufacturing, Retail and wholesale, Real estate, High-tech, Services, Other)
	Current Position	1		Multiple choice (CEO/Owner, Manager, Other)

Source: Prepared by the researcher.

6.4 Statistical analysis techniques

The collected data were first coded into Excel spreadsheets and then analyzed using **IBM SPSS (Version 26)**. The following statistical techniques were employed in the analysis process:

- **Frequency distribution tables** were used to describe the demographic and organizational characteristics of the sample.
- **The reliability and validity of the questionnaire** were assessed through **Cronbach's Alpha Coefficient and validity coefficients**, ensuring the internal consistency of the measured constructs.
- **The Kolmogorov–Smirnov test** was applied to evaluate the normality of the data distribution.
- **Descriptive statistics**, including the arithmetic mean, minimum, maximum, and standard deviation, were calculated to summarize the data.
- **The T-Test** was used to examine the statistical significance of the regression coefficients.
- **The Friedman Test** was conducted to determine the relative importance of the study variables.
- **Both simple and multiple linear regression models were utilized** to test the study hypotheses.
- In addition, non-parametric tests—**the Mann–Whitney U and Kruskal–Wallis H tests**—were used to identify differences across groups.

7. Results

7.1 Testing the reliability and validity of the questionnaire

To evaluate the measurement quality of the questionnaire, both **reliability** and **validity** were assessed. The **reliability** of the questionnaire was calculated using **Cronbach's alpha coefficient**, which ranges from **0** (no reliability) to **1** (maximum reliability) and its **validity** was evaluated by calculating **the validity coefficient**, defined as **the square root of the reliability coefficient (Table 7.1)**

Table 7.1. Reliability and validity coefficients of the study dimensions

Dimension	Number of items	Reliability Coefficient (Alpha)	Validity Coefficient
Innovativeness (EO1)	3	0.528	0.727
Proactiveness (EO2)	3	0.679	0.824
Risk-Taking (EO3)	3	0.543	0.737
Product innovation (IP1)	5	0.602	0.776
Process innovation (IP2)	4	0.752	0.867
Marketing innovation (IP3)	5	0.842	0.918
Total	23	0.892	0.944

Source: Prepared by the researcher based on statistical analysis results.

The results in the previous table indicate that cronbach’s alpha coefficients exceeded the minimum acceptable level for all study dimensions. Specifically, the overall questionnaire achieved an alpha value of **(0.892)**, confirming that it is a reliable tool for measuring the intended constructs. This demonstrates that the questionnaire items were clearly understood by the respondents (owners, CEOs, and managers in the manufacturing firms) and that repeating the survey with the same sample would yield consistent results.

For the independent variable EO, internal consistency coefficients ranged from **(0.727)** to **(0.824)** across the three dimensions (**innovativeness, proactiveness, and risk-taking**). These values fall within the acceptable range, **reflecting strong and reliable internal consistency**.

Similarly, for the dependent variable Innovation Performance, internal consistency coefficients ranged from **(0.776)** to **(0.918)** across its three dimensions (**product, process, and marketing innovation**). These values also indicate that the measurement scale is **highly reliable, with strong internal consistency** across all items.

7.2 Descriptive statistics and T-test for the study variables

Descriptive statistics for each dimension of the study variables (**Entrepreneurial Orientation and Innovation Performance**) were obtained by calculating the **mean, standard deviation**, and conducting **t-tests** for each item, as shown in *table 7.2*. below:

Table 7.2

Descriptive statistics and T- test of the study variables and their dimensions

Phrase	Mean	Std. Deviation	Std. Error	T-Test		Sig. (P-value)
				Degree of agree	Test Statistic	
Innovativeness	4.26	0.64	0.076	Strongly agreed	16.47	0.000
Proactiveness	4.14	0.66	0.079	Agreed	14.45	0.000
Risk-Taking	4.12	0.67	0.080	Agreed	13.98	0.000
Entrepreneurial Orientation	4.17	0.66	0.079	Agreed	14.83	0.000
Product Innovation	4.26	0.61	0.073	Strongly agreed	17.29	0.000
Process Innovation	4.33	0.59	0.071	Strongly agreed	18.84	0.000
Marketing Innovation	4.36	0.57	0.068	Strongly agreed	19.98	0.000
Innovation Performance	4.32	0.59	0.071	Strongly agreed	18.71	0.000

Source: Prepared by the researcher based on statistical analysis results.

The results in the previous table show that the mean values for all dimensions of *Entrepreneurial Orientation* are high, indicating strong agreement among respondents. Specifically, **innovativeness** recorded the highest **mean (4.26, SD = 0.64, Std. Error = 0.076)**, followed by **proactiveness (4.14, SD = 0.66, Std. Error = 0.079)** and **risk-taking (4.12, SD = 0.67, Std. Error = 0.080)**, with the overall **EO** mean at **4.17 (SD = 0.66, Std. Error = 0.079)**.

For *Innovation Performance*, the results are similarly high, with **marketing innovation** showing the highest mean (**4.36, SD = 0.57, Std. Error = 0.068**), followed by **process innovation (4.33, SD = 0.59, Std. Error = 0.071)** and **product innovation**

(4.26, SD = 0.61, Std. Error = 0.073), yielding an overall mean of 4.32 (SD = 0.59, Std. Error = 0.071).

The relatively low standard deviations across all dimensions indicate consistent responses, while the t-test values ($p < 0.05$) confirm that the agreement levels are statistically significant, meaning that all statements related to the study variables and dimensions were strongly agreed upon by the respondents.

7.3 Results of Testing the First Main Hypothesis (H1)

The first main hypothesis (H1) stated that "*EO has a positive impact of statistical significance on IP in Egyptian manufacturing SMEs under study*".

To test this hypothesis, the researcher used simple regression analysis and the results are presented in **table 7.3.** below:

Table 7.3. Results of Simple Regression Analysis for Hypothesis (H1)

Parameters	Estimated value (B)	T-Test		Correlation coefficient (R)	Determination coefficient (R ²)
		T-statistic	Sig. (p-value)		
Constant	1.647	4.678	0.000	0.679	0.461
Entrepreneurial Orientation	0.640	7.619	0.000		
F- statistic			58.048		
P- value (Sig.)			0.000		

Source: Prepared by the researcher based on statistical analysis results.

The results provide clear evidence to support Hypothesis H1. The analysis yields several key findings:

1. The model is statistically significant ($F = 58.048$, $p < 0.001$). This means the **probability that** this strong relationship occurred by random chance is less than **0.1%**, giving high confidence that a real effect exists.
2. The analysis reveals a *strong positive relationship* ($R = 0.679$). In practical terms, this indicates that as a firm's level of **EO** increases, its **IP** consistently shows a substantial increase.
3. **EO** accounts for a substantial portion (**46.1%**) of the variance in **IP** ($R^2 = 0.461$). **This implies that** nearly half of what makes some **Egyptian manufacturing SMEs** more innovative than others can be attributed to their **EO**, highlighting its critical importance.

4. The regression coefficient for **EO** is positive and statistically significant (**B = 0.640, t = 7.619, p < 0.001**). **This quantifies the impact:** for every one-unit increase in a firm's **EO** score, its **IP** score is predicted to increase by **0.640 units**.

Based on these results, Hypothesis H1 is fully supported. EO is confirmed to be a significant and substantial driver of **IP** in the context of **Egyptian manufacturing SMEs** in **Qalyubia**.

7.3.1 Results of Testing the Sub-Hypothesis (H1a)

The Sub-Hypothesis (H1a) stated that *"the three dimensions of EO (Innovativeness, Proactiveness, and Risk-Taking) collectively and individually have a positive impact of statistical significance on IP"*.

To test this hypothesis, a multiple linear regression analysis was conducted and the results are provided in **table 7.4**.

Table 7.4.

Results of Multiple Regression Analysis for Hypothesis (H1.a)

Parameters	Estimated value (B)	T-Test		Correlation coefficient (R)	Determination coefficient (R ²)
		T-statistic	Sig. (p-value)		
Constant	1.568	4.402	0.000	0.691	0.477
Innovativeness	0.321	3.718	0.000		
Proactiveness	0.132	2.420	0.013		
Risk-taking	0.203	2.677	0.009		
F- statistic	20.083				
P- value (Sig.)	0.000				

Source: Prepared by the researcher based on statistical analysis results.

The results provide clear evidence to support Hypothesis H1.a. The analysis yields several key findings:

1. The regression model is statistically significant (**F = 20.083, p < 0.001**). **This means that** the combination of the **three EO dimensions** together provides a model that is highly unlikely to have occurred by chance, **confirming their collective power in predicting IP**.
2. The model has a **strong explanatory power**, with the **three dimensions collectively** accounting for **47.7%** of the variance in **IP (R² = 0.477)**. This indicates that nearly half of the differences in innovation success between

Egyptian manufacturing SMEs can be explained by their combined levels of innovativeness, proactiveness, and risk-taking.

3. The analysis of each dimension reveals unique insights:

- *Innovativeness* has the **strongest unique positive effect** ($B = 0.321, p < 0.001$). **This implies that**, even when accounting for proactiveness and risk-taking, a focus on **R&D and new products** remains the single most important driver for achieving higher overall IP.
- *Risk-Taking* also shows a significant positive effect ($B = 0.203, p = 0.009$). **This confirms that** a willingness to commit resources to high-risk projects is a distinct and necessary contributor to innovation success.
- *Proactiveness* has a significant, yet relatively smaller, unique effect ($B = 0.132, p = 0.013$). This suggests that while initiating competitive actions and being first to market is important, its unique contribution to overall innovation is more moderate when the other two dimensions are already present.

Based on these results, Hypothesis H1.a is fully supported. The findings confirm that Innovativeness is the most critical pillar, followed by Risk-Taking and Proactiveness, **for Egyptian manufacturing SMEs in Qalyubia** aiming to enhance their innovation outcomes.

7.3.2 Results of Testing the Sub-Hypotheses (H1.b1, H1.b2, H1.b3)

This section tests the sub-hypotheses concerning the impact of each EO dimension on Product Innovation.

- **H1.b1: The Sub-Hypothesis (H1.b1) stated that " Innovativeness has a positive effect on Product Innovation".**
- **H1.b2: The Sub-Hypothesis (H1.b2) stated that " Proactiveness has a positive effect on Product Innovation".**
- **H1.b3: The Sub-Hypothesis (H1.b3) stated that " Risk-Taking has a positive effect on Product Innovation".**

To test these hypotheses, a multiple linear regression analysis was conducted and the results are shown in *table 7.5*. as follows:

**Table 7.5. Results of Multiple Regression Analysis for Hypotheses
(H1.b1, H1.b2, H1.b3)**

Parameters	Estimated value (B)	T-Test		Correlation coefficient (R)	Determination coefficient (R ²)
		T-statistic	Sig. (p-value)		
Constant	1.658	4.080	0.000	0.632	0.400
Innovativeness	0.406	4.126	0.000		
Proactiveness	0.150	2.809	0.021		
Risk-taking	0.061	2.706	0.024		
F- statistic	14.661				
P- value (Sig.)	0.000				

Source: Prepared by the researcher based on statistical analysis results.

The results provide clear but varying levels of support for the hypotheses.

The analysis yields several key findings:

1. The regression model is statistically significant ($F = 14.661$, $p < 0.001$). This confirms that the combined effect of the three EO dimensions provides a robust explanation for variance in **Product Innovation**, and the model is highly unlikely to be a product of chance.
2. The model explains **40.0%** of the variance in **Product Innovation** ($R^2 = 0.400$). This indicates that the **EO dimensions** are major drivers, accounting for a large portion of what makes some **Egyptian manufacturing SMEs** more **successful at developing new products** than others.
3. The analysis reveals the unique contribution of each dimension to **Product Innovation**:
 - **Innovativeness (H1.b1):** This hypothesis is strongly supported. *Innovativeness* has a strong, positive, and highly significant effect ($B = 0.406$, $p < 0.001$). This confirms that a focus on **R&D and new product development** is the single most critical and powerful driver for achieving **Product Innovation**.
 - **Proactiveness (H1.b2):** This hypothesis is supported. *Proactiveness* shows a significant positive effect ($B = 0.150$, $p = 0.021$). This indicates that being first to market and initiating competitive actions provides a distinct advantage in developing new products.
 - **Risk-Taking (H1.b3):** This hypothesis is supported. *Risk-Taking* has a significant positive effect ($B = 0.061$, $p = 0.024$). While its unique effect is

smaller, **this confirms that** a willingness to commit resources to uncertain ventures is a necessary component for **Product Innovation**.

Based on these results, all three hypotheses (H1.b1, H1.b2, and H1.b3) are supported. The findings confirm that while all three dimensions of EO contribute to **Product Innovation**, **Innovativeness** is the most critical driver for **Egyptian manufacturing SMEs** in Qalyubia.

7.3.3 Results of Testing the Sub-Hypotheses (H1.b4, H1.b5, H1.b6)

This section tests the sub-hypotheses concerning the impact of each EO dimension on Process Innovation.

- **H1.b4:** The Sub-Hypothesis (H1.b4) stated that " **Innovativeness has a positive effect on Process Innovation**".
- **H1.b5:** The Sub-Hypothesis (H1.b5) stated that " **Proactiveness has a positive effect on Process Innovation**".
- **H1.b6:** The Sub-Hypothesis (H1.b6) stated that " **Risk-Taking has a positive effect on Process Innovation**".

To test these hypotheses, a multiple linear regression analysis was conducted and the results are presented in *table 7.6*. as follows:

Table 7.6. Results of Multiple Regression Analysis for Hypotheses (H1.b4, H1.b5, H1.b6)

Parameters	Estimated value (B)	T-Test		Correlation coefficient (R)	Determination coefficient (R ²)
		T-statistic	Sig. (p-value)		
Constant	1.844	3.527	0.001	0.516	0.267
Innovativeness	0.225	2.776	0.023		
Proactiveness	0.079	2.747	0.018		
Risk-taking	0.291	2.610	0.011		
F- statistic	8.000				
P- value (Sig.)	0.000				

Source: Prepared by the researcher based on statistical analysis results.

The results provide clear evidence for the hypotheses, revealing a distinct pattern from the previous findings on product innovation. The analysis yields several key findings:

1. The regression model is statistically significant ($F = 8.000$, $p < 0.001$). **This confirms that the combination of the three EO dimensions provides a model that is significantly better than a baseline model with no predictors in explaining Process Innovation.**
2. The model explains **26.7%** of the variance in **Process Innovation** ($R^2 = 0.267$). **This indicates that while other factors also play a major role, a firm's EO is a meaningful driver of improvements in its production processes, techniques, and technologies.**
3. **The analysis reveals a unique hierarchy of effects for Process Innovation:**
 - **Risk-Taking (H1.b6): This hypothesis is supported. *Risk-Taking* has the strongest unique positive effect ($B = 0.291$, $p = 0.011$). This implies that for Process Innovation (which often requires significant investment in new technologies and fundamental changes to existing systems) a willingness to undertake bold, risky investments is the most critical entrepreneurial attribute.**
 - **Innovativeness (H1.b4): This hypothesis is supported. Innovativeness shows a significant positive effect ($B = 0.225$, $p = 0.023$). This indicates that a culture of innovation is also important, which facilitates the search for and adoption of novel process technologies and methods.**
 - **Proactiveness (H1.b5): This hypothesis is supported. Proactiveness has a significant, yet relatively smaller, positive effect ($B = 0.079$, $p = 0.018$). This suggests that while anticipating and leading market changes in operations is beneficial, its direct, unique contribution to process improvement is more limited compared to risk-taking and innovativeness.**

Based on these results, all three hypotheses (H1.b4, H1.b5, and H1.b6) are supported. The findings demonstrate that the driver profile for Process Innovation is distinct, with Risk-Taking emerging as the most pivotal dimension, highlighting the capital-intensive and uncertain nature of innovating production processes in Egyptian manufacturing SMEs in Qalyubia.

7.3.4 Results of Testing the Sub-Hypotheses (H1.b7, H1.b8, H1.b9)

This section tests the sub-hypotheses concerning the impact of each EO dimension on Marketing Innovation.

- **H1.b7: The Sub-Hypothesis (H1.b7) stated that " Innovativeness has a positive effect on Marketing Innovation".**
- **H1.b8: The Sub-Hypothesis (H1.b8) stated that " Proactiveness has a positive effect on Marketing Innovation".**
- **H1.b9: The Sub-Hypothesis (H1.b9) stated that " Risk-Taking has a positive effect on Marketing Innovation".**

To test these hypotheses, a multiple linear regression analysis was conducted and the results are presented in *table 7.7.* as follows:

Table 7.7. Results of Multiple Regression Analysis for Hypotheses (H1.b7, H1.b8, H1.b9)

Parameters	Estimated value (B)	T-Test		Correlation coefficient (R)	Determination coefficient (R ²)
		T-statistic	Sig. (p-value)		
Constant	1.201	2.524	0.014	0.635	0.404
Innovativeness	0.332	2.874	0.005		
Proactiveness	0.167	2.422	0.026		
Risk-taking	0.258	2.540	0.013		
F- statistic	14.902				
P- value (Sig.)	0.000				

Source: Prepared by the researcher based on statistical analysis results.

The results provide clear evidence supporting all three hypotheses, indicating a balanced contribution of EO dimensions to Marketing Innovation.

The analysis yields several key findings:

1. The regression model is statistically significant ($F = 14.902$, $p < 0.001$). This confirms that the combination of the three EO dimensions provides a reliable explanation for variance in Marketing Innovation.
2. The model explains 40.4% of the variance in Marketing Innovation ($R^2 = 0.404$). This indicates that a firm's EO is a primary determinant of its success in innovating marketing methods, pricing, promotion, and distribution.
3. The analysis reveals that all three dimensions contribute significantly to Marketing Innovation:
 - **Innovativeness (H1.b7):** This hypothesis is strongly supported. Innovativeness has the strongest positive effect ($B = 0.332$, $p = 0.005$). This confirms that developing new marketing strategies, product designs, and promotional techniques is fundamentally a creative act, driven by a firm's overall innovative capacity.
 - **Proactiveness (H1.b8):** This hypothesis is supported. Proactiveness shows a significant positive effect ($B = 0.167$, $p = 0.026$). This indicates that anticipating market trends and seizing initiative provides a distinct advantage in launching novel marketing campaigns and capturing customer attention.

- **Risk-Taking (H1.b9): This hypothesis is supported.**
Risk-Taking has a significant positive effect ($B = 0.258, p = 0.013$). This reveals that experimenting with new pricing models, distribution channels, and unproven promotional tactics requires a substantial tolerance for uncertainty and potential failure.

Based on these results, all three hypotheses (H1.b7, H1.b8, and H1.b9) are supported. The findings demonstrate that **Marketing Innovation** requires a comprehensive entrepreneurial approach, with **Innovativeness** as the cornerstone, effectively supported by both **Risk-Taking and Proactiveness**. This balanced driver profile highlights the multifaceted nature of renewing marketing activities in **Egyptian manufacturing SMEs in Qalyubia**.

7.3.5 Summary of Hypothesis Testing for the EO-IP Relationship

The analysis of the first main hypothesis and its sub-hypotheses yielded the following results (table 7.8):

Table 7.8. Testing hypotheses results

The Main hypotheses and sub hypotheses	Result
H1: EO has a positive impact of statistical significance on IP in Egyptian manufacturing SMEs under study.	Accepted
H1a: The three dimensions of EO (Innovativeness, Proactiveness, and Risk-Taking) collectively and individually have a positive impact of statistical significance on IP.	
H1.b1: Innovativeness has a positive effect on Product Innovation	
H1.b2: Proactiveness has a positive effect on Product Innovation.	
H1.b3: Risk-Taking has a positive effect on Product Innovation.	
H1.b4: Innovativeness has a positive effect on Process Innovation.	
H1.b5: Proactiveness has a positive effect on Process Innovation.	
H1.b6: Risk-Taking has a positive effect on Process Innovation.	
H1.b7: Innovativeness has a positive effect on Marketing Innovation.	
H1.b8: Proactiveness has a positive effect on Marketing Innovation.	
H1.b9: Risk-Taking has a positive effect on Marketing Innovation	

Source: Prepared by the researcher based on statistical analysis results.

8. Discussion

The results confirm known relationships and also provide new, important details about how *EO* works in *Egyptian manufacturing SMEs*.

The analysis strongly supports the main hypothesis (H1), showing that a company's overall *entrepreneurial approach* has a significant positive effect on its *IP*. This finding supports previous studies from other emerging economies. Specifically, **our results agree with the work of Perera and Samarakoon (2021)**, which found that "*EO as a whole significantly impacts IP*," and the work of Pozzo et al. (2023) which also reported a "*significant and positive*" link between *EO* and *IP*. This agreement **strengthens** the idea that an *entrepreneurial culture is a key driver of innovation*, even in the context of *the unique challenges faced by SMEs in developing countries*.

A major contribution of this study is its detailed look at how the different parts of *EO* affect specific types of innovation. Our finding that *Innovativeness* is the most important driver for *Product Innovation* (H1.b1) **aligns with the results of Seo (2019)** which also found a strong link between its combined *EO* measure and product innovation. **This shows that** creating new products is fundamentally connected to a firm's ability to innovate.

However, our most important finding is that Risk-Taking is the most critical driver for *Process Innovation* (H1.b6). While the study by Ato Sarsah et al., 2020) showed that *EO* is important for *radical innovation in manufacturing*, **it looked at *EO* as a single, combined factor. Our study goes further by breaking *EO* apart, showing that** it is specifically the willingness to take risks that is most vital for the major investments and changes required for improving production processes

Furthermore, the support for hypothesis H1.a confirms that all three parts of *EO* (*Innovativeness, Proactiveness, and Risk-Taking*) individually improve overall *IP*. *This emphasizes the need for a comprehensive and balanced entrepreneurial strategy, rather than focusing on just one area.*

The discovery of a U-shaped relationship between Firm Experience and *EO-IP* (H2.b) introduces an important complexity to our understanding. This mirrors the findings of Seo (2019), which also found that the relationship between *EO* and *innovation* is not a simple straight line.

Our finding suggests that the level of entrepreneurial activity and innovation in Egyptian SMEs changes over time, with both mid-experience firms (5-9 years) and the most experienced firms (more than 20 years) showing higher levels. This complexity requires further investigation but highlights that the benefits of *EO* are not fixed and may change as a company grows and gains experience.

9. Research Recommendations

In light of the theoretical framework of the study and based on the results of the statistical analysis, a set of research recommendations has been developed as shown in the following *table 9.1*:

Table 9.1. Research Recommendations Plan

Recommendation	Implementation Actions	Key Stakeholders	Expected Outcome and success metrics
<p>1. Systematically strengthen Innovativeness as the primary driver for <i>Product and Marketing Innovation</i>.</p>	<p>1. <i>Dedicate an R&D Budget</i>: Allocate a fixed percentage of annual revenue (e.g., 2-5%) to formal <i>R&D</i> activities and new product development.</p> <p>2. <i>Create Cross-Functional Innovation Teams</i>: Form teams with members from production, marketing, and finance to generate and evaluate new product ideas quarterly.</p> <p>3. <i>Implement an Idea Management System</i>: Use a simple digital platform or physical board to collect, track, and reward employee ideas for new products and marketing strategies.</p>	<p><i>SME Owners, Top Management, Department Heads</i></p>	<p>Outcome: A consistent pipeline of new products and more effective marketing campaigns.</p> <p>Metrics:</p> <ul style="list-style-type: none"> • Number of new product prototypes developed per year. • 15% increase in revenue from new products or services within 2 years.
<p>2. Develop a strategic approach to Risk-Taking, specifically to enable <i>Process Innovation</i>.</p>	<p>1. <i>Pilot Project Funding</i>: Create a separate budget for piloting new technologies or process improvements, defining a clear budget for "acceptable" failure.</p>	<p><i>SME Owners, Production Managers, All Employees</i></p>	<p>Outcome: More efficient, cost-effective, and competitive production processes.</p> <p>Metrics:</p>

	<p><i>2. Conduct Technology Audits:</i> Partner with local universities or consultants annually to identify mature technologies that can modernize production lines.</p> <p><i>3. Celebrate Intelligent Failures:</i> Publicly recognize projects that provided valuable learning, even if they did not achieve their primary commercial goal.</p>		<ul style="list-style-type: none"> • Implementation of at least one major process upgrade every 18-24 months. • 10% reduction in production costs or a 15% increase in production speed within 3 years of a new process implementation.
<p>3. Foster Proactiveness and ensure strategic alignment across all management levels.</p>	<p><i>1. Empower Middle Management:</i> Delegate authority to line managers to make strategic decisions within their domains, encouraging them to identify and act on new market opportunities.</p> <p><i>2. Hold Regular Environmental Scanning Meetings:</i> Dedicate monthly management meetings to analyzing competitor moves, customer feedback, and market trends to anticipate changes.</p> <p><i>3. Develop a Shared Vision Statement:</i> Collaboratively create a clear vision that emphasizes market leadership and first-mover advantage.</p>	<p><i>CEOs, Founders, Line/Division Managers</i></p>	<p>Outcome: A more agile and responsive organization that seizes market opportunities faster.</p> <p>Metrics:</p> <ul style="list-style-type: none"> • Reduction in time between identifying a market opportunity and launching a strategic response. • Sustained high scores on "Proactiveness" in internal assessments.

<p>4. Design support mechanisms that address the specific needs of <i>manufacturing SMEs</i> at different experience levels and for different innovation types.</p>	<p>1. <i>Create a "Process Innovation Grant"</i>: Offer non-repayable grants or soft loans specifically for <i>SMEs</i> to invest in advanced manufacturing equipment and technology.</p> <p>2. <i>Establish Stage-Specific Incentives</i>: Provide enhanced <i>R&D</i> tax credits for young firms (<5 years) and larger, strategic innovation grants for established firms (>20 years) to catalyze the U-shaped performance curve.</p> <p>3. <i>Fund Innovation Vouchers</i>: Provide <i>SMEs</i> with vouchers to spend on consultancy from universities or research centers for product design, marketing, or process engineering.</p>	<p><i>Ministry of Industry, SME Development Agency, Financial Institutions</i></p>	<p>Outcome: A more dynamic and innovative <i>SME</i> sector that contributes significantly to national manufacturing output.</p> <p>Metrics:</p> <ul style="list-style-type: none"> • 25% uptake of targeted grants by eligible <i>SMEs</i> within 3 years. • Measurable increase in public and private investment in process innovation technologies.
<p>5. Facilitate knowledge transfer and collaboration to boost the absorptive capacity of <i>SMEs</i>.</p>	<p>1. <i>Sponsor Industry-Academia Clusters</i>: Fund the creation of physical innovation centers or digital platforms where <i>SMEs</i>, large firms, and universities can collaborate on sector-specific challenges.</p> <p>2. <i>Organize National "Innovation Missions"</i>: Take delegations of <i>SME</i> managers to visit leading</p>	<p><i>Industry Associations, Universities, SME Development Agencies</i></p>	<p>Outcome: Faster adoption of best practices and new technologies, enhancing the collective innovativeness of the sector.</p> <p>Metrics:</p> <ul style="list-style-type: none"> • Number of formal collaboration

	innovation centers and trade fairs internationally.		agreements signed between <i>SMEs</i> and research institutions. • Increased participation of <i>SMEs</i> in international technology exhibitions.
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Source: Prepared by the research.

10. Future Research

The following ideas are offered to guide other researchers who wish to build on these findings:

1. *Use mixed-methods research*, combining surveys with in-depth interviews, to understand why risk-taking is crucial for process innovation and how managers make these decisions.
2. *Repeat this study in other Egyptian regions* and expand it to include service sectors.
3. *Investigate other important factors* such as organizational culture, leadership style, or market turbulence that might affect the **EO-IP** relationship.
4. *Study additional EO dimensions* like competitive aggressiveness and autonomy to see their impact on innovation performance.
5. *Conduct Longitudinal Case Studies of Business Growth* by tracking a small group of *SMEs* over 2-3 years to observe their innovation journey and study what factors (like saved money or special skills) help experienced businesses innovate

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References

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