Understanding Digital Transformation Technologies Adoption: A Theoretical Framework Analysis

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Abstract: This paper examines established theoretical and conceptual frameworks relevant to the impact of digital transformation on employee performance within commercial banks. The introduction of digital technologies fundamentally reshapes business models and operational processes. The study leveraged several established theoretical frameworks to understand technology adoption, focusing specifically on the Technology Acceptance Model (TAM), Self-Determination Theory (SDT), and the Theory of Planned Behavior (TPB). It used a mixed-methods approach, combining qualitative and quantitative data collection and analysis. Participants included employees from various levels, including management and executive roles, at two commercial banks in Lusaka, Zambia. The study findings indicated that Digital Transformation Technologies (DTTs) are perceived to have a positive impact on job performance, specifically regarding the completion of various job tasks and activities. The Technology Acceptance Model (TAM), Self-Determination Theory (SDT), and the Theory of Planned Behavior (TPB) offer valuable theoretical frameworks for understanding the dynamics of technology adoption in the context of digital transformation. By focusing on perceived usefulness and ease of use (TAM), addressing psychological needs (SDT), and considering social influences and individual beliefs (TPB), organizations can develop targeted strategies to promote the successful adoption and integration of Digital Transformation Technologies. Future research could explore the interplay between these frameworks, providing a more holistic understanding of the factors.

Keywords: *Digital Transformation Technologies, Financial Institutions, Banking Services, Technology Acceptance Model (TAM), Self-Determination Theory (SDT), Theory of Planned Behavior (TPB).*

I. INTRODUCTION

This review presents existing conceptual and theoretical frameworks considered relevant to Digital Transformation and employee performance in commercial banks. The adoption of digital transformation technologies changes the existing business models and how processes are achieved. These technologies are integrated in organizational processes, structures and existing services to ensure business continuity and competitive advantage is attained. Several digital transformation frameworks are reviewed with focus on the relevant factors that relate to employee satisfaction within the business environment.

Successfully navigating digital transformation hinges on understanding how organizations and their employees engage with Digital Transformation Technologies (DTTs). The adoption and effective utilization of these technologies are not guaranteed; rather, they are influenced by a complex interplay of individual, organizational, and technological factors. Several established theoretical frameworks offer valuable lenses through which to analyze this process, and this analysis will explore three particularly relevant models: the Technology Acceptance Model (TAM), Self-Determination Theory (SDT), and the Theory of Planned Behavior (TPB).

The Technology Acceptance Model (TAM) provides a foundational understanding of technology adoption by focusing on perceived usefulness and perceived ease of use as key predictors of behavioral intention and actual system use. TAM posits that individuals are more likely to adopt and utilize a technology if they believe it will enhance their job performance (perceived usefulness) and if they believe it is easy to learn and use (perceived ease of use). This model is particularly useful in assessing the usability and practical benefits of DTTs from the employee perspective.

Self-Determination Theory (SDT) offers a different perspective, emphasizing the role of intrinsic and extrinsic motivation in technology adoption. SDT suggests that individuals are more likely to embrace and engage with DTTs if they feel a sense of autonomy (control over their use), competence (ability to effectively use the technology), and relatedness (connection to colleagues and the organization through the technology). Unlike TAM, which primarily focuses on cognitive factors, SDT highlights the importance of psychological needs and their influence on technology acceptance. This model is particularly relevant in designing DTT implementations that foster a positive and supportive work environment.

The Theory of Planned Behavior (TPB) provides a comprehensive framework for understanding the determinants of intention and behavior. TPB proposes that intention to use a technology is influenced by attitudes towards the technology, subjective norms (perceived social pressure), and perceived behavioral control (belief in one's ability to use the technology). This model integrates both individual attitudes and social influences, making it useful in understanding the organizational context surrounding DTT adoption. TPB can inform strategies that address both individual perceptions and the overall organizational culture surrounding the implementation of new technologies.

By examining these three models—TAM, SDT, and TPB—in conjunction, a more holistic understanding emerges of the critical factors influencing the successful adoption and utilization of DTTs within organizations. This multi-faceted approach allows for the development of targeted strategies aimed at enhancing technology acceptance and fostering a positive, productive work environment amidst digital transformation.

B. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), initially proposed by Davis [5] and building upon the Theory of Reasoned Action, is a widely used framework for understanding and predicting technology adoption and usage. TAM has undergone several revisions since its inception [11], reflecting the evolving understanding of technology acceptance and the complexities of human-technology interaction. The model primarily focuses on two key factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to a user's belief that using a particular system will enhance their job performance or help them achieve their goals. Perceived ease of use refers to a user's belief that using the system will be free of effort. These two

factors, in turn, influence the user's attitude toward the technology and ultimately their intention to use it.

The model's primary aim is to provide a framework for understanding the factors that influence technology acceptance and to predict user behavior [11]. This is achieved by examining the user's beliefs, attitudes, and intentions related to technology usage. TAM considers how a user intends to use a system and the factors influencing their decision-making process. The model focuses on the specific behaviors related to technology use, examining what leads a user to choose to adopt and use a specific technology.

In a workplace environment, TAM is frequently applied to understand employee acceptance and use of information technology systems. Organizations procure and implement systems with the expectation that employees will use them to complete tasks and achieve organizational goals. TAM helps to identify the factors influencing employee willingness, intention, and actual use of these systems. These factors can include the perceived usefulness of the system for completing job tasks, the perceived ease of use, management support, peer influence, and the availability of training and resources. Understanding these factors is crucial for organizations to effectively implement new technologies and maximize their return on investment.

The COVID-19 pandemic significantly impacted organizational operations, creating a compelling context for technology adoption [11]. Movement restrictions and the need for remote work led many organizations to rapidly invest in and implement new technologies to ensure business continuity. The pandemic acted as a catalyst, accelerating the adoption of technologies that had previously been under consideration. The need for remote communication, collaboration tools, and digital workflows became paramount, leading to significant changes in technology adoption and usage patterns. This context highlights the dynamic nature of technology adoption and the significant role of external factors, such as unexpected crises, in influencing organizational decisions and behaviors. Understanding the dynamics of technology acceptance within a changing organizational environment is key for successful technological implementation and achieving intended outcomes.

The Technology Acceptance Model (TAM) is a widely used framework for understanding and predicting technology adoption and usage. At its core, TAM focuses on two key constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), which are considered the primary determinants of user acceptance [5].

Perceived Usefulness (PU): PU refers to the degree to which a person believes that using a particular system will enhance their job performance or help them achieve their goals [11]. This is a subjective assessment based on the individual's belief that the system will improve their productivity, efficiency, or effectiveness in completing their tasks. A user with high PU is more likely to adopt and use the system because they believe it will provide a tangible benefit.

Perceived Ease of Use (PEOU): PEOU refers to the degree to which a person believes that using a particular system will be free from effort. This is also a subjective assessment, based on the individual's perception of the system's user-friendliness, intuitiveness, and ease of learning. A user with high PEOU is more likely to adopt and use the system because they believe it will be easy to learn and use, requiring minimal effort and frustration.

TAM posits that both PU and PEOU directly influence the user's attitude towards the technology and their behavioral intention to use it. Behavioral intention refers to the user's subjective probability that they will use the system. This intention is a strong predictor of actual system usage. Therefore, increasing both the perceived usefulness and the perceived ease of use of a system increases the likelihood that the user will adopt and use it.

Payne [13] emphasizes the role of cost-benefit analysis in individual decision-making. Individuals weigh the expected benefits of performing a behavior (in this case, using a technology system) against the perceived costs or effort required. This cost-benefit analysis is a central aspect of TAM, with the perceived benefits (PU) and the perceived costs (the inverse of PEOU) directly influencing the user's intention to adopt the technology.

In an organizational setting, several factors influence the adoption and use of technology systems. These factors can include task completion requirements, rewards and incentives, perceived benefits such as time savings or improved productivity, career advancement opportunities, and financial compensation. The relevance of the system to the job plays a critical role in influencing the user's perception of its usefulness and, subsequently, their willingness to adopt and utilize the system. A system that is perceived as highly relevant to job responsibilities and that offers clear benefits is more likely to be adopted and used effectively. Conversely, a system that is perceived as irrelevant or difficult to use is likely to be rejected or underutilized. Figure 1.1 below illustrate the main variables of TAM.
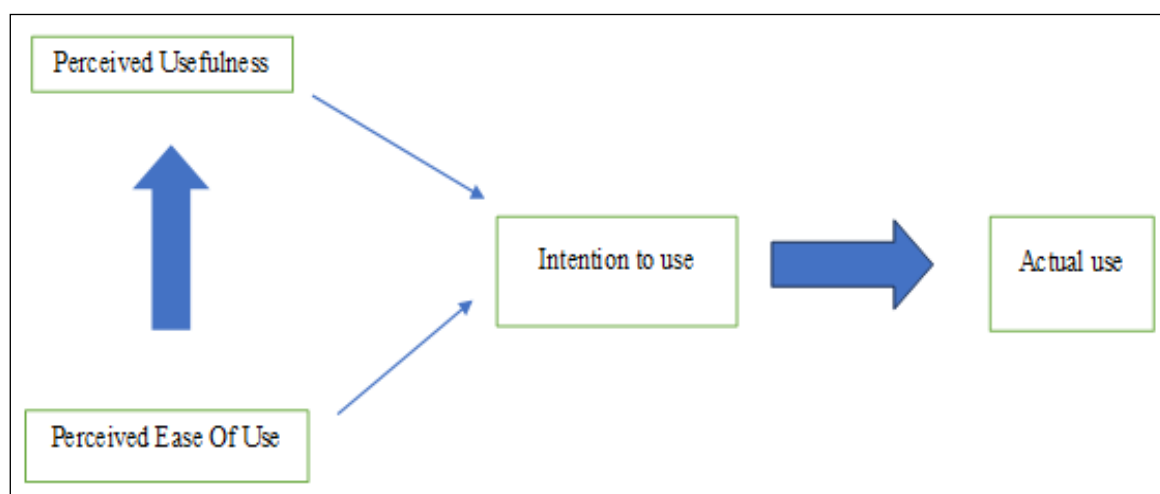

Fig 1 Technology Acceptance Model (TAM)
Source: Marikyan & Papagiannidis (2023)

The Technology Acceptance Model (TAM) provides a valuable framework for understanding and predicting employee behavior regarding the adoption and use of Digital Transformation Technologies (DTTs). TAM's focus on perceived usefulness (PU) and perceived ease of use (PEOU) allows researchers to investigate the factors motivating employees to utilize DTTs and to predict their behavior in this context.

In a commercial bank setting, perceived usefulness relates to how effectively employees can use DTTs to complete their assigned tasks and activities. The degree to which an employee believes that using DTTs will enhance their job performance and contribute to the successful completion of their work directly influences their desire and intention to use these systems. A strong perception of usefulness is a key driver of technology adoption, motivating employees to learn and utilize new tools and technologies.

TAM also helps to assess the perceived ease of use of DTTs within the workplace. This involves examining an employee's judgment of how easy or difficult it is to complete a given task using the available DTTs. The ease of use directly influences the employee's attitude towards the system and their willingness to use it. A user-friendly system, requiring minimal effort and training, is more likely to be adopted and utilized effectively.

The relationships between perceived usefulness, perceived ease of use, and employee performance are central to the application of TAM in this context. The study aims to investigate how these constructs interact to influence employee performance and job completion. The extent to which DTTs affect an employee's ability to complete their tasks efficiently and effectively will be analyzed using TAM, focusing on the factors influencing technology adoption and use within the workplace.

The model helps to explain how employees accept and use technology for achieving their allocated tasks, emphasizing the importance of both the perceived benefits and the ease of use in driving technology adoption. User-friendly DTTs reduce the time required for employees to complete tasks, increasing efficiency and overall productivity. This improvement in efficiency can lead to greater job satisfaction, enhanced employee morale, and ultimately improved organizational performance. By using TAM to investigate employee performance within the context of DTT adoption, organizations can gain valuable insights into how to optimize technology implementation, enhance employee engagement, and achieve improved outcomes.

B. Self Determination Theory

Self-Determination Theory (SDT) is a comprehensive framework for understanding human motivation and the factors that influence an individual's ability to autonomously fulfill their needs [6]. SDT emphasizes the importance of intrinsic motivation, focusing on the inherent satisfaction and enjoyment derived from engaging in an activity, rather than external rewards or pressures. The theory posits that individuals have an innate need for autonomy, competence, and relatedness. Autonomy refers to the feeling of being in control of one's actions and choices, competence refers to the feeling of being capable and effective, and relatedness refers to the feeling of being connected to and accepted by others.

The core of SDT is the concept of self-determination, which [10] defines as the ability of individuals to make choices and determine their actions. This refers to an individual's capacity for autonomous self-regulation, where they are driven by intrinsic motivation rather than external pressures. This capacity is not a fixed trait but rather a dynamic process that is influenced by various factors, including social interactions, environmental contexts, and individual personality characteristics.

The theory highlights how different motivational styles influence behavior and well-being. Individuals may be motivated by external pressures (extrinsic motivation), such as rewards or punishments, or by internal factors (intrinsic motivation), such as interest or enjoyment. SDT suggests that intrinsic motivation is associated with greater levels of persistence, creativity, and well-being. In contrast, relying heavily on extrinsic motivation may lead to decreased intrinsic motivation and lower levels of overall satisfaction.

Personality plays a significant role in an individual's level of self-determination. Individuals with certain personality traits, such as high levels of openness to experience or conscientiousness, may be more likely to exhibit greater levels of self-determination. Conversely, those with certain personality characteristics, such as high neuroticism or low self-esteem, may struggle to achieve a high level of self-determination.

SDT acknowledges the complexity of human motivation, recognizing that individuals are often driven by a combination of intrinsic and extrinsic motivations.

Understanding the interplay of these motivations and the factors that influence an individual's capacity for self-determination is crucial for promoting well-being and facilitating personal growth. This framework is not only relevant to personal development but also to organizational contexts, where understanding employee motivation is essential for enhancing productivity, fostering engagement, and creating a positive work environment.

The determination of an individuals' decision to ensure that a need is fulfilled is psychologically related. "It is now increasingly acknowledged that humans have a right to digital experiences that support, rather than hinder, their goals, values and psychological needs" [14]. SDT deals with the psychological and basic needs of humans. What is within a human such as beliefs determines their choices and how their needs are met. It's a drive to pursue a behavior and ensure that their behavior addresses that basic need. The selected behavior determines the result that an individual gets after pursuing it. Researchers observed that SDT's basic needs as three among several research-based wellbeing determinants that could be targeted to improve wellbeing in user experience [14]. Self-determination theory looks at three basic needs of humans which are competencies, relatedness, and autonomy as the main drivers for their actions. Competencies that an individual possess can lead to their ability to respond to a basic need. The skill and ability that an employee has can lead to them meeting their need. These skills are usually made possible by the training and experience that an individual possess over time. The qualification and exposure to skills contributes to a person's competency. The relatedness of an individual to the need contributes to the need being met. How the individual connects to the need and takes actions to ensure that the need is met is a way of self-determination. The autonomy of an individual's will to decide determines their conviction to undertake an action. These needs could be intrinsically and extrinsically motivated as they affect an employee's behavior. Extrinsic motivation is subdivided according to the degree to which external influences are internalized (absorbed and transformed into internal tools to regulate activity engagement) [7]. Intrinsically refers to the motivation that comes from within an individual to complete a task due to the pleasure within. Extrinsically refers to outside factors/forces influencing the individual to decide to act. Self-determination theory also distinguishes between different types of motivation that workers might experience: intrinsic motivation (doing something for its own sake, out of interest and enjoyment), extrinsic motivation (doing something for an instrumental reason) and amotivation (lacking any reason to engage in an activity) [7].

There is a strong intuitive alignment between the constructs of Self-Determination Theory (SDT) and established principles of user-centered technology design [14]. SDT provides a robust psychological framework that offers valuable insights for creating technology systems that are not only functional but also support users' basic psychological needs, leading to increased user satisfaction, engagement, and effectiveness.
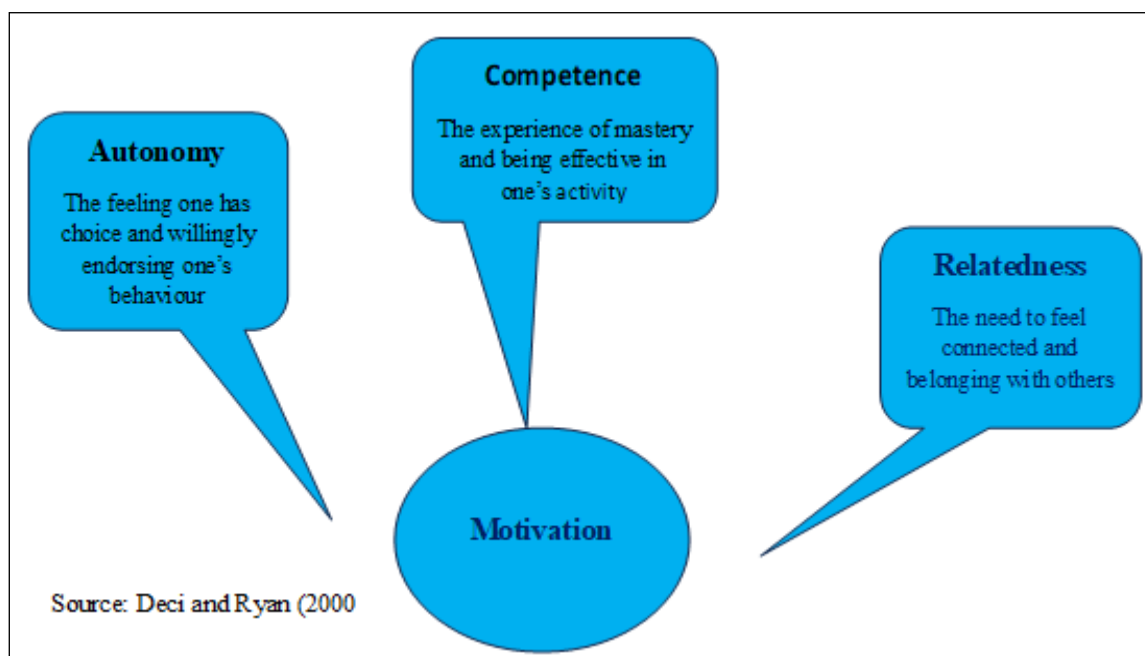
Fig 2: Self Determination Theory

SDT provides a foundational framework for system design, informing decisions related to user interface design, human-computer interaction, and the overall user experience. By incorporating SDT principles into the design process, developers can create systems that foster autonomy, competence, and relatedness—the three key psychological needs identified by SDT. Figure 1 above illustrates these three key psychological needs.

SDT identifies autonomy and competence as crucial design guidelines. Autonomy refers to the user's sense of control and freedom in interacting with the system. A well-designed system provides users with a sense of agency, allowing them to make choices and customize their experience. Competence, on the other hand, refers to the user's ability to effectively interact with the system and achieve their desired outcomes. A user-friendly system, with clear instructions, intuitive navigation, and effective feedback mechanisms, fosters a sense of competence and encourages continued use. The system's manual should clearly outline how to use the system, ensuring users develop the necessary competence. The ease of use and functionality of the system enhance a sense of autonomy in the users. Peters and Calvo (2024) note that technology designers have implicitly relied on SDT constructs for over three decades, even without explicitly recognizing the theory or benefiting from its unifying theoretical framework. This highlights the intuitive appeal and practical relevance of SDT's principles to the design process.

In the context of Digital Transformation Technologies (DTTs), SDT can provide valuable insights for researchers seeking to understand and predict human needs and behaviors as technologies are being designed and implemented. The basic psychological needs identified by SDT—autonomy, competence, and relatedness—offer valuable targets for design interventions, guiding developers in creating systems that support positive user experiences. By designing systems that cater to these basic needs, developers can improve user satisfaction, encourage adoption, and increase the effectiveness of the technology in achieving its intended outcomes (Peters & Calvo, 2024). This user-centered design approach, grounded in the principles of SDT, is crucial for creating technology that not only functions well but also support and enhances the overall well-being of the users.

Self-Determination Theory (SDT) provides a valuable framework for understanding how employees' psychological needs influence their motivation and engagement in using Digital Transformation Technologies (DTTs). SDT emphasizes the importance of intrinsic motivation, where individuals are driven by internal factors such as interest, enjoyment, and a sense of purpose, rather than external pressures such as rewards or punishments.

One key application of SDT in this context is recognizing that employees who feel their contributions significantly impact the organization's success are more engaged and motivated to perform their tasks. This sense of purpose and contribution directly addresses the SDT need for relatedness—the feeling of belonging and connection to a larger purpose. When employees feel valued and see the direct impact of their work, they are more intrinsically motivated to utilize DTTs effectively.

SDT provides valuable insights into technology design by focusing on user needs. As technology advances, human needs and expectations also evolve. SDT addresses these changing psychological needs by providing a framework for understanding what motivates employees to adopt and utilize new technologies. The design of work processes and technologies needs to accommodate employees' basic psychological needs [7].

Researchers highlighted the importance of considering motivation during the design and implementation of DTTs [7]. The design process should actively address the psychological needs of employees to enhance motivation and engagement. By creating work designs that align with employees' needs for competence, autonomy, and relatedness, organizations can foster a more productive and satisfying work environment. Meeting these needs can improve job satisfaction, which, in turn, positively impacts overall performance. Competence refers to the employees feeling capable and effective in using the DTTs. Autonomy refers to the feeling of control and choice in how they use the technology to complete tasks. Relatedness refers to the feeling of connection and belonging within the team and the organization.

The design of work using technology must cater to these psychological needs. As technology evolves, job requirements and expectations change, creating a dynamic interplay between the technology's capabilities and the employee's needs. The inherent need to complete tasks and fulfill job requirements motivates employees to use DTTs effectively. Employees who perceive their efforts as contributing to positive outcomes are intrinsically motivated and more likely to utilize DTTs successfully [7]. Therefore, a successful DTT implementation strategy must consider the psychological needs of employees, fostering a sense of competence, autonomy, and relatedness to enhance motivation, improve productivity, and achieve organizational goals.

For this study, the theory of self-determination is focused on individual behavior with a focus on self-needs as compared to technology use. The theory points out the focus on personal needs and their role to influence the use of DTTs. According to self-determination theory, three psychological needs (competency, relatedness and autonomy) must be fulfilled to adequately motivate workers and ensure that they perform optimally and experience well-being [7]. SDT is used in the design of technology to inform the interaction of the system and the user. Autonomy and relatedness are considered at the initial phase of system design. These needs are investigated in relation to the benefits that employees look at when using the technology.

The development of new automation and communication technologies is fundamentally reshaping the modern workplace. This technological transformation necessitates a focus on employee motivational needs during the design and implementation phases of new systems. Integrating technological advancements with a deep understanding of human psychology is crucial for creating productive and fulfilling work environments.

Improving existing communication platforms through the integration of artificial intelligence (AI) has the potential to significantly enhance employee performance and reshape the future of work design [7]. AI-powered tools can streamline communication processes, provide real-time support, and personalize interactions, leading to increased efficiency and employee satisfaction. By improving communication efficiency and providing employees with better tools, AI contributes to a more productive and satisfying work experience.

The future workplace may evolve into one where employees' psychological needs for autonomy, competence, and relatedness are more effectively met. This requires a shift from traditional, task-oriented work designs towards a more holistic approach that considers the psychological well-being of employees. Technology can play a crucial role in achieving this goal, facilitating autonomy through flexible work arrangements, enhancing competence through training and development opportunities, and fostering relatedness through improved communication and collaboration tools.

Self-determination theory (SDT) indirectly influences employee performance by providing a framework for understanding how technological changes impact job requirements and outcomes [7]. SDT highlights the importance of intrinsic motivation, where individuals are driven by internal factors such as interest, enjoyment, and a sense of purpose, rather than external pressures such as rewards or punishments. By creating work environments that support employees' basic psychological needs, organizations can foster greater intrinsic motivation, leading to improved performance, higher levels of engagement, and increased job satisfaction.

SDT provides a valuable platform for understanding user satisfaction and motivation, guiding system developers in creating technologies that enhance the employee experience. By incorporating SDT principles into the design process, developers can create systems that support autonomy, competence, and relatedness, leading to a more positive and productive work environment. Therefore, a holistic approach that integrates technological advancements with a deep understanding of human psychology is essential for creating the future of work—a workplace that is both technologically advanced and psychologically fulfilling.

C. Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), developed by Ajzen [2], is a widely used framework for understanding and predicting human behavior [1]. It's considered a generalized theory, applicable across a wide range of contexts, and it posits that human behavior is largely a result of conscious, reasoned decision-making processes shaped by cognitive factors and social influences [3]. TPB emphasizes the role of intentions in driving behavior, arguing that individuals are more likely to engage in behaviors they intend to perform.

TPB proposes three key determinants of behavioral intention:

- Attitudes toward the behavior: This refers to an individual's overall evaluation of the behavior, based on their beliefs about the likely consequences of performing that behavior. If an individual believes that a particular behavior will lead to positive outcomes (e.g., improved health, increased efficiency, enhanced social status), they will have a more favorable attitude towards it and be more likely to intend to perform it.

- Subjective norms: This refers to an individual's perception of social pressure to perform or not perform a particular behavior. It reflects the individual's belief about what important others think they should do. If an individual believes that important others approve of the behavior, they will experience greater social pressure to perform it and will be more likely to intend to do so.
- Perceived behavioral control: This refers to an individual's belief in their ability to successfully perform the behavior. This is not merely a measure of actual ability but also a subjective assessment of self-efficacy. Individuals who believe they have the necessary skills, resources, and opportunities to perform the behavior will have higher perceived behavioral control and will be more likely to intend to perform it.

These three factors—attitudes, subjective norms, and perceived behavioral control—combine to form an individual's intention to perform a behavior. Intention, in turn, is a strong predictor of actual behavior. However, TPB acknowledges that intention does not perfectly predict behavior, as unforeseen circumstances or lack of opportunity can sometimes interfere with the execution of intentions [2].

The Theory of Planned Behaviour (TPB) emphasizes the crucial role of perceived benefits and anticipated consequences in shaping an individual's intention to perform a specific behavior. Individuals are not simply driven by unconscious impulses but actively engage in a cognitive process of weighing the potential outcomes of their actions before deciding whether or not to engage in a particular behavior. This decision-making process is central to understanding and predicting human behavior.

The perceived benefits of a behavior exert a significant influence on an individual's motivation. If an individual believes that performing a particular behavior will lead to positive outcomes—such as improved health, increased efficiency, greater social acceptance, or enhanced financial rewards—they are more likely to form a positive attitude towards that behavior [2]. This positive attitude, in turn, increases their intention to perform the behavior. The strength of this positive attitude is directly proportional to the perceived magnitude and probability of the positive outcomes. The more significant and likely the positive consequences, the stronger the positive attitude and the greater the intention to act.

Conversely, the anticipation of negative consequences can deter an individual from engaging in a particular behavior. If an individual believes that performing a behavior will lead to undesirable outcomes—such as health problems, financial losses, social disapproval, or increased workload—they are more likely to develop a negative attitude toward it and be less inclined to intend to perform it. The perceived severity and likelihood of negative consequences directly influence the individual's attitude and intention.

The anticipated consequences, therefore, both positive and negative, play a crucial role in shaping behavioral intentions. Individuals engage in a cognitive cost-benefit analysis, weighing the perceived advantages against the perceived disadvantages before forming an intention to act. This process is not always conscious or deliberate, but it significantly influences the decision-making process [4]. People are inherently motivated to pursue behaviors that they believe will lead to desirable outcomes and avoid behaviors that they perceive will result in undesirable consequences. This inherent drive to maximize positive outcomes and minimize negative ones is a fundamental aspect of human behavior.

Intentions, therefore, are considered to be a crucial link between cognitive processes (attitudes, subjective norms, and perceived behavioral control) and actual behavior. They represent the individual's conscious decision to act in a particular way. Understanding the underlying determinants of intentions—particularly the perceived benefits and anticipated consequences of a behavior—is essential for developing effective interventions to promote positive behavior change. This understanding allows for the design of strategies that enhance the perceived benefits, reduce the perceived costs, and influence social norms to increase the likelihood of individuals adopting desired behaviors.

The Theory of Planned Behavior (TPB) offers a valuable framework for investigating technology acceptance and use within commercial banks. TPB focuses on understanding the factors that influence an individual's intention to engage in a specific behavior, in this case, the adoption and use of Digital Transformation Technologies (DTTs). The theory emphasizes the role of conscious decision-making and the interplay of individual beliefs, social influences, and perceived control in shaping behavioral intentions [2].

The intention to use DTTs is influenced by several key factors, as outlined by TPB. These include:
- Attitudes towards the behavior: An employee's overall evaluation of using DTTs, based on their beliefs about the likely consequences. Positive attitudes, stemming from the belief that DTTs will lead to improved efficiency, enhanced productivity, or career advancement, increase the likelihood of positive behavioral intentions.
- Subjective norms: The perceived social pressure to use DTTs, influenced by the beliefs of colleagues and supervisors. If employees perceive that their peers and managers support the use of DTTs, they are more likely to develop a positive intention towards using them.
- Perceived behavioral control: An employee's belief in their ability to successfully use DTTs. This includes factors such as confidence in their technological skills, the availability of training and support, and the user-friendliness of the DTTs themselves. High perceived behavioral control increases the likelihood of positive intentions.

Internal beliefs, shaped by individual experiences and personality traits, influence both intentions and actual behavior. External factors, such as resource availability (time, money, access to technology), also play a significant role. These factors can either facilitate or hinder the adoption

and use of DTTs, influencing the employee's ability to translate their intentions into actions. Abet [1] emphasize the importance of these three factors in predicting behavioral intentions, highlighting the interplay between individual attitudes, social pressures, and perceived self-efficacy.

While TPB can be a useful tool for predicting technology use, it's crucial to acknowledge that other factors can influence actual usage [2]. The theory primarily focuses on the individual's conscious decision-making process, neglecting the influence of unconscious biases or unexpected external events.

Haggar [8] emphasized TPB's focus on two basic facets of change: motivating individuals to engage in a desired behavior and addressing the difficulties associated with performing that behavior. This highlights the importance of both providing compelling reasons for DTT adoption (e.g., enhanced efficiency, improved job satisfaction) and addressing potential barriers (e.g., lack of training, technical difficulties) to facilitate successful technology adoption and utilization within commercial banks. Therefore, a comprehensive understanding of technology adoption requires a holistic approach that combines the insights of TPB with other relevant theoretical frameworks and an understanding of the organizational context.

II. METHODOLOGY

The study employed a mixed-method approach, which integrates both qualitative and quantitative techniques for data collection and analysis. The respondents involved in this study comprised employees from various levels of the two selected commercial banks, spanning both management and executive roles in Lusaka the capital city of Zambia. The mixed-method design of this study effectively combines qualitative and quantitative approaches to explore the relationship between digital transformation technologies and employee performance in the Zambian banking sector. By engaging employees across various levels and incorporating multiple data sources, the research aimed to provide a nuanced understanding of how DTTs shape employee experiences and performance outcomes.

The target population for this study consisted of employees working in commercial banks across Zambia, with a specific focus on employees from two selected institutions: ABSA and Zambia International Commercial Bank (ZICB). Data collection was conducted in Lusaka, Zambia, data was gathered over two months (April to May 2024) with the assistance of bank officials for efficient access to employees. The banks were chosen through convenience sampling due to their willingness to participate, as other institutions declined due to confidentiality concerns. A total of 80 respondents were selected randomly from the combined workforce of the two banks, with assistance from bank officials in the recruitment process. The latest version 29 of the Software Package for Social Sciences (SPSS) was used to compute and analyze the data collected using a questionnaire.

III. RESEARCH FINDINGS AND DISCUSSION

A. Perceived Usefulness of DTTS

The respondents were asked to rate the level of Perceived usefulness when using the DTTs by ranking their responses as: strongly agree, agree, neither agree or disagree, disagree and strongly disagree. The following statements were used to measure the employee's perception of the DTTs in relation to their job performance and completion of tasks.

- Using the technology would enhance my effectiveness in my job"
- "I think using the system enables me to accomplish my tasks more quickly"
- "I think using the technology is very useful for my job performance"
- "Using the technology improves my work productivity"

The findings revealed that the statements had a positive response to the rating of the Likert scale. Strongly agree and agree were the main scoring for all the statements that were asked in relation to perceived usefulness of DTTs. Figure 3 and Table 1 below illustrate and present the findings for each of the statements.
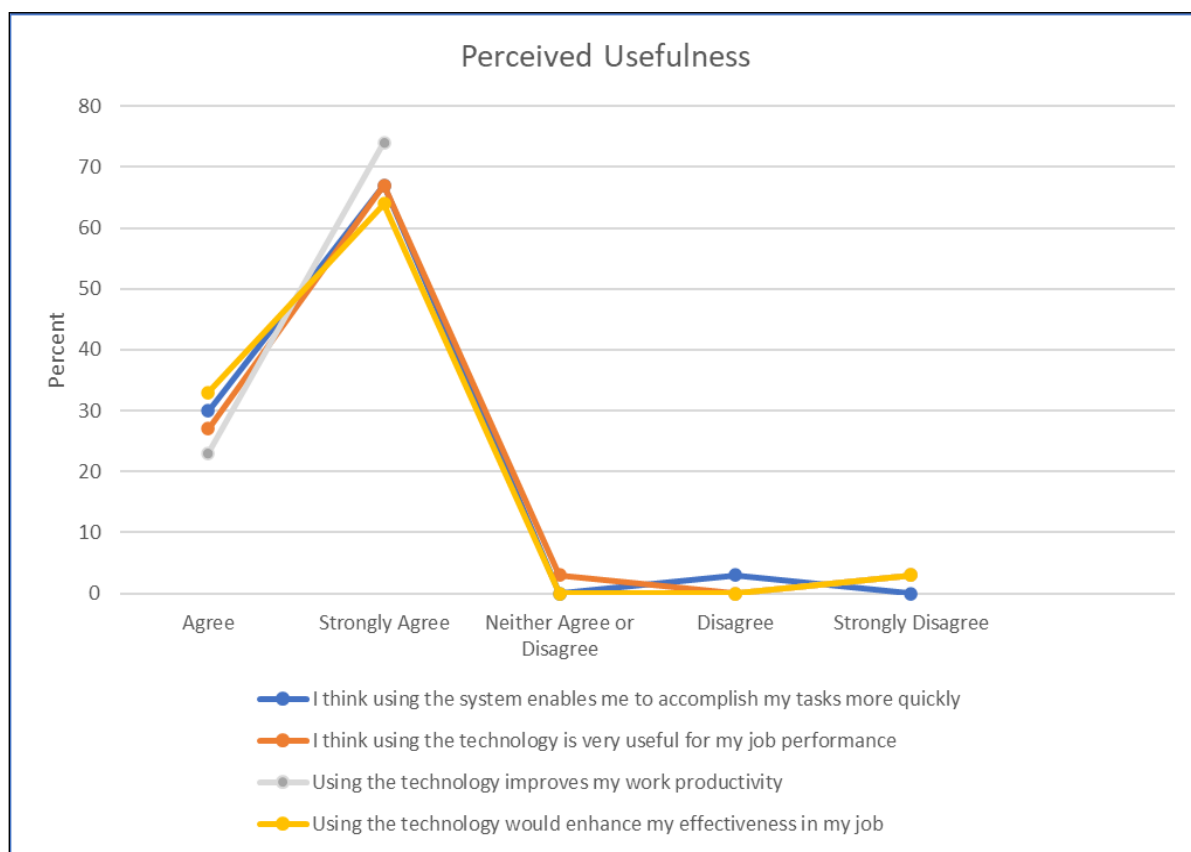
Fig 3: Perceived Usefulness (PU) of DTTs

Table 1: Perceived Usefulness of DTTs

	I think using the system enables me to accomplish my tasks more quickly	I think using the technology is very useful for my job performance	Using the technology improves my work productivity	Using the technolo... would enhance m... effectiveness in m... job
Agree	30	27	23	33
Strongly Agree	67	67	74	64
Neither Agree or Disagree	0	3	0	0
Disagree	3	0	0	0
Strongly Disagree	0	3	3	3

B. Perceived Ease of Use (PEOU)

The respondents were asked to rate the level of Perceived ease of use when using the DTTs by ranking their responses as: strongly agree, agree, neither agree or disagree, disagree and strongly disagree. The following statements were used to measure the employee's perception of the DTTs in relation to how easy it was to use the system.

- "It would be easy for me to become skillful in the use of DTTs"
- "I think that learning to use the digital technologies does not require a lot of mental effort"

- "I think it is easy to use the digital technologies to carry out and accomplish my tasks"
- "Learning to operate the technology has been easy for me"
- "I find it easy to get technology to do what I want it to do"
- "It would be easy for me to become skillful in the use of technology"
- 'I intend to use DTTs as often as needed for my job tasks"

The findings revealed that the statements had a positive response to the rating of the Likert scale. Strongly agree and agree were the main scoring for all the statements that were asked in relation to perceived Ease of Use of DTTs. Figure 4 and Table 2 below illustrate and present the findings for each of the statements.
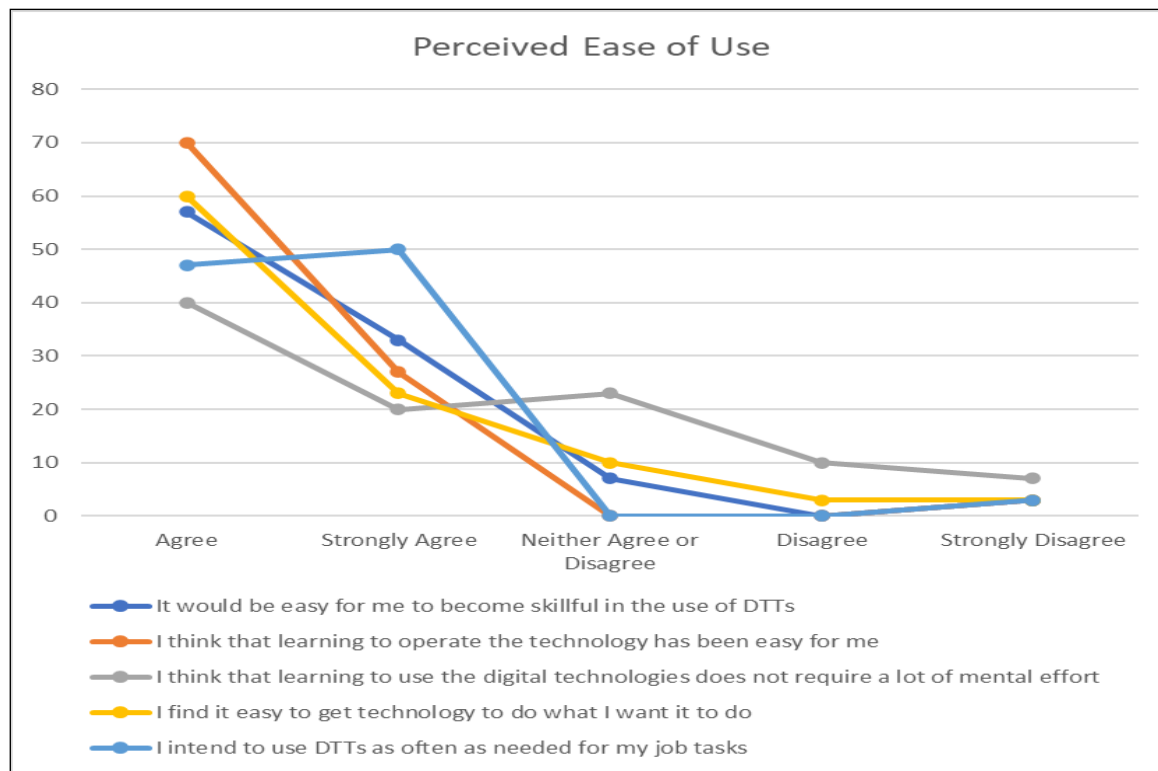

Fig 4: Perceived Ease of Use

C. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of DTTs

The study findings indicated that Digital Transformation Technologies (DTTs) are perceived to have a positive impact on job performance, specifically regarding the completion of various job tasks and activities. This perspective is supported by the research conducted by Mwiya [12], which highlighted that, within the Zambian context, factors such as perceived usefulness (PU), perceived ease of use (PEOU), and trust have a significant influence on the adoption of e-banking services. Their findings underscore the importance of users identifying digital tools as valuable and user-friendly in order to facilitate their integration into everyday banking operations. They emphasize the critical role these factors play in shaping users' attitudes towards technology, suggesting that when employees view a tool as useful and easy to utilize, they are more inclined to adopt and integrate it into their work practices.

Moreover, the work of Hoyng [9] provides further insights into the relationship between PU and PEOU of digital tools and employees' intentional digital readiness. Their study concluded that when employees perceive digital working tools as useful and easy to use, their readiness to engage with these technologies significantly increases. This readiness is essential for smoothly transitioning to digital processes and maximizing the efficiencies associated with digital transformation.

It is worth noting, however, that not all employees experience the same level of comfort with DTTs. Employees possessing a growth mindset may perceive digital working tools as more challenging to use, which, in turn, affects their intentional digital readiness [9]. This finding suggests that mindset plays a crucial role in how employees approach new technologies. Thus, organizations must recognize the varied perceptions and readiness levels among employees, tailoring training and support to foster a more inclusive and effective adoption process.

Furthermore, researchers concluded that both PU and PEOU of digital working tools significantly enhance employees' intentional digital readiness [9]. This suggests that organizations that prioritize the usability and perceived value of their digital tools are more likely to foster a workforce that is prepared and willing to engage with these technologies. Interestingly, their research also suggested that employees with a growth mindset might perceive digital tools as more challenging to use, resulting in lower levels of intentional digital readiness. This finding highlights the complex interplay between individual beliefs about technology and their readiness to engage with it effectively.

The demographic characteristics of banking employees also emerge as critical factors influencing the outcomes of digital transformation efforts, particularly age and educational level. Research found that these aspects tend to have a more significant impact on expected outcomes from digital transformation than gender or job tenure [15].

Specifically, determined that higher levels of education are positively associated with actual e-banking adoption, some researchers indicated that more educated individuals are more likely to embrace electronic services[12]. This suggests that educational initiatives may be necessary to enhance the adoption of DTTs among less educated employees.

The current study's findings further reveal that respondents who strongly agreed about the effectiveness of DTTs on job performance predominantly held advanced degrees, particularly at the Master's level. This trend aligns with a study, which suggested that achieving high levels of organizational performance through digital transformation processes in banking is more feasible when employees possess higher levels of education [15].

The perceived usefulness and perceived ease of use of DTTs are critical components in enhancing job performance within banking environments. The interplay of these perceptions with individual employee characteristics, such as mindset, highlights the complexity of technology adoption. Future efforts to implement DTTs should consider these dynamics to cultivate a workforce that is not only technologically equipped but also confident and ready to embrace the ongoing digital transformation in the banking industry.

The integration of DTTs within banking organizations is significantly influenced by employee perceptions of usefulness and ease of use, as well as demographic factors such as age and educational background. Organizations aiming to maximize the benefits of digital transformation should consider these factors when implementing new technologies, ensuring that training and support are tailored to enhance the perceived usefulness and user-friendliness of these systems. Further research could explore the impact of other demographic variables, such as experience and technical proficiency, to provide a more nuanced understanding of digital adoption in banking settings.

The age and educational level of banking employees are increasingly recognized as critical factors influencing the expected outcomes of Digital Transformation (DT) initiatives, outweighing the effects of gender or job tenure [15]. This observation is particularly relevant in the context of technological adoption within the banking sector. As noted, there was a positive correlation between educational attainment and the actual adoption of e-banking services; essentially, the more educated an individual is, the more likely they are to embrace electronic banking solutions [12]. This underscores the vital role of education in equipping employees with the necessary skills and confidence to engage with digital tools effectively.

The findings of the current study further illuminate the demographic characteristics that shape employees' perceptions of the benefits derived from Digital Transformation Technologies (DDTs). It becomes evident that personal characteristics, particularly age and education, significantly contribute to understanding how banking employees perceive the outcomes of DTTs in terms of organizational performance [15]. This aligns with broader research trends suggesting that educational background can influence not only the likelihood of adopting new technologies but also the quality of engagement with those technologies.

One noteworthy conclusion drawn from the study is that a substantial proportion of respondents who expressed strong agreement regarding the positive impact of DTTs on job performance held advanced degrees, particularly at the Master's level. This finding is reinforced and posited that attaining high levels of organizational performance through digital transformation processes within banks is more feasible when employees possess higher educational qualifications [15]. This relationship highlights the importance of investing in employee education and training as organizations seek to leverage digital transformation effectively.

As banks continue to evolve in an increasingly competitive landscape, prioritizing the education and professional development of employees could serve as a strategic advantage. By ensuring that employees are well-equipped to utilize DTTs, organizations can maximize the potential benefits of digital transformation, leading to improved performance and efficiency. Future research could delve deeper into the specific educational interventions that may be most effective in enhancing digital readiness among banking staff, thereby fostering a culture of continuous learning and adaptation to technological advancements.

IV. CONCLUSION

In conclusion, the Technology Acceptance Model (TAM), Self-Determination Theory (SDT), and the Theory of Planned Behavior (TPB) offer valuable theoretical frameworks for understanding the dynamics of technology adoption in the context of digital transformation. By focusing on perceived usefulness and ease of use (TAM), addressing psychological needs (SDT), and considering social influences and individual beliefs (TPB), organizations can develop targeted strategies to promote the successful adoption and integration of Digital Transformation Technologies. Future research could explore the interplay between these frameworks, providing a more holistic understanding of the factors.

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