# Engineers' Responses to Intention to Quit: Insights from Entrepreneurial Orientation Theory

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## Abstract

This study aimed to analyse the impact of individual entrepreneurial orientations (IEO) on engineers' intention to quit (ITQ) from the perspectives of entrepreneurial orientation theory. The research model and hypotheses were validated using PLS-SEM analysis. The results indicate that the higher the innovativeness, proactiveness, risk-taking, and competitive aggressiveness, the lower the likelihood of engineers experiencing ITQ in their current jobs. This study expands the IEO components in predicting engineers' ITQ. It highlights the need for further research and understanding of the roles of IEO, and behavioural expectations of engineers to address talent shortages in the competitive labour market for engineers.

Keywords: individual entrepreneurial orientation; intention to quit; engineers; entrepreneurial orientation theory


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## 1.0 Introduction

Engineering talent is a critical resource for many organisations, as it plays a crucial role in the development and implementation of new technologies, products, and services (Mittal, 2019; Rathi & Lee, 2017). Rapid technological advancements require engineers to constantly update their knowledge and skills (Perry, Hunter & Curral, 2016). Moreover, sectors with high growth potential, such as renewable energy and digital technology, exacerbate the competition for talent, making it challenging for organizations to attract and retain experienced engineers (Fouad, Singh, Cappaert, Wen, & Wan, 2016; Singh, Sodhi, & Rippin, 2021). As a result, the engineering field is experiencing a significant increase in employee turnover rates, which can have adverse consequences for organizations. A shortage of engineering talent can significantly impact an organisation's growth, profitability, and competitiveness (Singh, Fouad, Fitzpatrick, Liu, Cappaert, & Figuereido, 2013). It can lead to increased personnel costs, reduced productivity, and a longer time to market for new products and services.

High turnover rates resulting from intention to quit (ITQ) can prove to be a costly affair for organizations, leading to the loss of experienced engineers and creating a skills gap that increases recruitment and training costs (Chun & Chang, 2021). Moreover, ITQ can cause reduced productivity, absenteeism, and presentism, resulting in a negative impact on overall organizational performance (Ladelsky & Lee, 2022). These high turnover rates and low employee satisfaction can damage the organization's reputation, making it difficult to attract and retain top talent. The loss of experienced engineers can also lead to a loss of institutional knowledge, expertise, and technical skills, which are challenging to replace (Ayalp, 2022; Perry et al., 2016; Tomer & Sharma, 2022). Finally, the loss of key engineers can cause disruptions in ongoing projects, leading to delays, cost overruns, and reduced quality (Tremblay, Wils & Proulx, 2002; Williamson, Lounsbury & Han, 2013).

Therefore, it is critical to assess and improve the engineers' ITQ to address the talent shortage in the engineering sector. Research has highlighted the importance of nurturing individual entrepreneurial orientation (IEO) among engineers to enhance ITQ (Alavi, Moteabbed & Arasti, 2012; Igbaria & Siegel, 1992; Kharbanda & Stallworthy, 1990; Osman, Nordin, Mohd & Koe, 2018; Osman, Mohd Hashim, Mohd, Kassim, Othman & Mastor, 2022; Williamson et al., 2013). The association between engineers and IEO is a crucial topic that has received considerable attention in recent years. Engineers often possess behaviours, personality traits, and characteristics that are closely related to EO (Alavi et al., 2012; Igbaria & Siegel, 1992; Kharbanda & Stallworthy, 1990; Osman, Nordin, Daud & Othman, 2016; Saeed, 2022; Williamson et al., 2013). A strong IEO will be critical for engineers to take on the risks and responsibilities associated with technological innovation and product creation, and to succeed in their new entrepreneurial roles. By cultivating important personality traits and qualities and developing a strong IEO, engineers can position themselves for success in this rapidly evolving landscape (Alavi et al., 2012; Ayalp, 2022; Igbaria & Siegel, 1992; Kharbanda & Stallworthy, 1990; Osman, et al., 2016; Williamson et al., 2013).

Do IEOs truly have an effect on the reasons for an individual engineer's ITQ a job? Studies have shown that there is a significant relationship between entrepreneurial orientation and job satisfaction, which in turn can affect an employee's ITQ their job (Alavi et al., Igbaria & Siegel, 1992; Kapur & Tyagi, 2022; Kharbanda & Stallworthy, 1990; Menzel, Aaltio, & Ulijn, 2007; Osman et al., 2018; Osman, et al., 2022; Tremblay et al., 2002). When engineers exhibit entrepreneurial behaviours such as innovation, risk-taking, proactiveness, and opportunity-seeking, they are likely to feel more engaged and satisfied with their work (Covin & Slevin, 1986; Grip & Smits, 2012; Lumpkin & Dess, 1996; Williamson et al., 2013). This can lead to a reduced ITQ their jobs as they see opportunities for growth and development within their organization. In addition, organizations that encourage entrepreneurial behaviour among their employees are likely to have lower turnover rates (Campbell, Gluesing, & Perelli 2012; Igbaria Siegel, 1992; Kaewsri & Tongthong 2013). When organizations create a culture that supports innovation and risk-taking, employees are more likely to feel invested in the success of the organization and less likely to leave for other opportunities.

### 1.1 Gaps of Study

Although the IEO has been extensively used to determine the entrepreneurial intentions, abilities, and job performance of students and entrepreneurs, there has been limited research on its application to engineers' ITQ (Bolton & Lane, 2012; Elenurm, 2012; Krishnakumar, Devi, & Rao, 2013; Osman et al., 2018; Osman, et al., 2022; Taatila & Down, 2012). One possible reason for the lack of research in this area is the difficulty in identifying the specific components of IEO that are relevant to engineers' job satisfaction and ITQ. Another possible reason is the limited sample size of engineers available for study. Engineers with both entrepreneurial skills and engineering expertise may be a relatively rare population, and recruiting participants for such studies can be challenging. As a result, there may be limited data available on the relationship between IEO and ITQ among engineers. Furthermore, there may be a lack of interest in studying engineers and their ITQ, as engineers are often considered to have stable, and well-paying jobs with good benefits (Ayalp, 2022; Osman et al., 2018; Osman et al., 2022). However, this assumption ignores the fact that engineers, like any other professionals, may experience dissatisfaction or frustration with their current jobs and may be considering leaving their organizations (Mittal, 2019; Rathi & Lee, 2017; Singh et al., 2021).

Based on the gaps mentioned, therefore, the main objective of this study is to analyse the impact of IEO on ITQ among engineers. By identifying the specific components of IEO that are relevant to engineers and their job satisfaction, organizations can better understand how to retain valuable engineering talent. Additionally, understanding the factors that influence engineers' ITQ can help organizations address issues related to employee turnover, job satisfaction, and organizational commitment (Bigliardi, Petroni, & Dormio, 2005; Singh et al., 2013). While some studies have explored the relationship between engineers and IEO, few have examined how organizations can create a supportive environment for engineers to develop their entrepreneurial skills and ITQ behaviour (Alavi

et al., 2012; Igbaria & Siegel, 1992; Kharbanda & Stallworthy, 1990; Osman et al., 2018; Osman et al., 2022; Williamson et al., 2013). Therefore, further research in this area is needed to analyse the impact of IEO on ITQ in the engineering profession.

## 2.0 Literature Review

Intention to quit (ITQ) is a concept that has been widely studied in the field of organizational behaviour as a predictor of actual voluntary turnover (Tett & Mayer, 1993). ITQ refers to an individual's subjective perception of their likelihood of leaving their current job within a certain period (Tett & Mayer, 1993; Tuzun, 2007). It has been found that ITQ can be a strong predictor of actual voluntary turnover, meaning that individuals who express a high level of ITQ are more likely to leave their job than those who express a low level of ITQ (Hom and Griffeth, 1995). Research has shown that ITQ can be influenced by a variety of factors, including job satisfaction, organizational commitment, and perceived job alternatives (Chun & Chang, 2021; Ladelsky & Lee, 2022). In addition, personality factors such as openness to experience and neuroticism have also been found to be related to ITQ (Osman, et al., 2016; Saeed, 2020; Yang, Gong & Huo, 2011). Therefore, understanding the factors that contribute to an individual's ITQ can provide valuable insights into their likelihood of leaving their current job (Alavi et al., 2012; Auster & Ekstein, 2005; Bigliardi et al., 2005; Grip & Smits, 2012; Igbaria, Kassicieh, Silver, 1999; Korte & Li, 2015).

As with other skilled and professional employees, ITQ study is overlooked among engineers. To date, numerous studies examined critical ITQ factors for a variety of jobs, including nurses, information technology workers, professional employees, teachers, and social workers (Boudrias, Trépanier, Foucreault, Peterson, & Fernet, 2022; Dodanwala & Santoso, 2022; Ghosh, Goel, Dutta, & Singh, 2019; Maryam, Ali, Rizvi, & Farooq, 2021; Tomer & Sharma, 2022). Rewards and remuneration, job satisfaction, organisational fairness, professional development, advancement and opportunity, and work-life balance were frequently investigated (Boudrias et al., 2022; Kaur & Radhawa, 2021; Korte & Li, 2015; Rai, Ghosh & Dutta, 2019; Tomer & Sharma, 2022). Bigliardi et al. (2005); Igbaria and Siegel (1992); Singh et al. (2013); and Thurasamy, May, Amri, and Noor (2011) discovered that engineers' ITQ was negatively and significantly related to career aspirations, organisational socialisation, career satisfaction, job involvement, job satisfaction, role conflict, role ambiguity, task characteristics, organisational commitment, and organisational support. To gain a deeper understanding of the growing demand for ITQ among engineers, however, Bigliardi et al. (2005); Kaewsri and Tongthong (2013); Kharbanda and Stallworthy (1990); Osman et al., 2018; and Osman et al. (2022) pressed IEO to combine engineers with entrepreneurial values to respond to technological innovation.

In the context of engineering, the EO theory suggests that engineers who exhibit high levels of innovativeness are more likely to develop new technologies and solutions that improve the performance of their organizations (Covin & Slevin, 1986; Lumpkin & Dess, 1996). Engineers who are willing to take risks may be more willing to experiment with new

technologies, products, or services, and may be more likely to identify new opportunities for growth (Bigliardi et al., 2005; Igbaria & Siegel, 1992; Singh et al., 2013). Engineers who are proactive may be more likely to identify market trends and emerging technologies that can be leveraged to create new products or services (Fouad et al., 2016). Engineers who exhibit competitive aggressiveness may be more effective at competing for new business, while engineers who value autonomy may be more effective at leading teams and developing new ideas (Perry et al., 2016; Osman, et al., 2018; Thurasamy et al., 2011; Yates & Skinner, 2021). In summary, the EO theory provides a useful framework for understanding the individual entrepreneurial orientation of engineers. By identifying the five dimensions of IEO, the EO theory helps to explain the behaviours that are critical to entrepreneurial success and how these behaviours can be applied in the context of engineering.

### 2.1 Entrepreneurial Orientation Theory

The entrepreneurial orientation (EO) theory is a well-established framework for describing and generating entrepreneurial behaviours within organizations (Covin & Slevin, 1986; Lumpkin & Dess, 1996). These values and behaviours include innovation, risk-taking, proactivity, competitive aggressiveness, and autonomy (Covin & Slevin, 1986; Lumpkin & Dess, 1996). The EO theory suggests that firms with a high level of entrepreneurial orientation are more likely to engage in entrepreneurial activities, such as new product development, venturing into new markets, and pursuing new business opportunities (Yen, Arnold, Ping, & Chun, 2022; Lumpkin & Dess, 2001). The strategic orientation of a firm is defined by a set of entrepreneurial factors, including decision-making styles, methods, practices, and tactics. Firms that are willing to take risks may be more willing to experiment with new business models or pursue new markets (Rauch, Wiklund, Lumpkin, & Frese, 2009). Proactive firms may be more effective at identifying emerging trends and opportunities, while firms that are competitive may be more effective at competing for market share (Chen et al., 2022; Lumpkin & Dess, 2001; Wang, Dass, Arnett, & Yu, 2020).

According to several academic studies, EO theory can have a significant impact on the expected outcomes of individual entrepreneurial goals, job performance, and career happiness within an organization that fosters an entrepreneurial orientation (Dadzie, Agyapong & Suglo, 2021; Masa'deh, Al-Henzab, Tarhini, & Obeidat, 2018; Rachmawati, Suliyanto & Suroso, 2022; Soomro & Shah, 2019). One study found that employees who worked in firms with high levels of EO were more likely to exhibit higher levels of job satisfaction, motivation, and performance (Soomro & Shah, 2019). This is likely because employees in these firms are given more autonomy, are encouraged to take risks, and have the opportunity to work on innovative projects (Corr^ea, Queiroz, & Shigaki, 2021). In addition, research has shown that EO can have a positive impact on individual entrepreneurial intentions and career satisfaction (Kollmann, Christofor, & Kuckertz, 2007; Kumar, Ahmad Paray & Dwivedi, 2021; Perez, Martins, Mahauad & Lalangui, 2022).

The EO theory, which was originally developed to describe the methods, techniques, and decision-making activities employed by entrepreneurs, can also be applied to

engineers' entrepreneurial behaviours within an organization. While the EO theory was initially used to understand organisational entrepreneurship, it has since been expanded to apply to individual level (Bolton & Lane, 2012; Elenurm, 2012; Krishnakumar et al., 2013; Kollmann et al., 2007; Taatila & Down, 2012). This means that the EO theory can be used to describe and generate entrepreneurial behaviours within organizations and to identify the factors that contribute to an IEO (Bolton & Lane, 2012; Elenurm, 2012). Engineers, like entrepreneurs, are often called upon to identify new opportunities, develop innovative solutions, and take risks in pursuit of their goals (Bigliardi et al., 2005; Igbaria & Siegel, 1992; Menzel et al., 2007; Williamson et al., 2013). As such, the EO theory can provide a useful framework for understanding how engineers' behaviours and decision-making processes contribute to their EO within an organization.

For example, the EO theory identifies five key dimensions of entrepreneurial orientation: innovativeness, proactiveness, risk-taking, competitive aggressiveness, and autonomy (Covin & Slevin, 1986; Lumpkin & Dess, 1996). These dimensions can be used to analyse engineers' entrepreneurial behaviours and attitudes, such as their willingness to take risks, their ability to identify and capitalize on new opportunities, and their propensity to be proactive in their work (Covin & Slevin, 1986; Lumpkin & Dess, 1996). Additionally, the EO theory emphasizes the importance of leadership, organizational culture, and structure in fostering an entrepreneurial orientation within an organization (Chen et al., 2022; Lumpkin & Dess, 1996; Lumpkin & Dess, 2001). By applying the EO theory to engineering organizations, managers and leaders can identify the factors that contribute to an entrepreneurial culture and develop strategies to promote innovation and entrepreneurship among engineers (Bigliardi et al., 2005; Menzel et al., 2007; Williamson et al., 2013). Table 1 summarizes the IEO components, definitions and engineers' behaviours.

Table 1. IEO components and Engineers-IEO Behaviours

| IEO Components | Definitions | Engineers-IEO Behaviours |
|---|---|---|
| Innovativeness | Support new ideas, novelty, experimentation for new products and services | Innovate ideas in developing products; engineers develop innovative thoughts to transform his or her creative ideas into tangible business |
| Proactiveness | Act in anticipation of future problems, needs or changes | Creative in solving non-routine problem-solving in engineering; solve technical problems; able to think conceptually |
| Risk-taking | Proclivity to engage in risky projects and prefer bold actions for achieving firms' objectives | Coordinate with project owners, project advisors and contractors to ensure that project goals are achieved; ability to adapt to change and to thrive in any circumstances |
| Competitive Aggressiveness | Intensively challenges its competitors for improving position in the marketplace | Take risks; invest in research and development; aggressively market its products or services |

*(Source: Bigliardi et al., 2005; Covin & Slevin, 1986; Igbaria & Siegel, 1992; Lumpkin & Dess, 1996; Menzel et al., 2007; Williamson et al., 2013)*

### 2.2 IEO and Engineers' ITQ

Empirical research has shown that engineers who exhibit innovation, proactiveness, risk-taking, creativity, and autonomy tend to have better work performance and a stronger inclination towards entrepreneurship (Dadzie et al., 2021; Masa'deh et al., 2018; Perez et al., 2022; Rachmawati et al., 2022). These characteristics enable engineers to identify new opportunities, develop innovative solutions, and take calculated risks to achieve their goals. Innovation is a critical aspect of engineers' work, as they are often responsible for designing and developing new products, processes, or systems (Ayalp, 2022; Menzel, Aaltio, & Ulijn, 2007). Proactiveness allows engineers to take the initiative to identify problems and develop solutions before they become major issues (Covin & Slevin, 1986; Lumpkin & Dess, 1996). Risk-taking is also essential for engineers, as they must take calculated risks when making decisions that could have significant consequences (Covin & Slevin, 1986; Lumpkin & Dess, 1996). Creativity is another critical trait that enables engineers to generate new ideas and solutions. Autonomy allows engineers to work independently, take ownership of their work, and make decisions that impact their projects. All of these characteristics contribute to engineers' work performance and their potential for in-house entrepreneurship (Dadzie et al., 2021; Masa'deh et al., 2018; Osman et al., 2018; Osman, et al., 2022; Perez et al., 2022; Rachmawati et al., 2022).

#### 2.2.1 Innovativeness and Engineers' ITQ

In today's highly competitive business environment, innovation has become a key driver of organizational success. Engineers, as the creators and implementers of technology, are expected to be at the forefront of innovation (Fouad et al., 2016; Singh et al., 2021). As such, there is a growing need for engineers to incorporate innovation into their daily tasks and responsibilities in order to build their human capital and align it with the organization's competitive strategy. Innovation is a process that involves the generation, development, and implementation of new ideas, products, or services. It requires engineers to be creative, proactive, and willing to take risks (Covin & Slevin, 1986). By incorporating innovation into their daily tasks, engineers can build their skills and competencies in these areas, making them more valuable to their organizations.

Empirical studies have shown a significant negative connection between engineers' innovative work behaviour and their ITQ their job (Alavi et al., 2012; Igbaria & Siegel, 1992; Kharbanda & Stallworthy, 1990; Osman et al., 2018; Osman, et al., 2022; Williamson et al., 2013). Innovative work behaviour refers to the degree to which an individual is willing to generate and implement novel and useful concepts, ideas, or procedures to enhance work processes and outcomes (Covin & Slevin, 1986; Lumpkin & Dess, 1996). The innovative work behaviour of engineers is critical to the success of their organisations as it promotes the creation of new products, processes, and technologies, and enhances the competitive advantage of the firm. The empirical evidence suggests that encouraging innovative work behaviour among engineers can be an effective strategy to reduce their ITQ their jobs (Bigliardi et al., 2005; Igbaria & Siegel, 1992; Menzel et al., 2007; Osman et al., 2018; Osman, et al., 2022; Williamson et al., 2013). This can be achieved through various

methods such as providing training and development opportunities, promoting a culture of innovation, recognising and rewarding innovative ideas and solutions, and fostering a supportive work environment that encourages experimentation and risk-taking. Thus, it is hypothesized that:

*H1: Engineers' innovativeness is negatively relaed to ITQ the jobs.*

### 2.2.2 Proactiveness and Engineers' ITQ

Proactive behaviours refer to actions taken by individuals to shape their environment rather than simply responding to existing conditions (Covin & Slevin, 1986; Lumpkin & Dess, 1996). In the context of engineers, proactive behaviours can include seeking out new projects, taking on additional responsibilities, and seeking opportunities for professional development. Research has shown that engineers who exhibit proactive behaviours tend to be more satisfied with their jobs, have higher levels of job performance, and are more likely to engage in entrepreneurial activities (Covin & Slevin, 1986; Grip & Smits, 2012; Lumpkin & Dess, 1996; Williamson et al., 2013). Moreover, proactive behaviours can motivate engineers to seek out better job possibilities and chart their future career. By taking the initiative to identify opportunities for growth and development, engineers can build their human capital and match it with their organization's competitive strategy. This can help them to remain relevant in a rapidly changing job market and position themselves for future success.

When engineers perceive that they have limited opportunities for proactive behaviour within their current job, this can lead to decreased job satisfaction and a lower intention to stay in the same job. Proactive behaviour can include actions such as seeking out new projects, proposing new ideas, and taking the initiative to solve problems (Covin & Slevin, 1986; Lumpkin & Dess, 1996). Research has found that the perceived availability of proactive behaviour opportunities is a significant predictor of job satisfaction and ITQ in the same job among engineers. When engineers feel that they have greater opportunities for proactive behaviour within their current job, they are more likely to be satisfied with their job and have a lower ITQ (Alavi et al., 2012; Igbaria & Siegel, 1992; Kharbanda & Stallworthy, 1990; Mittal, 2019; Osman et al., 2018; Osman, et al., 2022; Rathi & Lee, 2017). On the other hand, when engineers feel that they have limited opportunities for proactive behaviour, they are more likely to experience job dissatisfaction and have a lower intention to stay. Therefore, it is important for organizations to create an environment that supports and encourages proactive behaviour among engineers. As a result, we postulated the following hypothesis:

*H2: Engineers' proactiveness and ITQ are negatively related*

### 2.2.3 Risk-taking and Engineers' ITQ

Research has found that engineers who are willing to take risks are more likely to be successful in their careers and less likely to leave their jobs voluntarily. This is because risk-taking behaviour is often associated with an entrepreneurial mind-set, which is characterized by a willingness to identify and pursue new opportunities, as well as a

tolerance for uncertainty and ambiguity (Bolton & Lane, 2012; Covin & Slevin, 1991; Lumpkin & Dess, 1996). Engineers who exhibit these traits are better equipped to adapt to changing circumstances and to capitalize on emerging trends and technologies. In addition, risk-taking behaviour can also be a sign of confidence and self-assurance, which are important qualities for success in any field. Engineers who are confident in their abilities are more likely to take calculated risks and to pursue innovative solutions to complex problems (Fouad et al., 2016; Mittal, 2019; Singh et al., 2021). This can lead to higher levels of job satisfaction and performance, as well as greater career advancement opportunities.

Empirical studies have shown that there is a strong link between engineers' willingness to take risks and their ability to hold onto their jobs. Engineers who are more willing to take risks tend to be more committed to their organizations and are less likely to have intentions to quit their jobs (Igbaria & Siegel, 1992; Igbaria et al., 1999; Kharbanda & Stallworthy, 1990; Osman et al. 2018; Osman, et al., 2022; Williamson et al., 2013). This could be due to the fact that engineers who are willing to take risks are often more confident in their abilities and more motivated to succeed in their roles. In addition, engineers who are willing to take risks may also be more open to new challenges and opportunities within their organizations, which can lead to greater job satisfaction and engagement. Overall, the willingness of engineers to take risks can have a significant impact on their ability to hold onto their jobs, as well as on their career development and success within their organizations. As a result, the following hypothesis is advanced:
*H3: Engineers' ITQ is negatively associated with risk-taking.*

**2.2.4 Competitive Aggressiveness and Engineers' ITQ**

Competitive aggressiveness is a term used to describe the level of a firm's effort to compete in the marketplace from an organizational perspective (Covin & Slevin, 1991; Lumpkin & Dess, 1996). It involves a strategic approach to business that emphasizes the importance of being proactive and assertive in order to gain a competitive advantage. Competitive aggressiveness can be manifested in various ways, such as a firm's willingness to take risks, invest in research and development, or aggressively market its products or services. In the context of engineering organizations, competitive aggressiveness can be crucial for maintaining a competitive edge in the marketplace (Ayalp, 2022; Perry et al., 2016; Tomer & Sharma, 2022). Engineers who exhibit a high degree of competitive aggressiveness are more likely to identify new opportunities and develop innovative solutions to problems. They are also more likely to take calculated risks in order to achieve their goals.

Empirical studies have shown a positive correlation between competitive aggressiveness and job performance, as well as a negative correlation with turnover intentions (Kapur & Tyagi, 2022; Osman et al., 2022). This suggests that engineers who exhibit a high degree of competitive aggressiveness are more likely to be satisfied with their jobs and less likely to leave their organizations. However, it is important to note that competitive aggressiveness can also have negative consequences if it is taken too far. Despite these, understanding the relationship between competitive aggressiveness and engineers' ITQ remains an important area of research, as it can help organizations develop

more effective strategies for retaining their engineering talent. By identifying the factors that contribute to high ITQ among engineers, companies can take steps to address these issues and create a more supportive and engaging work environment (Kharbanda & Stallworthy, 1990; Osman et al., 2022; Perry et al., 2016; Thurasamy et al., 2011; Williamson et al., 2013; Yates & Skinner, 2021). Therefore, we postulated the following hypothesis:
*H4: Engineers' competitive aggressiveness is negatively related with ITQ*

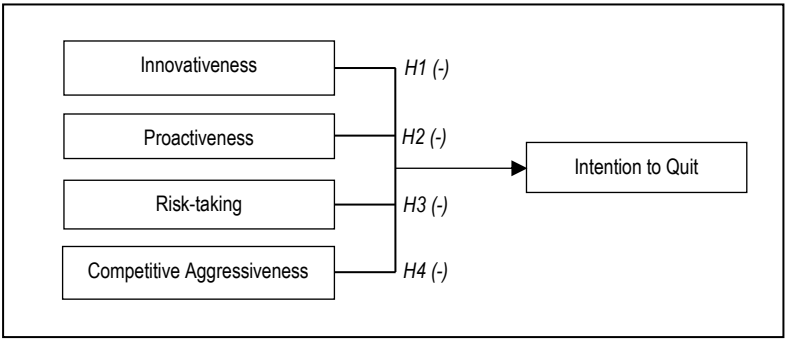


Figure 1. Research Framework
*(Source: Kaewsri & Tongthong, 2013; Kharbanda & Stallworthy, 1990; McDonnell & O'Neill, 2009; Osman et a., 2022)*

In order to test the relationship between IEO and ITQ among engineers, the following hypotheses were developed:

a) H1. There is a statistically significant relationship (*at the level* $\alpha <= 0.05$) between innovativeness and ITQ among engineers.
b) H2 . There is a statistically significant relationship (*at the level* $\alpha <= 0.05$) between proactiveness and ITQ among engineers.
c) H3. There is a statistically significant relationship (*at the level* $\alpha <= 0.05$) between risk-taking and ITQ among engineers.
d) H4. There is a statistically significant relationship (*at the level* $\alpha <= 0.05$) between competitive aggressiveness and ITQ among engineers.

## 3.0 Methodology

This section provides an explanation of the methodology that was used to carry out the research for this study, including the sample and procedure, the data analysis, as well as the variables and measures that were utilised in the data analysis.

### 3.1 Sample and Procedures

The data for this study was collected from engineers working in manufacturing enterprises located in Malaysia's Southern Region, including Melaka and Johor. All participants in the study were registered with the Malaysian Board of Engineers (BEM). To obtain the sample,

a purposive sampling technique was utilized, which a non-probability is sampling strategy where informants are selected based on their specific characteristics (Bernard, 2002). Purposive sampling is a non-probability sampling method that is used when researchers aim to include only certain participants who meet specific criteria. In purposive sampling, the researcher identifies the characteristics or traits of the population of interest that are important for the research, and then selects participants who meet those criteria. In this study, a formal letter was initially sent to all human resource (HR) officials of the manufacturing enterprises identified from the Federation of Malaysian Manufacturers (FMM) directory. The study categorized the manufacturing enterprises with more than 500 employees and contacted 69 manufacturers. Subsequently, coordinators were appointed and contacted via phone to seek their approval to participate in the study.

This study collected data from a diverse range of industries, including accounting, finance and banking, arts, media, and communication, building and construction, computer, information technology, electric and electronics, oil and gas, and sciences. To ensure a representative sample, each company received between ten and twenty copies of the questionnaires, along with the research summary and the consent letter. The questionnaires were distributed via self-administered platforms over a period of two and a half months. A quantitative research approach was used in this study, with multiple-item questionnaires based on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The use of a seven-point scale was deemed efficient in minimising response bias, increasing power, and minimising errors. However, some studies suggest that expanding beyond a seven-point Likert scale may improve the sensitivity of variables impacting reliability. A total of 450 surveys were distributed to respondents representing 30 manufacturing organisations that agreed to participate in the study. Of the total surveys distributed, 51.1 percent were returned, and 46.4 percent of the returned surveys were usable for additional data processing.

### 3.2 Data Analysis

The present study employed a Partial Least Square Structural Equation Modelling (PLS-SEM) approach with SmartPLS 3.2.8 to test the developed hypotheses. PLS-SEM is a statistical technique that is commonly used in social science research when the analysis is concerned with testing a theoretical framework from a prediction perspective. It is a form of SEM, which is a set of techniques for testing and estimating causal relationships between latent (unobserved) and observed variables. PLS-SEM is a popular technique because it can handle small sample sizes, non-normal data, and complex models with many variables and relationships (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Hair, Hult, Ringle, & Sarstedt, 2017). It can also estimate both formative and reflective measurement models, which are used to assess the validity and reliability of the observed variables.

In PLS-SEM, latent variables are represented by composites of the observed variables, which are weighted averages of the observed variables. The study utilized a two-step PLS-SEM approach to validate both the outer (measurement) and inner (structural) models on a sample of 209 respondents. The process of model validation ensures that the empirical

work's quality is achieved through the use of both measurement and structural models (Urbach & Ahlemann, 2010). To validate the measurement model, the study evaluated its internal consistency, indicator reliability, convergent validity, discriminant validity, and multicollinearity. The PLS-SEM structural model's explanatory and predictive power was also determined using the coefficient of determination, the magnitude of the effect, path coefficient, predictive relevance, and relative impact.

### 3.3 Variables and Measurement

In this study, innovativeness is defined as an individual's support for unique ideas, innovation, and experimentation with new products and services, following the operational definition of innovativeness by Covin and Slevin (1991), Lumpkin and Dess (1996), and Miller (1983). Proactiveness is defined as the act of anticipating future issues, needs, or changes and acting accordingly. Seven items were used to assess proactiveness in this study. Risk-taking refers to the inclination to engage in risky initiatives and favour bold actions to accomplish business objectives. Competitive aggressiveness is defined as an organization's intense competition to improve its market position. To measure these two characteristics, six items were adopted from Covin and Slevin (1986) and Lumpkin and Dess (1996), and modified to fit the current study's objectives. ITQ, on the other hand, was defined using Haque's (2018) operational definition as an individual's behavioural intention to leave their current organization. The researchers chose three items from Govaerts, KyndtDochy, and Baert's (2011) to assess ITQ. All measurements were developed using a seven-point Likert scale with anchors ranging from one (strongly disagree) to seven (strongly agree).

## 4.0 Results

Of the 209 total respondents, 180 (*86.1 percent*) were male and 13.9 percent were female. The majority of respondents were graduate engineers (*n=170, 81.3 percent*) or professional engineers (*n=39, 18.7 percent*). The age range of most respondents (*n=116, 55.5 percent*) fell between 26 and 35 years, and a majority of them had been in service for less than five years (*n=103, 49.3 percent*). The largest sample in this study came from the electrical and electronics sector (*n=80, 38.3 percent*). Demographic data for all respondents is provided in Table 2.

Table 2. Demographic Data (*n=209*)

| Category | Frequency | Percentage |
|---|---|---|
| *Status of Engineers* | | |
| Graduate Engineers | 170 | 81.3 |
| Professional Engineers | 39 | 18.7 |
| *Gender* | | |
| Male | 180 | 86.1 |
| Female | 29 | 13.9 |
| *Age* | | |
| <25 years old | 18 | 8.6 |

| | | |
|---|---|---|
| 26-35 years old | 116 | 55.5 |
| 36-45 years old | 52 | 24.9 |
| 46-55 years old | 18 | 8.6 |
| >56 years old | 5 | 2.4 |
| *Marital Status* | | |
| Single | 86 | 41.2 |
| Married | 120 | 57.4 |
| Divorced | 3 | 1.0 |
| *Race* | | |
| Malay | 158 | 75.6 |
| Chinese | 42 | 20.1 |
| Indian | 9 | 4.3 |
| *Education Level* | | |
| Bachelor Degree | 198 | 94.7 |
| Master Degree | 9 | 4.3 |
| PhD | 2 | 1.0 |
| *Length of Service* | | |
| 1-5 years | 103 | 49.3 |
| 6-10 years | 65 | 31.1 |
| 11-15 years | 31 | 14.8 |
| >16 years | 10 | 4.8 |
| *Sectors* | | |
| Accounting/Finance/Banking | 18 | 8.6 |
| Arts/Media/Communication | 12 | 5.7 |
| Building/Constructions | 24 | 11.5 |
| Computer/IT | 11 | 5.3 |
| Electrical & Electronics | 80 | 38.3 |
| Oil & Gas | 35 | 16.7 |
| Sciences | 12 | 5.7 |
| Others | 17 | 8.1 |

### 4.1 Assessments of the Measurement Model

To evaluate the effectiveness of the confirmatory factor analysis (CFA), this study assessed the reliability, convergent validity, and discriminant validity of the items. To determine convergent validity, Hair et al. (2010) suggested examining the loadings, composite reliability (CR), and average variance extracted (AVE). As presented in Table 3, the loadings of all items were higher than the recommended threshold of 0.5. The CRs of all constructs ranged from 0.831 to 0.929, exceeding the established cut-off of 0.70 (Nunnally, 1978; Gefen, Straub & Boudreau, 2000). Additionally, the AVE values were greater than or equal to 0.5, in line with Bagozzi and Yi's (1988) recommended value of 0.5, indicating that over half of the variance in the observable measurement items was explained by the latent factors, on average (Fornell & Larcker, 1981).

Table 3. Convergent Validity of the Reflective Items in the Measurement Model

| Construct/Items | Loadings | CR[a] | AVE[b] |
|---|---|---|---|
| *Innovativeness (INNO)* | | | |
| My organisation adopts creative methods of running business ahead of competitors (INNO1) | 0.644 | 0.929 | 0.688 |

| | | | |
|---|---|---|---|
| My organisation introduces new products or technological capabilities ahead of the competition (INNO2) | 0.805 | | |
| My organisation has a long-term commitment to invest in new technology, R&D, and continuous improvement (INNO3) | 0.902 | | |
| My organisation innovative initiatives hard for competitors to imitate successfully (INNO4) | 0.930 | | |
| My organisation routinely makes a dramatic innovation in products, services, or process technologies (INNO5) | 0.841 | | |
| My organisation engages innovative behaviours and activities (INNO7) | 0.825 | | |
| *Proactiveness (PROAC)* | | | |
| My organisation adopts creative methods of running business ahead of competitors (PROAC1) | 0.814 | 0.927 | 0.648 |
| My organisation introduces new products or technological capabilities ahead of the competition (PROAC2) | 0.773 | | |
| My organisation expands capacity ahead of the competitors (PROAC3) | 0.792 | | |
| My organisation continuously seeks opportunities (such as new market, new customer) related to the present operations (PROAC4) | 0.605 | | |
| My organisation strives to be a “first mover” to capture the benefits of industrial pioneering (PROAC5) | 0.893 | | |
| My organisation closes monitoring of technological trends and identifying future needs of customers (PROAC6) | 0.853 | | |
| My organisation is proactive (PROAC7) | 0.870 | | |
| *Risk-taking (RISK)* | | | |
| My organisation commits a large portion of its resources in order to grow (RISK1) | 0.770 | 0.872 | 0.534 |
| My organisation invests in high-risk projects which promise high returns (RISK2) | 0.651 | | |
| My organisation invests in major projects through heavy borrowing (RISK3) | 0.837 | | |
| My organisation uses tried-and-true practices and techniques to explore new opportunities (RISK4) | 0.702 | | |
| My organisation adopts bold, aggressive posture in order to maximise the probability of exploiting potential opportunities (RISK5) | 0.728 | | |
| My organisation encourages risk-taking behaviours (RISK6) | 0.683 | | |
| *Competitiveness Aggressiveness (COMPT)* | | | |
| My organisation adopts a price-cutting strategy to enhance a competitive position (COMPT1) | 0.702 | 0.831 | 0.500 |
| My organisation assumes an aggressive position to combat market challenge (COMPT2) | 0.703 | | |
| My organisation copies the business practices or techniques of successful competitors to enhance a competitive position (COMPT3) | 0.612 | | |
| My organisation adopts routinely, a highly competitive, “undo-the-competitive” posture against threatening competition (COMPT4) | 0.634 | | |
| My organisation uses of unconventional strategies to challenge competitors (COMPT5) | 0.858 | | |
| *Intention to Quit (ITQ)* | | | |
| I intent, within a period of three years, to go working in another company (ITQ1) | 0.883 | 0.899 | 0.748 |

| | |
|---|---|
| I have checked out a job in another company previously (ITQ2) | 0.900 |
| If I received an attractive job offer from another company, I would take the job (ITQ3) | 0.809 |

*Notes: Item INNO 6 was deleted due to low loading; [a] CR = (square of the summation of the factor loadings)/ {(square of the summation of the factor loadings) + (summation of error variances)}; [b] AVE = (summation of the square of the factor loadings)/ {summation of the square of the factor loadings} + (summation of error variances)}.*

In this study, the discriminant validity of the components was determined using the heterotrait-monotrait correlations (HTMT) criterion. Henseler, Ringle, and Sarstedt (2015) argued that the Fornell-Larcker criterion, which is commonly used, has low sensitivity and may not be able to detect discriminant validity issues as effectively as the HTMT criterion. Based on the HTMT results presented in Table 4, none of the inter-construct correlations exceeded 0.90, indicating that none of the correlations met the HTMT.90 requirement. Therefore, the HTMT results confirmed a lack of discriminant validity.

Table 4. Discriminant Validity: Heterotrait-Monotrait (HTMT) Results

| Constructs | COMPT | INNO | ITQ | PROAC | RISK |
|---|---|---|---|---|---|
| COMPT | | | | | |
| INNO | 0.589 | | | | |
| ITQ | 0.366 | 0.198 | | | |
| PROAC | 0.587 | 0.883 | 0.216 | | |
| RISK | 0.822 | 0.641 | 0.319 | 0.560 | |

### 4.2 Assessments of the Structural Model

The study employed the bootstrapping technique with 500 re-samples to create path coefficients and their corresponding t-values, and the $R^2$ results indicate that innovativeness, proactiveness, risk-taking, and competitive aggressiveness account for 38.8 percent of ITQ. The study found that all four proposed hypotheses were significantly related to the ITQ of engineers. The negative association between innovativeness and ITQ ($\beta$*=-0.164, t-value=1.679*) was supported at the 0.05 level of significance, thereby supporting H1. Similarly, proactiveness was negatively associated with ITQ ($\beta$*=-0.315, t-value=3.452*) at the $p<0.05$ level of significance, thus supporting H2. The data also revealed that risk-taking had a negative relationship with ITQ ($\beta$*=-0.359, t-value=5.012*) at the $p<0.05$ significant level, thereby supporting H3. Additionally, the study found that competitive aggressiveness was negatively associated with ITQ ($\beta$*=-0.319, t-value=4.505*) at the $p<0.05$ level of significance, supporting H4. The findings are summarized in Table 5 and Figure 2.

Table 5: Path Coefficient And Hypothesis Testing

| Hypotheses | Relationships | Beta | t-Value | p-Value | Decisions |
|---|---|---|---|---|---|
| H1 | Innovativeness (INNO) → Intention to Quit (ITQ) | -0.164 | 0.679 | 0.047 | Supported |
| H2 | Proactiveness (PROAC) → Intention to Quit (ITQ) | -0.315 | 3.452 | 0.000 | Supported |
| H3 | Risk-taking (RISK) → Intention to | -0.359 | 5.012 | 0.000 | Supported |

| | | | | | |
|---|---|---|---|---|---|
| | Quit (ITQ) | | | | |
| H4 | Competitive Aggressiveness (COMPT) → Intention to Quit (ITQ) | -0.319 | 4.505 | 0.000 | Supported |

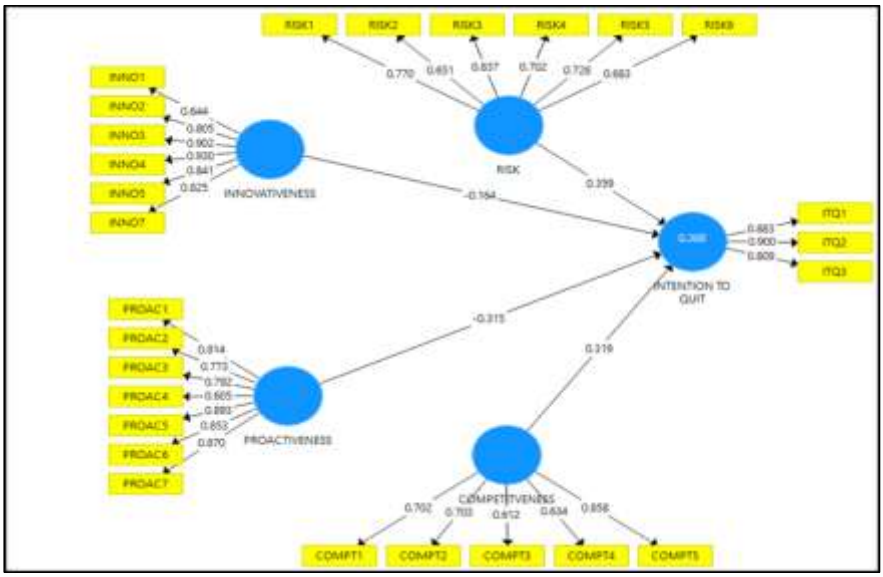


Figure 2. Structural Model (Full Estimation Model)

## 5.0 Discussion

The current study aimed to investigate the relationship between engineers-entrepreneurs, IEO and ITQ in organizations. Previous research has highlighted the importance of engineers-entrepreneurs in this context (Alam, Nasir & Abdul Rehman, 2020; Buekens, 2014; Osman, et al., 2018; Osman et al., 2022; Williamson et al., 2013). Results from data analysis indicated that 38.8 percent of the variance in engineers' ITQ jobs could be explained by innovativeness, proactiveness, risk-taking, and competitive aggressiveness behaviours. Innovation is an essential component of business growth and success, and it is often linked to the personalities and behaviours of those who are responsible for generating and implementing new ideas. In the case of engineers, their ability to be innovative is closely tied to their inherent qualities and skills, such as creativity, problem-solving, and technical knowledge (Fouad et al., 2016; Singh et al., 2021). Through their expertise and experience, engineers are able to take abstract concepts and turn them into tangible products, systems, and services that can drive a company's success (Bigliardi et al., 2005; Igbaria & Siegel, 1992; Menzel et al., 2007; Osman et al., 2018; Osman, et al., 2022; Williamson et al., 2013). As a result, the direct relationship between innovativeness

and ITQ can be seen as a reflection of the critical role that engineers play in driving innovation and growth within an organization.

The process of innovation is a critical element in the success of any organisation. Engineers, with their technical skills, knowledge and expertise, play a vital role in developing and implementing new technological solutions. To enhance their potential for innovation, engineers must exhibit innovative behaviours such as creativity, risk-taking, and proactivity (Campbell et al., 2012; Igbaria Siegel, 1992; Kaewsri & Tongthong 2013; Lumpkin & Dess, 1996; Osman et al., 2022). When engineers exhibit these behaviours, they are more likely to generate new ideas, develop new products and services, and contribute to the growth and success of their organisation. However, innovative behaviours alone are not enough to guarantee success. To reduce the level of ITQ among engineers, it is crucial to develop and cultivate innovative behaviours within their personalities (Osman, et al., 2018; Saeed, 2022; Williamson et al., 2013; Yang et al., 2011). This means instilling certain traits and characteristics, such as being extroverted, creative, flexible, and possessing conceptual thinking skills. When engineers feel supported and empowered to take risks and try new ideas, they are more likely to demonstrate innovative behaviours and reduce their ITQ levels.

Proactive engineers are crucial for an organisation's growth and success, particularly in a competitive market where innovation is the key to staying ahead. Their proactivity can be displayed in several ways, such as identifying potential problems before they occur, seeking out new opportunities, and coming up with solutions that align with the company's objectives (Chen et al., 2022; Lumpkin & Dess, 1996; Lumpkin & Dess, 2001). By engaging in proactive behaviour, engineers can anticipate the needs of the organisation and take the initiative to develop new ideas that support those objectives, rather than simply reacting to changes in the market. For instance, a proactive engineer might conduct research on new technologies and propose innovative solutions that could improve the organisation's efficiency or product quality. This kind of proactive behaviour requires a high level of creativity, strategic thinking, and risk-taking, as well as a willingness to challenge the status quo. In order to encourage such behaviours, organisations must provide a supportive environment that fosters creativity and innovation, as well as recognize and reward proactive engineers for their contributions.

Risk-taking is a crucial factor in the success of engineering projects, as it is often necessary to take calculated risks to achieve new breakthroughs and innovations. Engineers must be willing to take on challenging projects and navigate complex problems, even when the risks are high. This behaviour can be particularly important when developing new products or technologies, as there may be significant uncertainties involved in the process. In an engineering job, the stakes can be high, as mistakes or failures can result in serious consequences such as equipment damage, financial loss, or even injury. Therefore, it is important that engineers understand the potential risks involved in their work and take steps to mitigate them while still pushing the boundaries of what is possible (Fouad et al., 2016; Mittal, 2019; Singh et al., 2021). By emphasizing risk-taking as a desirable behaviour in engineering job descriptions, organizations can attract engineers who are

willing to take on these challenges and contribute to the success of the company (Corr^ea et al., 2021).

Engineering firms are under constant pressure to innovate and compete with their rivals in order to stay ahead in the market (Ayalp, 2022; Mittal, 2019; Perry et al., 2016; Tomer & Sharma, 2022). This requires engineers to possess a certain level of innovation skills, which enables them to identify, evaluate, and translate ideas into actual products or services. In addition to these skills, engineers need to have a greater level of achievement spirit and extraversion behaviours to succeed both at an individual and organizational level. This includes being proactive, taking calculated risks, and being assertive in their decision-making processes (Covin & Slevin, 1986; Grip & Smits, 2012; Lumpkin & Dess, 1996; Williamson et al., 2013). By developing these traits, engineers can become more confident in their abilities to innovate and compete effectively in the market, ultimately leading to greater job performance and success. Additionally, these traits can also contribute to the development of a positive organizational culture that fosters creativity, collaboration, and continuous improvement.

## 6.0 Conclusion

The current study aims to fill a gap in the existing literature in human resource management, entrepreneurship, and ITQ by exploring the relationship between IEO and ITQ among engineers. Specifically, this study expands upon the IEO components to allow for a more thorough analysis of their individual impact on ITQ. This contributes to the theoretical understanding of how IEO behaviours can affect engineers' ITQ, and highlights the importance of considering individual components rather than viewing IEO as a singular construct. Furthermore, by investigating the relationship between IEO and ITQ among engineers, this study offers practical implications for organisations seeking to improve their employees' ITQ. The findings suggest that organisations should encourage and support IEO behaviours among their engineering workforce, including innovativeness, proactiveness, risk-taking, and competitive aggressiveness (Covin & Slevin, 1986; Grip & Smits, 2012; Lumpkin & Dess, 1996; Osman, 2018; Osman, et al., 2022; Williamson et al., 2013). Additionally, organisations should consider the demographic characteristics of their engineering staff, such as gender and age, when promoting and developing their ITQ skills. By doing so, organisations can create a more productive and innovative work environment, leading to increased competitiveness in the marketplace.

By expanding the understanding of how IEO affected engineers' ITQ, the current study contributes to the existing literature by shedding light on the intricacies of the relationship between these variables. Through a comprehensive analysis of the roles of engineers as entrepreneurs, the study provides insights into the specific IEO components that have a significant impact on engineers' workplace behaviours and their ability to avoid ITQ. This understanding can inform human resource management practices, allowing for more effective recruitment, training, and retention strategies for engineers. The study also provides a framework for further research on the topic, which can lead to a deeper

understanding of the relationship between IEO and ITQ among engineers and potentially inform the development of interventions to mitigate ITQ.

Engineers with strong IEO possess a unique set of characteristics and skills that enable them to drive innovation and creativity within an organization (Covin & Slevin, 1986; Grip & Smits, 2012; Lumpkin & Dess, 1996; Osman et al., 2022; Williamson et al., 2013). By combining their inventiveness, risk-taking, proactiveness, and competitive aggressiveness with the knowledge, skills, and competencies required to boost entrepreneurial values, these engineers can help organizations achieve their strategic objectives and maintain a competitive edge in the market (Bigliardi et al., 2005; Igbaria & Siegel, 1992; Menzel et al., 2007; Osman, et al., 2022; Williamson et al., 2013). Such engineers are typically self-motivated and proactive, possessing a deep understanding of their field and industry trends (Perry et al., 2016; Tomer & Sharma, 2022). They are comfortable with uncertainty and ambiguity, and they are willing to take calculated risks to achieve their goals. Additionally, they tend to be competitive and driven, always looking for new ways to improve their performance and outperform their peers. By leveraging their IEO behaviours, engineers can create a culture of innovation and entrepreneurialism within their organizations, driving growth and success in the long term.

The current study offers significant contributions to the existing body of knowledge on engineers' ITQ and the role of IEO behaviours in predicting it. While previous research has identified innovativeness, proactiveness, and risk-taking as essential IEO components, the relevance of competitive aggressiveness had not been explored thoroughly, and there was a lack of supporting research, scale measurements, and argumentation. By including competitive aggressiveness as a crucial IEO component, this study fills the research gap and provides new insights into how this behaviour affects engineers' ITQ. Additionally, this study contributes to the conceptual framework of EO theory, which proposes that IEO behaviours can lead to ITQ jobs for engineers. By empirically demonstrating this relationship, the study adds to the understanding of how IEO can be used to improve engineers' ITQ and the overall performance of organisations. It not only highlights the importance of competitive aggressiveness but also provides a more comprehensive understanding of how IEO behaviours can influence ITQ among engineers.

The current study has made several significant contributions to the field of human resource management and ITQ among engineers, but it has some limitations that future research can address. Firstly, the study's primary findings focused on the relationship between IEO and ITQ among engineers, but did not account for the potential impact of other variables that could influence engineers' desire to stay in their current job. Future research should investigate the effects of other factors such as perceived organizational support, extra-role behaviours, trust, leader-member exchange, and organizational citizenship behaviours as mediators of the relationship between IEO and ITQ.

Secondly, the current study was conducted entirely on Malaysian engineers and was limited to manufacturing enterprises in the states of Melaka and Johor. Therefore, its findings may not be generalizable to other regions or sectors of the engineering industry. Future research could expand the study's scope to include engineers from various regions

and industries in Malaysia, as well as comparative studies among professions. Furthermore, the study did not explore the potential moderating effects of age and gender on the relationship between IEO and ITQ. Future research could investigate how these demographic variables could influence the observed relationships in the conceptual framework. Finally, since this study only recruited engineering samples, future research should examine the IEO components and their impact on ITQ in other professions such as accountants, architects, medical doctors, and lawyers. This could broaden the scope of the study's findings and contribute to a more comprehensive understanding of the relationship between IEO and ITQ across various professions.

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## Article Contribution to Related Field of Study

The study provides new insights of EO theory into the relationship between IEO and ITQ among engineers, which contributes to the theoretical framework development of the concept of IEO and ITQ. By examining the relationship between IEO and ITQ, the study extends the existing literature in human resource management (HRM), and entrepreneurship study. This study sheds light on how individual characteristics such as innovativeness, proactiveness, risk-taking, and competitive aggressiveness can influence an engineer's ITQ. The study also highlights the importance of understanding the role of IEO in predicting ITQ among engineers, which can be useful for researchers and practitioners interested in enhancing employee retention and reducing talent shortages in the engineering sector.

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