

# A Parallel Mediation Analysis of Behavioral Constructs Linking Intention-to-Use Technology to Performance Outcomes Among Pharmaceutical Executives

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## Abstract

Managers in organizations are at a crossroads in understanding how behavioral intention to use technology influences employee performance. In the technology acceptance model, behavioral intention is a precursor to actual system use. However, there is inadequate information on how this intention indirectly impacts performance among employees in pharmaceutical organizations. Intuitively, behavioral mechanisms (job satisfaction, conscientiousness, self-efficacy, perceived relevance) should transform technology use into desired outcomes and serve as explanatory links between behavioral intention and technology performance. Using the theoretical lens of the technology acceptance model, reasoned action, and contingency theories, this study explored the mechanisms linking behavioral intention to technology performance among pharmaceutical executives. A web-based survey of a random sample of 282 pharmaceutical executives was conducted using a self-administered Google Forms questionnaire. Data was analyzed using variance-based structural equation modeling in ADANCO software, controlling for job-based demographics. All independent variables in the model significantly explained the variance in the dependent variable, technology performance. Perceived relevance was the only substantial linkage between behavioral intention and technology performance. The study confirmed that perceived relevance is an important mediator between behavioral intention and technology performance. To enhance performance, managers should adopt strategies that enhance job satisfaction, conscientiousness, self-efficacy, and perceived relevance. Ensuring appropriate technology deployment, adequate employee education, and targeted training are crucial for enhancing these mediating effects. The study contributes to the existing literature by recommending the inclusion of perceived relevance as a mediating link in the technology acceptance model.

## 1. Introduction

The technology acceptance model is a globally applied concept by researchers and managers to identify user acceptance and adoption (Davis, 1989; Davis et al, 2023). In advancing the technology acceptance model, Davis et al (1993) identified three key variables that typically underlie the parsimonious model- perceived ease of use (PEOU), perceived usefulness (PU), and behavioral intention to use (BIU). The initial model has undergone further developments to variants using a basis or background in the theory of reasoned action and planned behavior (Davis et al, 2023).

Whilst BIU is surmised to be a precursor of actual system use, not much empirical research has been done to explore the behavioral mechanisms through which BIU positively impacts performance. Moreover, it has been established in the technology acceptance model that employees with high levels of BIU tend to use technology more, and invariably achieve positive performance (Davis et al, 2023). Hence, it is implied that there is a need to investigate these mechanisms that mediate or explain their effect on technology performance (TechP) among pharmaceutical executives in Nigeria. The pharmaceutical marketing industry in Nigeria comprises many indigenous and multinational companies with a large network of representatives or executives estimated to be over 20,000 (Oamen, 2021a; Oamen, 2021b). Before the mid-2000s, work engagement with clients, colleagues, and superiors by pharmaceutical executives in developing countries like Nigeria had been largely done via manual or analog means. The use of manual-based processes has largely limited the quality, speed, efficiency, and effectiveness of performance output. However, the widespread use of the internet and technology-enabled work processes such as computers, electronic mail, WhatsApp, electronic or e-detailing, e-marketing, and e-reporting methods has shifted the paradigm of performance management in the pharmaceutical industry (Kwak & Chang, 2016; Kwak & Chang 2022).

It has been established in management literature, that the potential instrumentality of behavioral norms of employees in explaining the mechanisms of the technology acceptance model, apart from PEOU and PU (Davis et al., 1993: Davis et al., 2023). On the other hand, the theory of reasoned action suggests that an individual's decision to engage in a particular behavior or action is influenced by external factors or influences. Some key behavioral mechanisms outlined in the literature include job satisfaction (JS), self-efficacy (SE), conscientiousness (CS), and perceived relevance or value (PR) (Ajzen et al., 2009; Mallya et al., 2019: Oamen, 2022c; Oamen & Omorenuwa, 2022). For instance, highly satisfied employees or employees with high levels of job satisfaction (JS) tend to perform better at work. In the same vein, employees who are satisfied with their work conditions (remuneration, quality of technology used, work climate, etc.) tend to elicit higher performance than those who are not (Oamen, 2021a; Oamen & Omorenuwa, 2022). By extension, the rate of technology utilization for executing tasks is enhanced when they are satisfied with their jobs. Although the direct link between JS and BIU is apparent in most firms, how it explains TechP outcomes has not been empirically established in the context of the pharmaceutical marketing industry.

Individuals with high levels of SE tend to perform better at work because they have an intrinsic belief in their ability to use technology effectively (Mallya et al, 2019). This positive attitude to work is known to elicit better technology use among employees. SE has been connected to enhanced job performance among pharmaceutical managers (Oamen, 2022). Consequently, it is interesting to explore how SE links BIU to TechP among pharmaceutical executives, taking into consideration BIU's direct link to performance outcomes. Likewise, employees who are conscientious or task-focused tend to perform better at work (Oamen & Ihekoronye, 2022). Although the construct of CS in task environments is known to enhance intentions to act or take steps for individuals with high levels (Ajzen & Czasch, 2009; Conner & Norman, 2022). However, how it explains the linkage between BIU to performance is yet to be tested. This establishes the imperative to explore how CS links BIU to TechP.

Furthermore, PR of adopted or existing technology has some effect on the behavioral intentions of users of technology and consumer products. In other words, from an individual perspective, PR is achieved as a perceived balance between what is received from technology, and the actual value it delivers. This is as perceived by the user, and not by the owner or supplier of the technology (Woodruff, 1997). Perception of relevance of any technology by end users or employees should be evaluated especially as a firm constantly seeks to update or add to existing technology. Otherwise, implementation may be suboptimal or unconvincing.

These aforementioned arguments provide a conceptual basis for incorporating JS, CS, SE, and PR as explanatory variables for elucidating the relationship between BIU and TechP. However, in the context of the pharmaceutical marketing industry, there is insufficient empirical evidence to show how these constructs or variables influence the causal relationship between BIU and TechP among field-based employees in the industry. Extrapolating from the theoretical basis established by Henseler (2021) and Collier (2020), the variables were used as parallel mediators because the authors intended to explore their independent mediating or explanatory effects in the model (Collier, 2020; Henseler, 2021).

The rationale or premise for focusing this empirical study on pharmaceutical executives in Nigeria is hinged on the strategic relevance of Nigeria's pharmaceutical market in Africa. Several reasons may be adduced for this

focus, firstly, according to McKinsey (2017), Nigeria is projected to be the largest market in Africa within the next decade, especially for medicines used for the management of diseases prevalent in the continent. Secondly, due to the fast-growing population in Nigeria (estimated to be over 200 million people), it portends huge commercial and economic importance to pharmaceutical industries operating in the country. Thirdly, from the standpoint of performance improvement due to technology adoption and use, pharmaceutical executive's use of technology in the marketing of pharmaceutical products to the healthcare system is increasingly important. Thus, it is required to equip pharmaceutical executives with the necessary technology tools and ensure they understand the imperatives of utilizing technology to enhance performance (Oamen, 2021a).

Therefore, the objective of the study is to explore the explanatory or mediatory influence of JS, CS, SE, and PR on the relationship between BIU and TechP among pharmaceutical marketing executives in Nigeria.

## 2. Literature Review and Hypotheses Development

### 2.1 The Theoretical Framework of the Study

#### 2.1.1 Technology Acceptance Model

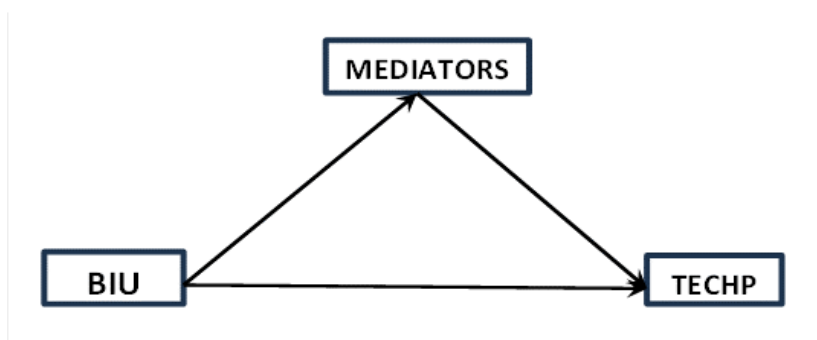
The technology acceptance model was propounded by Davis (1989: 1993) is a leading social psychology concept used to explore user acceptance and adoption of technology. The three key variables –PEOU, PU, and BIU are pivotal to understanding how technology acceptance affects actual system use and performance (Davis et al, 1993: 2023). The model presumes that user acceptance of technology is premised on users' perceived benefit and usefulness of new technology (Davis, 1989). Technology acceptance models have enabled researchers to comprehend and assess how users or prospective users accept any given technology. Therefore, the evaluation of intention to adopt or use technology within the explanatory context of mediators among pharmaceutical executives is essential as it elucidates how acceptance and use of technology support competitive advantage, efficiency, productivity, and overall performance (Davis et al., 1989; Davis et al., 2023).

#### 2.1.2 Theory of Reasoned Action

The theory of reasoned action suggests that an individual's decision to engage in a particular behavior is contingent upon or influenced by the intention to perform an action or engage in a behavior (Fishbein & Ajzen, 1975). In sync with the technology acceptance model, the theory of reasoned action enables researchers to explore the variables that may influence user acceptance of technology (Fishbein & Ajzen, 1975). In other words, volitional behavior engaged by an employee is premised on the attitude towards that particular behavior. In the context of this study, an attitude refers to the feelings or affective response towards a particular behavior.. Invariably, BIU directly influences work behavior or actions, and eventually performance. Hence, implicitly, BIU does not necessarily lead to actual use behavior only, and its effect on performance may be mediated by attitude influenced by behavioral constructs such as JS, CS, SE, and PR.

#### 2.1.3 Theory of Contingency Management

The theory of contingency management (also known as Leaders-Managerial-Adaptation Theory) as advocated by Fiedler (1974) refers to the adaptive measures taken by managers to elicit the best performance from subordinates or the adapted response of managers to behaviors expressed by subordinates (Venkatraman 1989; Shala et al, 2021). The contingency approach is a highly advocated skill set among managers as it enables managers to respond adequately to the attitudes and behaviors of subordinates to provide solutions (Vidal et al., 2017). In the context of strategic management, contingency theory stipulates that there is no singular, universal best solution to address work problems irrespective of the firm or work context, but requires managers to be adaptable and responsive (Shala et al, 2021). This means that managers should adequately respond to employees who may exhibit behaviors such as JS, CS, SE, and PR which may mediate the conversion of BIU to work actions and thereby impact TechP, Therefore, in light of this theory, employees exhibiting varying levels of SE, CS, JS, and PR require their managers to address their concerns adaptively and should be managed differently.



**Fig.1** Conceptual framework diagram

**Note.** BIU=behavioral intention-to-use, TechP= technology performance, \*Mediators are SE=self efficacy, CS=conscientiousness, JS=job satisfaction, PR=perceived relevance

## 2.2 Technology Performance (TechP)

Technology performance (TechP) refers to the perception of the benefits of proposed or existing technology on an employee and organization's work operations and outputs (Martinez-Caro et al, 2020). From the perspective of the employer, it is essential to measure or ascertain the mindset of their employee about existing, newly introduced, or proposed technology in their work processes. Intuitively, TechP is therefore an outcome of positive BIU and actual system use by the employer. Therefore, TechP from the perspective of the employee is indicative of the improvement in core work operations due to the impact of technology used by the employee. Examples of work functions include- inventory management, enhanced selling competencies, improved communication with clients, colleagues, and superiors, reduced cost of doing business, reduced physical meeting time, enhanced information sharing capability, e-detailing, supply chain optimization, prospecting activities, and bookkeeping (Kwak & Chang, 2016; Martinez-Caro et al, 2020; Oamen, 2021b; Kwak & Chang 2022).

## 2.3 Behavioral Intention-to-use

BIU is an integral component of the technology acceptance model. It typifies the willingness or unwillingness of an individual to exhibit, engage in a particular behavior, or use a particular technology. It is influenced by PEOU and PU of technology in enhancing attitudes and behaviors that lead to technology acceptance and utilization for productive use (Davis et al., 1989; 1993). In the typical technology acceptance model, BIU serves as a mediator by explaining the effects of PEOU and PU on actual system use and invariably on performance. In the pharmaceutical marketing industry, the actual use of technology impacts the activities that influence TechP. Inherent in the technology acceptance model is the modeling of BIU as a consequence of the effects of PEOU and PU on technology use, the desired behavior is impacted not only by the perceived benefits of using technology but by the individual's perception of relevance to the task/s at hand (Davis, 1989). The more task-focused an individual is in the workplace, the more likely that positive intentions toward technology use would impact TechP. Hence, the CS behavior of an employee toward technology support for tasks or work has a potential impact on BIU for positive outcomes (Conner & Abraham, 2001; Conner & Norman, 2022; Lindahl, 2023). As a construct- the JS of employees has a positive impact on their BIU, however, this relationship may be reciprocal in nature, as employees with high BIU may implicitly possess or exhibit JS (Lindahl, 2023).

Furthermore, according to Basaram & Aksoy (2017), from the perspective of consumers, established a direct link between domains of PR and BIU in which a better appreciation of the value of a particular technology has positive effects on their intention to use such technology. In the same vein, PR has been shown to have positive effects on BIU when employees perceived greater benefits compared to efforts required to understand and utilise technology tools (Woodruff, 1997). Mallya et al (2019) affirmed high SE (belief in the ability to use technology) tends to enhance the intention of employees toward productive engagement in tasks (Mallya et al, 2019).

Therefore, based on the above, the following hypotheses were developed-

- H1:** BIU positively influences TechP of pharmaceutical executives
- H2a:** BIU positively influences JS of pharmaceutical executives
- H2b:** BIU positively influences PR of pharmaceutical executives
- H2c:** BIU positively influences CS of pharmaceutical executives
- H2d:** BIU positively influences SE of pharmaceutical executives

## 2.4 Mediators

### 2.4.1 Self-efficacy (SE)

Self-efficacy (SE) refers to the perception of an individual about his or her ability to perform tasks, duties, and responsibilities. SE is a widely researched construct in social and management sciences. High levels of SE among individuals or employees are asserted to be associated with improved job performance, learning, and innovative behavior (Bandura, 1977; Yusuf, 2011; Iroegbu, 2015; Newman et al., 2018). SE has been identified as a significant predictor of job performance among pharmaceutical managers (Oamen, 2022). Furthermore, SE aligns with the theory of social cognition or learning which affirms that the behaviors of individuals are influenced by the behavior and outcomes of the behavior of others in the environment (Bandura, 1977). In other words, the employee learns from his actions and those of others and the environment. Thus, when SE levels tend to increase, it encourages more performance as compared to when lowered (Bandura, 1977; Mallya et al., 2019). In the same vein, SE is a task-specific attribute, and hence, it should be evaluated in the context of technology. Iroegbu (2015) suggested the use of SE in conjunction with other constructs to explain the impact on performance. Rhodes et al (2008) and Webb & Sheeran (2006) argued that SE serves as a mediating link between intention and actual behavior which impacts the success of the desired outcome. In other words, individuals with high SE are better able to translate their BIU to better TechP. Therefore, in the context of pharmaceutical marketing executives, this study proposes SE as a link to explain the relationship between BIU and performance as perceived by employees

**H3a:** SE positively influences the TechP of pharmaceutical executives

**H3b:** SE mediates the relationship between BIU and TechP

### 2.4.2 Conscientiousness (CS)

CS refers to the degree to which an individual is self-directed, task-focused, and performance-driven to achieve set goals and objectives (Ajzen, Czasch, & Flood, 2009). CS is an organization-based citizenship behavior known to be a key determinant and linked to improved or high levels of performance for the benefit of the organization (Kappe & Van Der Flier, 2012). Conscientious employees tend to be self-motivated and are not deterred by challenges in pursuit of their personal and corporate goals (Oamen, 2022). A study by Oamen (2022) established that high CS displayed by pharmaceutical executives had a significant impact on the desire to remain in the organization (normative commitment). In the same study, it was established that adequate motivation and staff retention strategies tend to enhance the capacity of conscientious employees to make more contributions to their organization. Also, Lindahl (2023) established that conscientiousness was a significant predictor of research productivity of doctoral students. Conversely, persons who score high on CS tend to be dependable, hardworking, result-oriented, and with a high sense of duty to their organization's purpose with an overall impact on productivity (Rothmann & Coetzer, 2003; Lindahl, 2023). A systematic study by Ajzen et al (2009) affirmed that CS plays a mediatory role between intention and actual behavior (Ajzen, Czasch, & Flood, 2009). Therefore, executives who have high levels of CS have been shown to engage more in tasks that engender value for their work (Devaraj et al, 2008). On the other hand, from a practical point of view, individuals with high CS are more likely to translate positive BIU to improved performance (Kibos et al, 2019). Hence, it is necessary to establish if CS as an important intrinsic capability acts as a link between BIU and TechP among pharmaceutical executives.

**H4a:** CS positively influences TechP of pharmaceutical executives

**H4b:** CS mediates the relationship between BIU and TechP

### 2.4.3 Job Satisfaction (JS)

JS is one of the most studied constructs in management science. It refers to the positive or negative feelings of an employee about his organization or work. It is denoted by an affective (emotional) and cognitive assessment or appraisal of one's job conditions (Mwesigwa et al, 2020). JS is vastly explored in management research because of its relevance in predicting job motivation, perceived organizational support, turnover intentions, organizational citizenship behavior, and organizational commitment (Maan et al, 2020; Oamen & Omorenuwa, 2022). Highly satisfied employees tend to remain loyal and dedicated to their organizations, and therefore more likely to have positive attitudes and behavior toward new technologies introduced by the firm (Becker, 2004). Studies have shown that the degree of JS experienced by employees is largely indicative of working conditions, remuneration, recognition, relationship with co-workers and superiors, and availability of adequate work tools (Oamen, 2021a; Oamen & Omorenuwa, 2022). In turn, positive levels of JS play a role in engendering employee involvement in applying themselves to technology provided by their company. Conceptually, JS translates or links the influence of BIU on technology use and consequently performance-TechP (Phuong & Vinh, 2020). It is presumed that employees high in JS, are more likely more willing to use technology tools given to them to perform better at work (Oamen, 2021a; Oamen & Omorenuwa, 2022). In this light, JS is yet to be empirically explored as a possible explanation for the effects of BIU on TechP



**H5a:** JS positively influences the TechP of pharmaceutical executives

**H5b:** JS mediates the relationship between BIU and TechP

#### 2.4.4 Perceived Relevance or Value (PR)

**PR** as perceived by pharmaceutical executives is the degree of belief that technology would provide important, functional, appropriate, and adequate value to the work characteristics of an employee (Kim & Huh, 2016). It relates to the customer or individual preference based on perceived desired utility or outcomes to be derived from the attributes of the product or service (Woodruff, 1997; Basaran & Aksoy, 2017; Pate et al, 2021). In other words, employees will use technology to the extent that they perceive or feel it will add value to their work. In the context of the study, perceived relevance **PR** differs from perceived usefulness **PU** in that **PR** refers to the value inherent in the use of a particular technology in executing tasks while perceived usefulness considers the inherent generic capability of technology to impact productivity (Sanchez-Mena et al, 2017). In other words, **PR** is task-specific while **PU** is generic. Sanchez-Mena et al (2017) in a survey of teachers' intention to use educational video games surmised that **PR** did not positively influence the intention to use technology. Furthermore, **PR** is known to be a critical predictor of **BIU** in the service industry in which consumers use value-added services and goods offered by the vendor, but in the context of pharmaceutical marketing, performance is influenced by intermediary factors such as resource availability and improved awareness or sense of relevance (**PR**) about the impact of resources on work operations and output (Kibos et al, 2019). However, this aforementioned context has not been empirically tested to affirm that **PR** mediates the effect of **BIU** on **TechP** among pharmaceutical executives in Nigeria. This is important because having the intention to use a particular technology may be more impactful on the behavior of the employees if he or she finds it relevant to the critical tasks before them that will substantially improve performance (Lu & Wang, 2020). Hence, the study seeks to answer if **PR** mediates or links the relationship between **BIU** and **TechP** among pharmaceutical executives.

**H6a:** **PR** positively influences the **TechP** of pharmaceutical executives

**H6b:** **PR** mediates the relationship between **BIU** and **TechP**

#### 2.4.5 Rationale for Hypothesized Mediating Role of SE, CS, JS, and PR

According to Collier (2020) and Henseler (2021), a parallel mediation model was developed with four mediators (**SE**, **CS**, **JS**, and **SE**) in order to reflect the independent effects of each mediating variable in the relationship between the independent variable (**BIU**) and dependent variable (**TechP**). Based on the technology acceptance model, **BIU** influences attitudes and behaviors that impact individual and organisational performance (Davis et al, 2023). In the light of the theory of reasoned action framework, the mediating role of behavioral constructs, **CS**, **JS**, and **PR** was used to explain the effect of **BIU** on **TechP**. For instance, in organizations, persons with high **SE** are more likely to exhibit better use of technology and deliver expected performance (Mallya et al, 2019). Similarly, employees high in **CS** and **JS** are more motivated and focused on translating **BIU** to better performance (Saari & Judge, 2004; Maan et al, 2020; Lindahl, 2023).

Furthermore, high **PR** in employees tends to positively stimulate positive and optimal use of resources for organisational performance (Lu & Wang, 2020). The contingency management model provides a framework to understand the implications of the presence or absence of mediating effects of **SE**, **CS**, **JS**, and **PR** on human resource managers' strategies to stimulate improved **TechP** among pharmaceutical executives (Shala et al, 2021). However, most studies used **SE**, **CS**, **JS**, and **PR** as moderators to establish the relationship between **BIU** and technology in the technology acceptance model. This study was modeled to explore the mediating mechanisms through which **BIU** influences **TechP** through **JS**, **CS**, **SE**, and **PR** variables among pharmaceutical executives.

In a nutshell, behavioral variables (**JS**, **CS**, **SE**, and **PR**) were modeled as mediators to translate or transform technology use to **TechP** as depicted in Figure 1. They were hypothesized to explain how **BIU** translates to **TechP**. Therefore, this study whilst assuming actual system use by executives, attempts to extend the direct effect of **BIU** on performance.

### 3. Methodology

Based on the theory of reasoned action and technology acceptance model, a structural equation model (**SEM**) was developed using variance-based **SEM** to address these hypotheses in **ADANCO** software while controlling for occupational-demographic variables. **SEM** provides a robust means of conducting advanced multivariate analysis of complex relationships between constructs while accounting for the non-normality of data using the maximum likelihood estimator and bootstrapping methods (Hair et al., 2017; Collier, 2020). Control variables such as gender, type of company, work role, and years of industry experience were considered in the model to adjust or account for the confounding effects their non-inclusion in the model may cause (attenuated path estimates and explanatory power) of the hypothesized model (Nielsen & Raswant, 2018). Therefore, their parameters were not required but their effect on the main parameters of the model. An online survey questionnaire was distributed to

300 pharmaceutical executives from pharmaceutical companies in Nigeria using random sampling, out of which a total of 282 valid responses were obtained representing a 94% return rate. Sample size calculator for structural equation models based on the gamma exponential method by Kock & Hadaya (2018) using parameters- minimum path coefficient=0.15;  $p < 0.05$ ; statistical power=0.8) gave 262 (Kock & Hadaya, 2018). The final sample size was 282. A parallel mediation model was used to understand the mechanisms of the mediator variables independently without causality relationships between the mediators (Hayes, 2013). The model specification was based on one main independent variable-BIU linked to the main dependent variable-TechP by four Mediator variables- JS, CS, SE, and TPR. Data analysis was conducted using variance-based structural equation modeling in ADANCO with bootstrapping set at 999 iterations (Henseler & Dijkstra, 2015). Statistical significance was set at 5% ( $t$ -value  $> 1.96$ ; 95% confidence interval).

### 3.1 Measurement of Variables and Parameters

JS was measured using a single indicator- "How would you rate your level of satisfaction with your job" on a 5-point Likert-type scale ranging from 1 (*very dissatisfied*) to 5 (*very satisfied*), (Maan et al, 2020; Oamen, 2021a; Oamen & Omorenuwa, 2022). According to Scarpello & Campbell (1983) and Maan et al (2020), a single-item global question on a 5-point Likert scale for JS is an adequate measure of overall JS among employees in organisations.

BIU was measured with 5 indicators on a 5-point Likert scale from 1 (*never*) to 5 (*always*). They are-"I will use it as long as it is available"-BIU1; I will recommend it to my colleagues'-BIU2; I think it is relevant to my work-BIU3; I will most likely use it if it is available-BIU4; Technology tools are best work tool for now"-BIU5 (Davis et al., 1989; 1993).

SE was measured with 6 indicators on a 5-point Likert scale from 1 (*never*) to 5 (*always*) -I am very effective in my job-SE1; I take timely decisions and actions-SE2; I address issues/tasks proactively-SE3; I am not limited by challenging or negative situations-SE4; I adapt easily to change-SE5; I am very confident in my capability-SE6. (Bandura, 1977; Mallya et al., 2019).

CS was measured with 7 indicators on a 4-point Likert scale ranging from 1 (*never*) to 4 (*most times*). The indicators include- I work hard at my job-CS1; I need little or no supervision-CS2; I strive to exceed performance expectation-CS3; I am a very detailed person-CS4; I complete work/tasks successfully-CS5; I take timely and prompt decisions-CS6; and I am very dependable-CS7 (Kappe & Van Der Flier, 2012; Oamen & Ihekoronye, 2022; Lindahl, 2023).

PR was measured by six indicators on a 4-point ordinal scale- 1 (*low*), 3 (*moderate*), and 5 (*high*). They include- Technology will help improve business process performance-CPT1; it will minimize losses-CPT2; It will enhance sales performance monitoring-CPT3; It will align my company to global best standards-CPT4; It will enhance feedback with colleagues and clients-CPT5; and it will enhance business profitability-CPT6 (Woodruff, 1997; Basaran & Aksoy, 2017; Sanchez-Mena et al., 2017)

TechP was measured by nine indicators on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*) as follows-My performance has improved significantly-ITP1; It has enhanced my inventory management skills-ITP2; My selling skills have improved-ITP3; my paperwork has significantly reduced-ITP4; It has improved my communication with clients and colleagues-ITP5; My information sharing capability has improved-ITP6; My financial accountability has improved-ITP7; Physical meetings times have greatly reduced-ITP8; and my cost of doing business has reduced-ITP9 (Kwak & Chang, 2016; Oamen, 2021b; Kwak & Chang 2022).

## 4. Results

### 4.1 Demographic Characteristics of Respondents

A majority of respondents were male (77%), while 23% were female. Age-wise, 119 (42.2%) were within 20 to 30 years, 161 (57.1%) were within 31 to 50 years and less than 1% (2) were above 50 years. All respondents are first degree holders out of which 178 (63%) were higher diplomas and Bachelor of Science degree holders. Approximately 58% (164) worked in locally owned firms while 42% (118) worked with multinational firms. In terms of marketing experience, 162 (65%) had between 1 to 5 years of experience, 60 (22%) had 6 to 10 years experience, and 40 (14%) had above 11 years work experience in the pharmaceutical marketing industry.

### 4.2 Assessment of Model Fit

To establish the fit of the data to the hypothesized model, a null hypothesis was developed. The null hypothesis holds that the estimated model fits the data. As shown in Table 1, the standardized root mean squared residual (SRMR) parameter was 0.046 which is less than the cutoff of 0.08; which indicates a good fit of the model to the data (Henseler & Sarstedt, 2013; Henseler, 2021). Discrepancy measures of fit-squared euclidean distance ( $d_{LS}$ )

and geodesic discrepancy ( $d_G$ ) were explored. Hence, since the discrepancy between the estimated model and the implied model is less than the distribution quantile marked by the selected alpha level ( $\alpha=0.05$ ; HI95 or  $\alpha=0.01$ ; HI99), this implies that the structural model is supported (Bollen & Stine, 1992; Henseler, 2021). Therefore, the lower or closer to zero the squared euclidean distance ( $d_{LS}$ ) and geodesic discrepancy ( $d_G$ ) are, the better the model fit of the proposed model.

**Table 1** Model fit of the saturated model

Measures	Value	HI95	HI99	Inference
SRMR	0.0461	0.0494	0.0527	supported
$d_{LS}$	1.3364	1.5354	1.7522	supported
$d_G$	0.7062	0.7755	0.8544	supported

Note. SRMR-standardised root mean squared residual;  $d_{LS}$  –squared euclidean distance;  $d_G$  –geodesic discrepancy, HI95-95% quantile, HI99-99% quantile

**Table 2** Assessment of measurement model: Reliability and Convergent validity measures

Construct	Indicators	FL	VIF	CR	Joreskog's rho	Cronbach	AVE
<b>BIU</b>				0.909	0.904	0.906	0.654
	BIU1	0.687	2.547				
	BIU2	0.854	2.969				
	BIU3	0.857	2.701				
	BIU4	0.765	3.227				
<b>TechP</b>	BIU5	0.866	1.790				
				0.919	0.917	0.917	0.551
	ITP1	0.792	2.298				
	ITP2	0.754	2.457				
	ITP3	0.766	2.160				
	ITP4	0.649	1.646				
	ITP5	0.753	2.266				
	ITP6	0.822	2.456				
	ITP7	0.717	2.022				
ITP8	0.723	2.090					
ITP9	0.688	2.475					
<b>PR</b>				0.889	0.877	0.880	0.548
	CPT1	0.569	1.717				
	CPT2	0.787	1.909				
	CPT3	0.658	1.893				
	CPT4	0.659	2.143				
	CPT5	0.828	1.942				
<b>SE</b>				0.857	0.850	0.851	0.489
	SE1	0.751	1.720				
	SE2	0.773	1.864				
	SE3	0.784	1.929				
	SE4	0.608	1.603				
	SE5	0.607	1.690				
	SE6	0.650	1.628				
<b>CS</b>				0.689	0.686	0.688	0.355
	CS4	0.616	1.311				
	CS5	0.624	1.358				
	CS6	0.533	1.333				
	CS7	0.604	1.210				
<b>JS</b>	JS	1.000	1.000	1.000	1.000	1.000	1.000



Note. FL-factor loadings, VIF-variance inflation factor, Cronbach alpha, AVE-average variance extracted, JS-measured by a single indicator; CS1, CS2, and CS3 were removed for factor loadings below 0.5.

The measurement model was assessed for convergent validity. As shown in Table 2, the convergent validity of the constructs was evaluated based on indicator items with factor loadings above 0.5 (Hair et al., 2017). However, measurement items- CS1, CS2, and CS4 were removed because of low factor loadings. Based on criteria of greater than 0.6 to 0.7 for composite reliability, Joreskog's rho, and Cronbach alpha, all values of the constructs were within range. Furthermore, average variance extracted (AVE) values were above the baseline of 0.5 for BIU, TechP, and PR while the values for SE, and CS were below 0.5. However, based on the argument of Malhotra & Dash (2011) and Hair et al (2017), acceptable convergent validity is established when CR is above 0.6 with AVE below 0.5.

**Table 3** Discriminant validity of measurement model (Heterotrait Monotrait)

Construct	CS	PR	TechP	SE	BIU	JS
CS						
PR	0.308					
TechP	0.340	0.531				
SE	0.514	0.334	0.458			
BIU	0.311	0.360	0.674	0.556		
JS	0.101	0.231	0.191	0.079	0.107	

Note. Heterotrait Monotrait=HTMT, baseline value<0.85

As shown in Table 3, the divergent or discriminant validity of the estimated model was evaluated using the Heterotrait Monotrait criterion with a strict benchmark of 0.85 (Henseler et al., 2015). The constructs all have values within the range of 0.079 to 0.674; which are below the baseline value of 0.85. Hence confirming the separability or uniqueness of each construct from the other is established.

**Table 4** Path analysis of the structural model

Path	R <sup>2</sup>	coefficient	t-value	p-value	95% C. I	Hypotheses
CS ---> TechP [ <i>d_path</i> ]		0.059	0.720	0.236	[-0.089; 0.218]	not supported
PR ---> TechP [ <i>f_path</i> ]		0.315	4.257	0.001	[0.173; 0.466]	supported
SE ---> TechP [ <i>h_path</i> ]		0.025	0.262	0.397	[-0.164; 0.220]	not supported
BIU ---> CS [ <i>c_path</i> ]	10.0	0.316	4.026	0.001	[0.155; 0.477]	supported
BIU ---> PR [ <i>e_path</i> ]	13.3	0.365	4.308	0.001	[0.191; 0.524]	supported
BIU ---> TechP [ <i>direct_path</i> ]	57.7*	0.520	6.915	0.001	[0.350; 0.647]	supported
BIU ---> SE [ <i>g_path</i> ]	31.2	0.558	7.055	0.001	[0.401; 0.706]	supported
BIU ---> JS [ <i>a_path</i> ]	1.14	0.107	1.573	0.058	[-0.023; 0.244]	not supported
JS ---> TechP [ <i>b_path</i> ]		0.059	1.283	0.100	[-0.031; 0.146]	not supported

Note. Coefficient of determination=R<sup>2</sup> expressed as a percentage; \*R<sup>2</sup> value includes all independent variables

Table 4 shows the test of hypotheses of the structural model, the *f\_path*, *c\_path*, *e\_path*, *direct\_path*, and *g\_path* were all supported with significant t-values above 1.96 and 2.56 ( $p < 0.05$ : 0.01). Also, the coefficient of determination (R<sup>2</sup>) values provided evidence of the variance in the dependent variables accounted for by the independent variables. Hence, based on the cutoff of equal or more than 10% (0.1) recommended by Falk & Miller (1992), all paths apart from *a\_path* satisfied the condition (Falk & Miller, 1992). In other words, BIU did not adequately predict or influence JS in the structural model

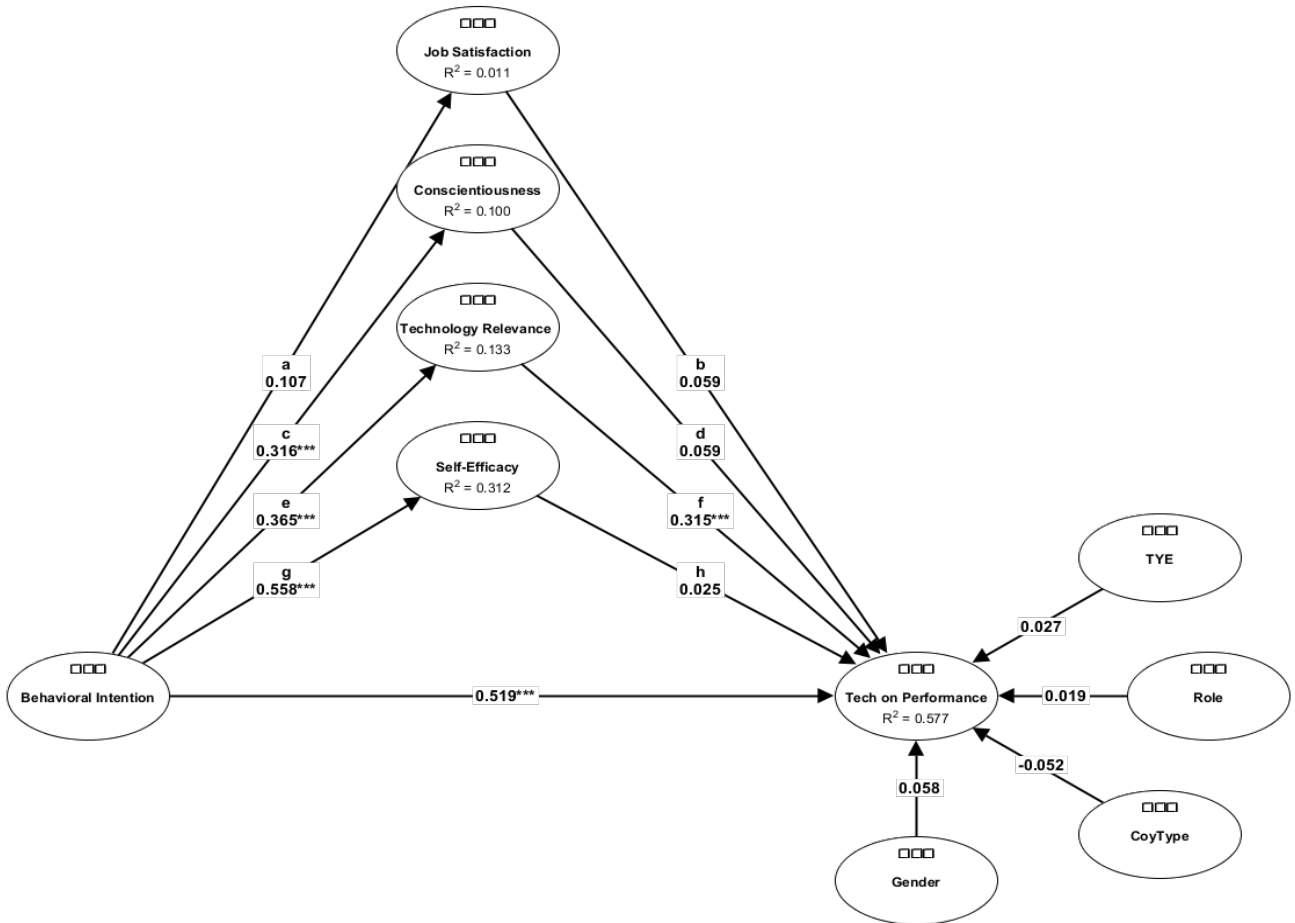


Fig. 2 Structural model of the study

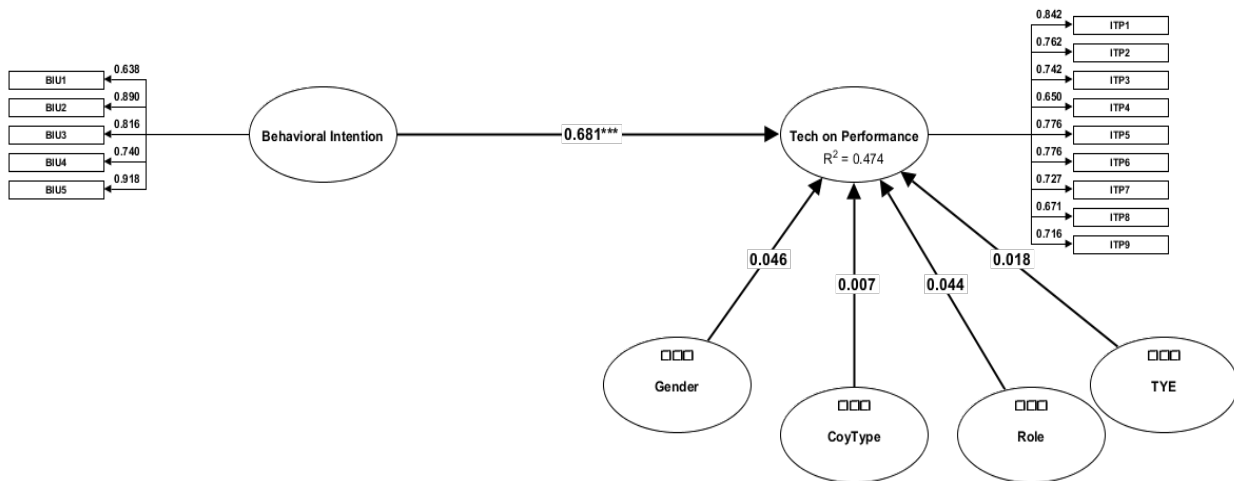


Fig.3 Structural model showing the direct effect of BIU on TechP

In Figure 3, the model was examined without the presence of intervening or mediating variables. To prevent attenuation of path coefficients, the control variables were added to the model. The analysis showed that the direct effect of BIU on TechP was highly significant (beta coefficient=0.681;  $t$ -value=13.821,  $p < 0.001$ ) with effect size ( $f^2$ )=0.867. In the model, BIU explained 47.5% of the variance in TechP (coefficient of determination,  $R^2$ ).

### 4.3 Hypotheses Testing of the Structural Model

**Table 5** Hypotheses testing of Direct effects of the structural model

Hypotheses	Inference
BIU	
H1: BIU positively influences TechP of pharmaceutical executives	Supported
H2a: BIU positively influences JS of pharmaceutical executives	Not supported
H2b: BIU positively influences the PR of pharmaceutical executives	Supported
H2c: BIU positively influences CS of pharmaceutical executives	Supported
H2d: BIU positively influences SE of pharmaceutical executives	Supported
SE	
H3a: SE positively influences the TechP of pharmaceutical executives	Not supported
H3b: SE mediates the relationship between BIU and TechP	Not supported
CS	
H4a: CS positively influences TechP of pharmaceutical executives	Not supported
H4b: CS mediates the relationship between BIU and TechP	Not supported
JS	
H5a: JS positively influences the TechP of pharmaceutical executives	Not supported
H5b: JS mediates the relationship between BIU and TechP	Not supported
PR	
H6a: PR positively influences the TechP of pharmaceutical executives	Not supported
H6b: PR mediates the relationship between BIU and TechP	Supported

Note. BIU=behavioral intention to use, SE=self efficacy, CS=conscientiousness, JS=job satisfaction, PR=perceived relevance

Table 5 shows a summary of hypotheses testing the direct effects of the structural model. The direct effects of BIU on the main dependent variable (TechP) were positive and significant thereby supporting H1. Similarly, BIU had positive effects on SE, CS, and PR (H2b, H2c, and H2d) were supported unlike for effect on JS (H2a not supported). The direct effects of the mediating variables-SE, CS, JS, and PR on TechP were not significant (H3a, H4b, H5a, and H6a were not supported). Finally, the mediating effect of SE, CS, and JS was not significant (H3b, H4b, and H5b not supported) unlike PR (H6b supported).

**Table 6** Mediation analysis of the structural model

Path	coefficient	t-value	p-value	95% C. I	Hypotheses
BIU-->JS--> TechP [path_a*b]	0.006	0.891	0.187	[-0.004; 0.023]	not supported
BIU-->CS--> TechP [path_c*d]	0.019	0.667	0.252	[-0.035; 0.080]	not supported
BIU--> PR-->TechP [path_e*f]	0.115	2.736	0.003	[0.043; 0.209]	supported
BIU--> SE--> TechP [path_g*h]	0.014	0.252	0.401	[-0.091; 0.135]	not supported

As shown in Table 6, path\_e\*f (PR) as mediator showed that compared to JS, SE, and CS, is a significant mediator of the relationship between BIU and TechP with a 95% confidence interval with the absence of a zero between the lower and upper limit [CI: 0.043; 0.209]. Therefore, PR is a complementary mediator (a form of partial mediation) because its positive effect is the same as the positive sign of the direct effect of BIU on TechP. The paths of the mediation model are indicated in Figure 2.

## 5. Discussion

The study attempts to explore the effects of JS, CS, SE, and PR as possible explanatory linkages to elucidate how BIU technology impacts TechP. Performance was measured in the context of technology influence or motivated outputs on employees' work operations and activities. A parallel mediation model was developed using structural equation modeling to estimate path coefficients. The outcome of the study would provide managers with valuable insights into the behavioral variables that explain the impact of positive behavioral intention on performance.

As shown in Table 5, BIU positively influences TechP among pharmaceutical executives. This finding is supported by empirical studies that affirm a significant direct relationship between BIU and TechP typified by actual system use (Davis et al., 2023). This implies that the higher the level of perception of intention to use or apply technology at work, the higher the likelihood for such employees to perform better at work. This finding is corroborated by a submission by Conner & Norman (2022) which asserted that enhanced intentions tend to strengthen expected behavior. Therefore, hypothesis H1a was supported. The same positive significant relationship applied to the relationship between BIU and the mediators SE, CS, and PR implies that positive levels of BIU expressed by an employee may be indicative of high self-efficacy, conscientious-mindedness, and high perception of value added (Bandura, 1977; Sanchez-Mena et al., 2017; Lindahl, 2023)

However, JS was not influenced by BIU; this may be due to the fact that satisfaction at work is more of a predictor or influencer of positive behavioral tendencies (Oamen, 2021a; Oamen & Omorenuwa, 2022). Therefore, a non-reciprocal relationship exists in which JS predicts BIU, and not the other way around. The overall structural model revealed a substantial relationship in which the mediators and BIU cumulatively explained 57.7% ( $R^2=0.577$ ) of the variance in the main dependent variable-TechP which is indicative of high predictive relevance. The structural model depicted in Figure 2 reinforces the fact that intention is a direct predictor of behavior, and invariably largely predicts performance (Sheeran, 2002; Ajzen et al., 2009). This finding from the study was reaffirmed by the large predictive value of the nested model and the high regression coefficient of the structural relationship between BIU and TechP ( $\beta=0.681$ ,  $p<0.01$ .  $R^2=47.4\%$ ) in Figure 3.

Interestingly, only perceived relevance-PR significantly mediated the relationship between BIU and TechP. This suggests that employees will use technology to the extent that they feel it will add value to their work (Woodruff, 1997; Basaran & Aksoy, 2017). Hence, the complementary mediation effect of PR is given its positive effects or signs similar to that of the direct effect between BIU to TechP (Henseler, 2021). The non-significant mediation paths by JS, CS, and SE imply that they do not necessarily explain the relationship between BU and TechP. That is, how satisfied an employee is, does not contribute to the effect of BIU on JP. Furthermore, the lack of significant mediation by CS is supported by Ajzen et al (2009) who asserted that the influence of intention to implement or use on performance behavior is not dependent on an employee's level of CS.

Invariably, managers are expected to utilise the contingency theory of management to adapt how they address issues involving employees with varying levels of mediators (SE, CS, JS, and PR), hence, the more managers continue to emphasize the salient operational and productivity benefits of continued persistent technology use to their workforce or subordinates, the more positive behavioral tendencies are elicited. Consequently, this will positively improve expected performance outcomes from work engagement.

## 6. Conclusion

The study explored a structural model using CS, SE, JS, and PR as intermediary, explanatory variables to explore the causal relationship between BIU and TechP for pharmaceutical executives adopting technology. The study provides empirical evidence that the PR variable activates the link between intention-to-use and performance outcomes among pharmaceutical executives. Therefore, the focus of management towards executives is to build acceptance and enhance maximum technology utilization by highlighting the applicability and functionality of any technology-based tools introduced. The study adds to the literature by highlighting the practical importance of engendering support for technology use by engagement and training rather than only through policy enforcement. The study provides insight for managers to utilize contingency management techniques to modify mediators exhibited by employees for improved performance. The study affirmed that the perceived relevance of technology use was an important mediator between behavioral intention and technology performance. To enhance performance, managers should consistently adopt strategies to enhance the mediating effects of employee job satisfaction, conscientiousness, self-efficacy, and perceived relevance. Strategies such as ensuring the appropriateness of technology deployed, adequate employee enlightenment, and targeted training are important to enhance the mediation effect. The study adds to the existing literature by recommending the inclusion of perceived relevance as a mediating link in the technology acceptance model.

### 6.1 Limitations of the Study

The paper was addressed from the perspective of employees from the pharmaceutical marketing sector in Nigeria. Therefore, extrapolation of study outcomes to other sectors should be done with caution. Future research should be done to explore the concepts from other countries and industries.

### 6.2 Implications of the Study

The findings of the study present implications for human resource and strategic managers involved in managing the workforce in the pharmaceutical industry. Firstly, as a result of significant PR, managers should focus on encouraging an improved perception of relevance among employees or executives by ensuring technologies in

use are tailored to enhance flexibility, reduce time to use, usefulness to specific task purposes, and impact on productivity. Thereby, pharmaceutical executives would be encouraged to use technology tools as a result of the heightened perception of relevance or value accrued from using technology for their work processes.

Secondly, engaging pharmaceutical executives in technology use in a way to elicits positive intentions to use is critical to improved productivity, routine evaluation of user perception of technology's relevance and impact on work objectives is critical to developing policies to support technology development and use, especially among employees in sales-oriented organizations. Thirdly, despite the non-significance of the mediators CS, SE, & JS, these findings represent a gap in employee participation in pharmaceutical marketing organizations that cannot be underplayed. Therefore, the priority should be on adapting managerial skills in response to the effects of these constructs. This approach tends to improve positive attitudes towards the use of newly introduced technology or existing ones. Training and developmental programs that harness these constructs towards productive contributions to the firm should be encouraged.

Finally, human resource managers should focus on employment and promotion criteria for persons with positive attitudes toward adopting technology. Candidates or employees with positive vibes or familiarity with technology should be engaged. This would minimize the loss in productivity due to non-compliance

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## Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

## Author Contribution

**Oamen:** Conceptualization, Methodology, and Writing Original draft, Formal analysis. **Ihekoronye:** Methodology, review, and editing, **Olowofela:** Data curation, Methodology, Visualization.

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