ANALYTICAL THINKING COMPETENCIES OF INFORMATION PROCESSING SPECIALISTS FOR EFFECTIVE PERFORMANCE IN SMEs IN ENUGU STATE, NIGERIA

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Abstract

This study investigated analytical thinking competencies required of information processing specialists for effective performance in SMEs crucial for effective performance in SMEs in Enugu State. Two research questions were posed, and two null hypotheses were tested at 0.05 level of significance. The study adopted a descriptive survey research design**,** and the population comprised 1,800 information processing specialists in registered SMEs in Enugu State. The sample size of 180 information processing specialists was drawn using a proportionate stratified random sampling technique. A structured questionnaire titled "Analytical Thinking Competencies Required of Information Processing Specialists for Effective Performance Questionnaire (ATCRIPSEPQ), with 20 items, was used for data collection. The instrument was face validated using three experts in the field of education, the reliability was ascertained using a pilot-testing method, and the data collected were calculated with the Cronbach Alpha formula, which yielded reliability coefficients of .75 and .81. The researcher administered copies of the questionnaire to the respondents with the help of four research assistants adequately briefed. Data were analyzed using mean and standard deviation to answer the research questions, t-test, and Analysis of Variance (ANOVA) to test the null hypotheses. Findings revealed that critical thinking and problem-solving competencies are highly required for the effective performance of information processing specialists in SMEs. It was also found that gender did not influence respondents' mean ratings of the critical thinking and problem-solving competencies required for effective performance by information processing specialists. Based on the study's findings, the researchers concluded that analytical thinking competencies are highly required of information processing specialists for effective performance in SMEs in Enugu State. It was recommended that information processing specialists working in SMEs in Nigeria should be constantly retrained through in-service training, workshops, seminars, and conferences to enable them up-date their critical thinking competencies for effective performance in SMEs.

Keywords: Analytical Thinking Competencies, Information Processing Specialists, SMEs,

Introduction

The success of small and medium-sized businesses (SMEs) in the modern business world depends on their capacity to critically analyze data and make well-informed decisions. Since technological developments and globalization have changed the nature of business operations, SMEs are depending more and more on information to obtain a competitive advantage. Aspects like capital, project scope, annual turnover, and employee financial strength define SMEs, which are privately held companies with fewer than 500 employees. By utilizing economic potential to reduce poverty, SMEs play a vital role in national development. SMEs are profitable entities that differ from larger organizations. Iregha and Uloghobui (2022) stated that the Central Bank of Nigeria (CBN) described SMEs as companies with fewer than 300 employees, assets of no more than 500 million naira, and an annual revenue of no more than 500,000 naira. Ndukwe (2019) noted that SMEs account for 90% of businesses worldwide and are vital to Nigeria's economy, employing roughly 70% of the workforce and making up 90% of the manufacturing and industrial sectors.

Nigerian SMEs are essential to job creation and economic expansion, but they have a high failure rate as many of them do not survive for more than five years (Mukerjee, 2017). In agreement, Ajayi (2020) lists several contributing factors to the failure of SMEs as a lack of skilled labour, poor infrastructure, and an unstable power supply. Other factors include inadequate management, inconsistent government policies, bad marketing strategies, regulatory lapses, and ineffective management (Roberge et al., 2025). For SMEs to survive, efficient information processing may also be essential. Since timely and accurate information is crucial for decision-making, SMEs may not be able to survive without trained staff. Additionally, SMEs can effectively manage resources and adjust to market changes when they have access to pertinent data. Furthermore, information is becoming more and more crucial for business survival in a globalized economy driven by information and communication technologies (ICTs), underscoring the need for information processing specialists in SMEs to possess requisite competencies.

Information processing specialists are vital to the gathering and evaluation of data that is necessary for making decisions. They oversee documents, guaranteeing their accurate information and physical preservation across paper, electronic, and video records. The efficiency of SMEs is greatly impacted by the proficiency of the specialists in analyzing complex data. They help organizations interpret data and respond to inquiries in addition to managing collections, which calls for competencies in analyzing, critical thinking, and general information management (Usman, 2019)

Competency includes the changing relationship between people's skills and demands at work. It includes the knowledge, skills, attitudes, and behaviours necessary for carrying out tasks effectively and producing desired outcomes. By focusing on behavioural, emotional and cognitive aspects of performance in addition to technical skills, competency sets exceptional performers apart from mediocre ones. Onoyovwi et al. (2022) defined competencies as the

necessary power and authority of knowledge, attitudes and facts required to complete tasks, while the Organization for Economic Co-operation and Development (OECD) (2020) sees competencies as comprehensive sets of social, functional and cognitive elements essential for effective job performance. Information processing specialists in the digital age need to be capable of critical analysis, specialized subject knowledge and knowledge of information resources (Man, 2018). They should also be fluent in language, time management, ICT, marketing, and customer service. Analytical thinking is also thought to be required for effective performance.

Performance indicates how well an individual, group, or organization accomplishes tasks aligned with specific goals and standards. It is measured through indicators like productivity, quality, efficiency, timeliness, and goal attainment (Aguinis, 2019). Effective performance transcends task completion, focusing on achieving optimal results through the right skills, strategies, and resources. As noted by Oparaocha and Eze (2022), it involves executing jobs correctly to meet organizational objectives and is connected to competencies such as critical thinking and problem-solving, as well as consistently meeting or exceeding standards.

Analytical thinking competencies are essential cognitive abilities that form a core part of critical thinking skills, allowing for the systematic evaluation of information and logical conclusions (Facione, 2020). These higher-order cognitive skills enable individuals to interpret, analyze, evaluate, and infer information, facilitating sound judgments and complex problem-solving (Lau et al., 2023). Critical thinkers engage dynamically with evidence to reach defensible conclusions and adapt to challenges. Such competencies are crucial for information processing specialists in SMEs, as they enhance the analysis and interpretation of data necessary for effective decision-making. This results in improved managerial efficiency, reduced errors, and overall better quality of decisions. In SMEs facing limited resources and high uncertainty, critical thinking competencies foster adaptability and innovation. Specialists with strong critical thinking skills can foresee challenges, assess alternative solutions, and provide evidence-based recommendations, thereby improving operational resilience and organizational performance (Facione, 2020; Aguinis, 2019). Apart from critical thinking competencies, an information processing specialist may also require problem-solving competencies for effective performance.

Information processing specialists encounter problems such as data errors and evolving customer needs. Problem-solving competencies enable them to identify issues, analyze information, and make timely decisions essential for efficient information system management, particularly in small to medium enterprises (SMEs) with limited resources. These competencies foster skills such as active listening, research analysis, creativity, and time management, vital for addressing unexpected workplace challenges. In Enugu State, SMEs benefit from specialists capable of assessing problems and developing effective solutions, thereby enhancing customer satisfaction and organizational efficiency.

The increasing adoption of digital technologies by small and medium-sized enterprises (SMEs) in emerging economies highlights the critical role of analytical thinking competencies, such as critical thinking and problem-solving for effective performance. Information specialists are essential for interpreting data and providing solutions, thereby improving decision-making and organizational workflows necessary for sustainable growth. Jones (2018) underscores the importance of these professionals mastering analytical competencies to identify trends and manage vast data effectively. However, challenges persist as Okoye and Okafor (2020) point out that many SMEs struggle to develop these competencies due to insufficient training resources, inadequate infrastructure, and a lack of focus on cognitive skill growth. In Nigeria, enhancing the

capabilities of information processing specialists, particularly in critical thinking and problem-solving thinking, is crucial. The current lack of these competencies results in poor data interpretation and ineffective decision-making, undermining competitiveness in the digital economy (Ajayi & Olatokun, 2022). Many specialists face limitations due to inadequate training and an emphasis on mundane tasks, which restricts organizational flexibility and hampers digital transformation. Therefore, understanding the impact of analytical thinking competencies on job performance is vital for policymakers, educators, and SME managers to promote human capital development and sustainable growth.

Information processing specialists in SMEs, consisting of both male and female personnel, exhibit differing approaches based on gender. Brown (2018) indicated that males are typically more analytical, while females lean towards intuition. Dakare (2019) further noted that males focus on physical attributes in conceptualizing items, whereas females use evaluative concepts. Despite these insights, the study faced limitations due to time and financial constraints. This study investigated the analytical thinking competencies of information processing specialists for effective performance in SMEs in Enugu State.

Statement of the Problem

Small and Medium Enterprises (SMEs) in Nigeria are crucial for employment, wealth creation, and poverty alleviation. Their success increasingly relies on information processing specialists who must possess cognitive innovative competencies, such as analytical thinking competencies, essential for navigating the complex business landscape. However, many SMEs face significant challenges, including insufficient capital, poor infrastructure, and a lack of qualified personnel. These issues often lead to the premature failure of enterprises, exacerbated by substandard information management practices. Observations in Enugu State by the researchers reveal that many information processing personnel lack advanced competencies in critical thinking, which negatively impacts decision-making and innovation. Consequently, there is a lack of empirical research on the specific analytical thinking competencies required of information processing specialists, creating barriers to effective policy formulation and human capital development in the SME sector. This study, therefore, determined analytical thinking competencies of information processing specialists for effective performance in SMEs in Enugu State.

Purpose of the Study

The major purpose of the study was to determine analytical thinking competencies of information processing specialists for effective performance in SMEs in Enugu State, Nigeria.
Specifically, the study determined:

1. Critical thinking competencies required of information processing specialists for effective performance in SMEs,
2. Problem-solving competencies required of information processing specialists for effective performance in SMEs.

Research Questions

The research questions below guided the study;

1. What are the critical thinking competencies required of information processing specialists for effective performance in SMEs?

2. What are the problem-solving competencies required of information processing specialists for effective performance in SMEs?

Null Hypotheses

The following null hypotheses were tested at 0.05 level of significance;

1. There is no significant difference in the mean ratings of male and female information processing specialists on critical thinking competencies required for effective performance in SMEs in Enugu State.
2. Male and female SMEs information processing specialists do not differ significantly in their mean ratings on problem-solving competencies required for effective performance in SMEs in Enugu State.

Methods

The study adopted descriptive survey research design. It was carried in Enugu State, which is one of the states in the southeast of Nigeria. The population of the study comprised 1,800 information processing specialists in SMEs that registered with the Ministry of Small and Medium Enterprises and New Business Development (Enugu State). The population of the study was distributed according to the size and location. The sample size of 180 information processing specialists of registered SMEs in the state which was selected using stratified proportionate stratified random sampling techniques. The instrument used for data collection was a structured questionnaire titled, "Analytical Thinking Competencies Required of Information Processing Specialists for Effective Performance Questionnaire (ATCRIPSEPQ)" The questionnaire was made up of two sections: A and B. Section A contained the demographic variable of the respondents such as gender. Section B is divided into clusters B1 and B2 with 10 items each. The questionnaire was structured on 5-points rating scale of Very Highly Required (VHR), Highly Required (HR), Moderately Required (MR), Lowly Required (LR) and Not Required (NR).

The instrument for data collection was subjected to face validation by three experts: one from Measurement and Evaluation of the Department of Educational Foundations, Faculty of Education, and two from the Business Education Department, Faculty of Technology and Vocational Education, Nnamdi Azikiwe University, Awka, Anambra State. The reliability of the instrument was established by administering 30 copies of the instrument to randomly selected SMEs' information processing specialists in Anambra State. Cronbach Alpha statistics were used to test the internal consistency of the instrument, which yielded the reliability coefficients of .75 and .81 for clusters B1 and B2. Copies of the instrument were administered to the respondents by the researcher with the help of four research assistants, residents adequately briefed on the modalities involved in the administration and retrieval of the questionnaire. Out of 180 copies of the questionnaire distributed, 171 (95%) were correctly filled out and returned and were used for data analysis. Data collected were analyzed using descriptive statistics of mean and standard deviation to answer the research question and determine how homogeneous or heterogeneous the respondents' opinions are. The null hypotheses were tested using an independent t-test. The decision rule was to accept a null hypothesis where the p-value is greater than or equal to the alpha level of 0.05 ($p > 0.05$). The null hypothesis was rejected, where the p-value is less than the alpha level ($p < 0.05$). The analysis was done using Statistical Package for Social Sciences (SPSS) version 25.0.

Results

Research Question 1

What are the critical thinking competencies required of information processing specialists for effective performance in SMEs?

Table 1: Respondents' mean ratings and standard deviation on critical thinking competencies required of information processing specialists for effective performance in SMEs **N = 171**

S/N	Critical Thinking Competencies	$\bar{X}$	SD	Remarks
1	Ability to think critically, research and communicate ideas for solutions in situations.	3.67	.67	Highly Required
2.	Ability to break down complex information into smaller components for better understanding	4.09	.71	Highly Required
3.	The ability to analyze data accurately supports effective decision-making	3.62	.72	Highly Required
4.	Ability to evaluate the credibility of information before use	4.55	.70	Very Highly Required
5.	Ability to reason logically and draw valid conclusions from evidence	4.62	.71	Very Highly Required
6.	Ability to assess alternative solutions before selecting a course of action	3.52	.64	Highly Required
7.	Ability to collect relevant information and identify the underlying issues affecting the organization.	3.51	.74	Highly Required
8.	Ability to critically review work processes to support continuous improvement in SMEs.	4.50	.65	Very Highly Required
9.	Ability to apply critical reasoning in solving work-related problems	3.88	.69	Highly Required
10.	Ability to carefully examine actions to arrive at well-reasoned decisions in the organization.	3.73	.70	Highly Required
	Cluster Mean	**4.00**		**Highly Required**

Data in Table 1 show that out of 10 critical thinking competencies listed for effective performance in SMEs, items 4, 5, and 8 are very highly required of information processing specialists for effective performance, with mean scores ranging from 4.50 to 4.62. The remaining seven items (1, 2, 3, 6, 7, 9, and 10) with mean scores ranging from 3.51 to 4.09 are highly required. The cluster mean score of 4.00 shows that overall, critical thinking competencies are highly required of information processing specialists for effective performance in SMEs in Enugu State. Standard deviations for all the items are within the same range, showing that the respondents are not widely apart in their ratings.

Research Question 2

What are the problem-solving competencies required of information processing specialists for effective performance in SMEs?

Table 2: Respondents' mean ratings and standard deviation on problem-solving competencies required of information processing specialists for effective performance of SMEs **N = 171**

S/N	Problem-Solving Competencies	$\bar{X}$	SD	Remarks
11.	Competencies in anticipating events in business	3.51	.72	Highly Required

12.	The ability to predict demand, price and future market situations.	3.54	.70	Highly Required
13.	Ability to take time thinking of the solutions to business problems before they happen.	3.70	.74	Highly Required
14.	Capable of functioning in multi-professional project teams	3.73	.73	Highly Required
15.	Ability to establish and manage communications.	3.67	.72	Highly Required
16.	Ability to yield to self-learning and self-organization.	4.76	.67	Very Highly Required
17.	Ability to gather necessary information from the environments to take pre-active action.	4.51	.69	Very Highly Required
18	Ability to acquire interdisciplinary knowledge and form the missing competencies.	3.82	.71	Highly Required
19	Ability to solve complex problems in the organization.	3.98	.68	Highly Required
20	Ability to be reflexive.	3.51	.72	Highly Required
	Cluster Mean	**3.87**		**Highly Required**

Data in Table 2 show that out of 10 problem-solving competencies listed for effective performance of SMEs, items 17 and 18 are very highly required of information processing specialists with mean scores between 4.51 and 4.76. The remaining eight items with mean scores ranging from 3.51 to 3.98 are highly required of information processing specialists. The cluster mean score of 3.87 shows that overall, problem-solving competencies are highly required of information processing specialists for effective performance of SMEs in Enugu State. Standard deviations for all the items are within the same range showing that the respondents are not wide apart in their ratings.

Null Hypothesis 1

There is no significant difference in the mean rating of male and female information processing specialists on the critical thinking competencies required for effective performance in SMEs in Enugu State.

Table 3: Summary of t-test analysis of mean ratings of male and female information processing specialists on critical thinking competencies required for effective performance in SMEs

Gender	N	$\bar{X}$	SD	Df	t-value	P-value	Decision
Male	101	4.02	.71				
				169	.36	.72	Not Significant
Female	70	4.06	.70				

Table 3 shows that male respondents recorded a mean score (X^-) of 4.02 with a standard deviation (SD) of .71, while female respondents recorded a mean score (X^-) of 4.06 with a standard deviation (SD) of .70. An independent samples *t*-test indicated that the observed difference in mean ratings was not statistically significant, t (169) = .36, p = .72, which is greater than the .05 level of significance. Consequently, the null hypothesis was accepted. This implies that there is no significant difference in the mean ratings of male and female information processing specialists regarding the critical thinking competencies required for effective performance in SMEs in Enugu State.

Null Hypothesis 2

Male and female SMEs information processing specialists do not differ significantly in their mean ratings on problem-solving competencies required for effective performance in SMEs in Enugu State.

Table 4: Summary of t-test analysis of mean ratings of male and female information processing specialists on problem-solving competencies required for effective performance of SMEs

Gender	N	$\bar{X}$	SD	df	t-value	P-value	Decision
Male	101	3.90	.73				
				169	.55	.59	Not Significant
Female	70	3.84	.70				

Table 4 shows that male respondents recorded a mean score ($\bar{X}$) of 3.90 with a standard deviation (SD) of .73, while female respondents recorded a mean score ($\bar{X}$) of 3.84 with a standard deviation (SD) of .70. An independent samples *t*-test revealed that the difference in mean scores between male and female respondents was not statistically significant, $t(169) = .55$, $p = .59$, which is greater than the .05 level of significance. Consequently, the null hypothesis is therefore accepted. This indicates that there is no significant difference in the mean ratings of male and female information processing specialists on problem-solving competencies required for effective performance in SMEs in Enugu State.

Discussion of Findings

Findings of the study revealed that critical thinking competencies are highly required of information processing specialists for effective performance in SMEs in Enugu State. The researcher initially posited the criticality thinking competencies are important for effective performance of every employee of an organization. These competencies enable professionals to analyze and evaluate complex information systematically**.** They also enhance the capability of information processing specialists in decision-making accuracy and reduce reliance on assumptions or biases. In agreement, Oparaocha and Eze (2022) reported that effective performance hinges on critical thinking abilities of employees. Similarly, Adebayo and Ogunleye (2021) noted that effective performance is often linked to critical thinking competencies, innovation, and the ability of information processors to respond to changing business environments. Additionally, Rasheva-Yordanova et al. (2018) underscored analytical thinking as an important competency for optimal job performance of information processing specialists. Similarly, Chux-Nyeche et al. (2023) found a consensus among respondents regarding the link between their analytical thinking competencies and the timely delivery of information. Findings of the study revealed that there was no significant difference in the mean rating of male and female information processing specialists on the critical thinking competencies required for effective performance in SMEs in Enugu State. These findings agree with the findings of Vandendorpe et al. (2024) which revealed that gender was not a significant factor on competencies possessed by employees for job performance.

Findings of the study revealed that problem-solving competencies are highly required of information processing specialists for effective performance of SMEs in Enugu State. The findings concur with the earlier findings of Greiff et al. (2014) which revealed that problem-solving competencies are required of business operators for business success in any environment. Similarly, Abdul and Omolara (2018) asserted that information professionals highly require

problem-solving competencies such as the ability to analyze situations, generate novel solutions, and implement effective fixes quickly. Abdul and Omolara posited that problem-solving and innovative competencies are core drivers of SME performance in Nigeria. In the same vein, Chikere (2025) observed that problem-solving competencies boost SME performance. Findings of the study revealed that there was no significant difference in the mean ratings of male and female information processing specialists on the cognitive innovative problem-solving competencies required for effective performance of SMEs in Enugu State. This finding aligns with that of Oladunjoye and Oladunjoye (2020), who found no significant gender differences in the employability competencies of employees for effective performance

Conclusion

Based on the findings of the study presented, analyzed, and discussed, the study concludes that analytical thinking competencies, such as critical thinking and problem-solving, are highly required of information processing specialists for effective performance in SMEs in Enugu State.

Recommendations

Based on the findings of the study, the following recommendations are made;

1. Information processing specialists working in SMEs in Nigeria should be constantly retrained through in-service training, workshops, seminars, and conferences to enable them up-date their critical thinking competencies for effective performance in SMEs.
2. SME owners/managers should assign information processing specialists challenging tasks to strengthen their problem-solving competencies for effective performance.
3. Information processing specialists should be encouraged to engage in brainstorming sessions and analytical thinking exercises to enhance their ability to analyze and evaluate information for effective decision-making in SMEs.

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