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# DETERMINANTS OF ADOPTION OF MICRO-SERVICES IN DIGITAL BANKING SOLUTIONS AMONG COMMERCIAL BANKS IN KENYA

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***Abstract:*** **The main goal of this study was to assess the determinants of adoption of microservices architecture in digital banking solutions among commercial banks in Kenya. A descriptive research was employed. The study target population was 38 commercial banks licensed by the central Bank of Kenya as per 2023. The sample size for the study was 76 respondents selected through random sampling. The study adopted survey questionnaires to collect primary data, Google Surveys were used. Descriptive statistics as well as regression analysis were used to analyse the collected data. Findings were presented through descriptive statistics and ordinary least squares regression. The study established that benefits positively influence the perceived value of microservices architecture adoption. It also established that Sacrifices are not a hindrance to technology adoption where the technology offers greater value. The recommendation of the study was for more studies to be carried out more so from the end user perspective when implementing key financial software solutions. Users are the key stakeholders to any information technology solution hence, greater emphasis should be placed upon them. And for players within the industry to speed up the adoption process by regularly publishing comparative statistics with monolithic architectures to help other organizations to appreciate its benefits. More information will help address uncertainties particularly around technicalities of the architecture implementation.**

***Keywords:*** **Microservices Architecture, Digital Banking Solutions, Value Based Technology Adoption Model.**

## 1. INTRODUCTION

The banking industry has witnessed significant growth in terms of technology over the past decade, converging banking experience and operating model close to that of other industries and user expectations than ever before (Wewege, 2017). Digital transformation has had a profound impact on the financial industry, driving banks and other financial institutions to adopt new technology to keep up with consumer expectations (Scardovi, 2017). One of the most significant changes in this regard has been the adoption of micro-services architecture, which has become increasingly popular in digital banking. Microservices architecture is an approach to building software applications that emphasizes the creation of small, modular services that work together to perform specific functions within the overall application. In the context of digital banking channel applications, microservices architecture is a way to create a flexible and scalable systems that can support the diverse needs of digital banking channels, such as mobile banking apps, online banking portals, agency banking among others.

Digital banking has become increasingly popular over the years as it offers customers greater convenience, flexibility, and speed in managing their finances (Lipton, et al., 2016). Traditional banking systems, built on monolithic architecture, have struggled to keep pace with the rapidly changing digital landscape, resulting in slow innovation cycles and outdated technology. Microservices architecture offers an alternative approach to building digital banking systems, enabling banks to provide a more agile, resilient, and scalable infrastructure. (Alam, et al., 2018). With digital banking, customers can access their accounts and perform transactions 24/7 from anywhere with an internet connection. This eliminates the need to visit a physical bank branch during business hours, which can save time and reduce the cost of banking services. As digital banking continues to evolve, the adoption of microservices architecture is likely to increase, with more banks adopting this approach to keep up with the fast-paced and highly competitive digital landscape. While microservices have gained popularity in many industries, including banking, there are still some research gaps on the adoption of microservices in digital banking, such as improving the reliability and performance of microservices, trade-offs between the costs and benefits associated with microservices architecture and developing tools and frameworks to simplify microservices adoption and management. (Gu et al., 2021).

**STATEMENT OF THE PROBLEM**

Digital Banking Solutions within Banks is largely a function of the Information technology department. Some Banks have software developers that built these solutions in house while some outsource it to software development companies that meet their procurement requirements. The biggest headache for IT Managers in banks has been downtimes caused by outage of services due to scheduled updates/upgrades on the Digital Banking solutions, performance hitches when the number of users increase especially during holidays, school openings and end of the month.

The adoption of Micro services in banks is still relatively low, despite the significant benefits that they offer. Traditional banking systems are monolithic in nature, with large, complex architectures that are difficult to modify, scale, or maintain. This lack of flexibility makes it challenging for banks to quickly respond to changing customer needs and market demands. Micro services, on the other hand, provide a more modular approach to software development, with small, independent services that can be easily modified, deployed, and scaled.

They offer improved agility, resilience, and scalability, which are essential for modern banks to stay competitive in an ever-changing landscape. However, the adoption of micro services in banks poses several challenges, such as the need for a fundamental shift in the way banks approach software development and the requirement for significant investments in infrastructure and talent. The problem is that Despite the growing popularity of microservices as a software architecture style for building digital banking solutions, there is limited research on the factors that drive the adoption of microservices in digital banking.

## 2. LITERATURE REVIEW

A straightforward framework for structuring application logic, was first introduced by Jackson structured pro-gramming where it encouraged maintenance of a subroutines library, each of which would achieve one functionality well (Jackson, 1975). This fosters modularity as well as code reuse. The next phase was Object orientation which focuses on establishing code block abstractions as a group of services which can be called by other objects (Hoare, 1972). The next development was component based system development where a number of objects are packaged together as a component to achieve higher levels of granularity (Alahmari,.2010). The justification is that as opposed to objects, components would result in better productivity through enhance granularity thus simpler to translate business logic. The next phase was service oriented architecture where a services brings together multiple components to offer discrete business function. The service layers permit standard industry protocols, which simply access to the service hence enhancing interoperability. The current phase is microservice architecture where software development is broken down into small independent services which communicate via well-defined secure APIs (Shadija,.2017).

Microservices architecture has increasingly become an approach of choice when building distributed systems. As opposed to monolithic applications, microservices is loosely coupled such that every service runs independently of the other (Kalske & Mäkitalo, 2018). Similarly, to monoliths, a microservice has business logic as well as local data storage, but only for independent single purpose services. This makes microservices unique to monolithic architecture, as it includes an entire application within a single service. Consequently, a set of microservices comprising of distinct running services function as a group of small services (Fowler, 2019). Fine grained running services are easy to maintain due to the size of services as well as their organization, where if one service fails, the entire system will not break. It makes components easy to replace and autonomous teams are able to carry out maintenance and updates on their own (Mazzara, et al., 2017).

As a result of the structured manner of microservices and how they operate independently, they rely on internal communication between the services. Microservices are language independent implying that components must not communicate via language level method or function calls (Microsoft, 2021). This can be an impediment when transitioning from a monolith to microservice architecture. Straight conversion via method calls is inefficient. Consequently, microservices communicate via inter-service communication protocols like Grpc OR HTTP. The best architectural change approach is transitioning the old/existing code base then adapting business areas to profit from the new possibilities existing within the microservices based architecture. Fowler asserts that organizations would largely benefit from already having a monolithic architecture prior to switching to a microservices based architecture (Fowler, 2019). He further suggests that it would be cumbersome to build applications from scratch through only microservices (Fowler, 2019). This makes it for Kenyan Banks as they will not be required to completely do away with existing digital banking applications codebase.

Prathap, & Saravanan, recommend that as you break down more independent services, it becomes simpler to reuse or integrate with most front end services and expose them to 3rd party services (Prathap, & Saravanan, 2019). According to Jbsolutions, when you need to scale up performance of a monolith, you have the option of increasing RAM, additional processors or huge servers. However, if you have reached a limit, then sharding comes to perspective. Sharding helps to decompose a huge database and distribute traffic accordingly to better performance (Jbsolutions, 2021). According to Bayloy & Dimoy, Microservices have a small codebase such that developers do not need to understand the entire application to make a change in a service (Bayloy & Dimoy 2016). This scales down the time needed in troubleshooting issues and fixing them. Tiny services can be built, deployed and executed quickly. Due to the high automation levels of microservices this can be realized in seconds.

Capital One, a US-based bank, adopted a microservices architecture to improve the agility and scalability of its digital banking platform (Trivedi, 2022). The bank moved from a monolithic architecture to a microservices architecture, which enabled it to rapidly deliver new features and services to its customers (Trivedi, 2022). The microservices architecture also helped the bank to reduce the time to market for new products and services. Lloyds Banking Group, a UK-based bank, adopted a microservices architecture to improve the agility and scalability of its digital banking platform (Chironga, et al., 2018). The bank's microservices architecture allowed it to rapidly deliver new features and services to its customers, and it also helped the bank to reduce the time to market for new products and services (Chironga, et al., 2018). The bank also used microservices to improve the performance and reliability of its digital banking platform.

Deutsche Bank, a German bank, adopted a microservices architecture to enable the rapid development of new digital products and services (Redhat, 2019). The bank's microservices architecture was designed to be flexible and scalable, and it allowed Deutsche Bank to quickly respond to changing customer needs and market conditions (Redhat, 2019). The bank also used microservices to improve the performance and reliability of its digital banking platform.

Ecobank, a Pan-African banking group, adopted microservices architecture to improve the speed and scalability of its digital banking platform (CHEREDNYCHENKO, 2020). The bank migrated its legacy systems to a microservices architecture, which allowed it to develop and deploy new digital products and services quickly (CHEREDNYCHENKO, 2020). The bank's microservices architecture also enabled it to enhance customer experience by providing real-time services and personalized offerings. NCBA Bank partnered with Murong Technology as well as Huawei to build a state of the art hardware and software infrastructure (Owino, 2020). The bank adopted a modern distributed core banking system that embrace microservices software architecture. NCBA were able to improve reliability and resilience of services and improved customer experience (Owino, 2020). Furthermore, the platform allows the Bank capability to take its flagship products Fuliza and Mshwari beyond current offerings to address the underserved market segments.

A study by Shaik et al., 2021 found out that the biggest impediments to technology adoption are cost of technology and infrastructure, adoption challenges, technical skills, lack of organizational support among others (Shaik et al., 2021). According to Mike, 2020, most microservices projects are meant to replace legacy monolithic applications, and given that such software are complex and have evolved over time. The complexity of the applications being replaced implies sunk cost which in most cases, organizations have not reaped the benefits fully, furthermore, the software are being upgraded to support new functionality (Mike, 2020). Baskarada et al., 2018 notes that Microservices architecture is a promising solution which conjugates maintainability, scalability, reduce infrastructure costs, ease of deployment, resilience, heterogeneity, reusability among others (Baskarada et al., 2018).

## HYPOTHESIS DEVELOPMENT

Based on reviewed literature, the study adopted the Value Based Technology Adoption Model by Hee-Woong Kim et al., 2007, According to Kim, Chan, and Gupta (2007), the adoption intention can be predicted via perceived value. Perceived value is defined on the context of balance based on benefits and sacrifices as well as the classification of motivators as either extrinsic or intrinsic. This model was designed to address the shortcomings of the technology adoption model, given the factors that affect perceived value. While TAM was designed on the basis of perceived usefulness and perceived ease of use variables to elucidate and predict customer intent towards technology adoption, the value based technology adoption model bases on benefits and sacrifices.

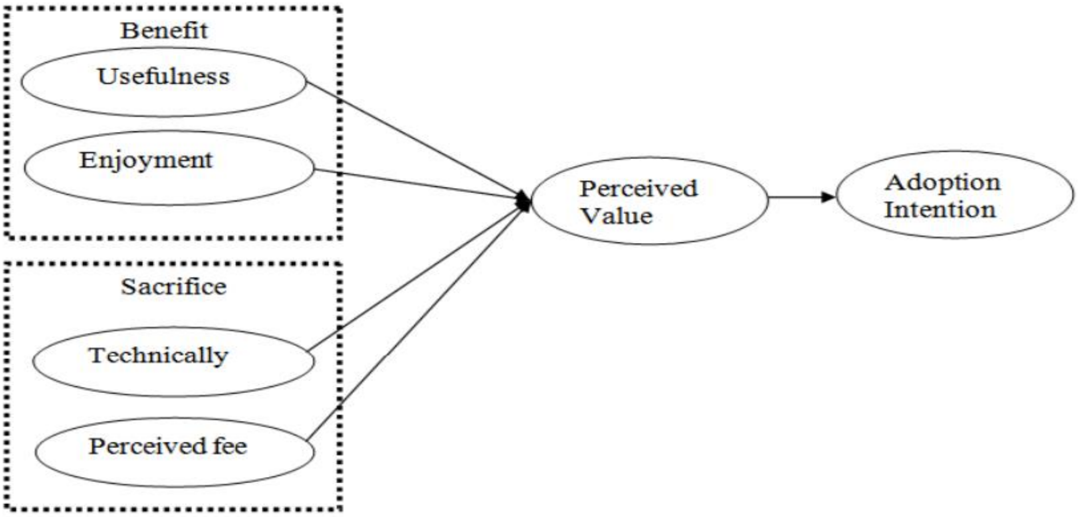


**Figure 1: Value Based Technology Adoption Model (Hee-Woong Kim et al., 2007)**

### Benefits

Motivations are classified as being either extrinsic or intrinsic on the basis of the Cognitive Evaluation Theory. Extrinsic motivation is the performance of an activity to realize a particular goal while intrinsic motivation is the performance of an activity for no particular benefit other than the process of performing it (Deci, 1971). Previous scholars have found that extrinsic and intrinsic factors influence perceived value as well as the behavioral intention, which has also been applied to information systems (Moore, & Benbasat, 1991; Rogers, 1995). This study thus proposes usefulness and enjoyment as the benefit aspects of perceived value.

### Extrinsic benefit: usefulness

Usefulness is the total value a user perceives from using a new technology, the technology adoption model views perceived usefulness as an expectancy outcome as well as a measure of extrinsic motivation (Rogers, 1995). Performance expectations including perceived usefulness which concentrates on task achievement, reflect on an individual’s desire to engage in an activity as a result of external rewards. The usefulness construct is similar to the concept of product quality in marketing defined as the customer’s cognitive assessment of the superiority of a product. From the customer’s perspective, the product attributes imply some desirable concepts that it can perform.

A number of studies have proven that product quality has a positive effect on perceived value and this study expects the usefulness construct to have a similar effect (Steenkamp, 1990). A number of studies have looked into the usefulness construct with strong empirical evidence pointing at it as a major predictor of technology adoption. The study therefore hypothesized;

**$H_1$ Perceived usefulness has a positive effect on the perceived value of adoption of microservices architecture in digital banking solutions**

**Intrinsic benefit: enjoyment**

Individuals who prefer using technology and deem use of technology as an enjoyable activity from the fundamental contribution of technology are much likely to adopt and technology or appreciate its adoption more than others (Davis, et al., 1989). Enjoyment in this context refers to the degree to which the activity of using a product is perceived to be enjoyable on its own, distinct from the performance value that may be anticipated. Hence, enjoyment represents an intrinsic benefit. Some studies have also found out that the benefit aspect comprises perceived enjoyment further to perceived usefulness and that enjoyment as well as fun have a notable effect on technology acceptance beyond just usefulness. Based on this we therefore hypothesize:

**$H_2$ Enjoyment has a positive effect on the perceived value of adoption of microservices architecture in digital banking solutions**

**Sacrifices**

Sacrifices are both monetary as well as non-monetary. Monetary sacrifices include the actual cost of the product, and is largely measured on the basis of the perception of the actual cost of the product (Thaler, 1985). Non-monetary cost often includes facilitative costs to ensure implementation of the technology. For this study we adopt the constructs from the value model namely perceived fee and technicality.

**Non-monetary sacrifice: technicality**

DeLone and McLean in their information success model define system quality and technicality as the extent to which a technology is perceived as being technically excellent in service provision (DeLone & McLean, 2003). The perception of Microservice adoption is determined by technical and non-technical users, usage, implementation, maintenance and system reliability (consistent reliability and security). Ease of use has been largely adopted as an element of technicality.

Some studies have also found out that Ease of use is a significant factor for new technology adopters as opposed to experienced users. Particularly, it has been revealed that complexity of the technology has a notable negative effect with the adoption of the new technology. In a microservices architecture perspective, response time of the digital banking solution can be deemed as time costs while ease of use considered as the effort costs. For this study we adopt the Ease of use and System quality as elements of technicality.

**$H_3$ Ease of use has a negative effect on the adoption of microservices architecture in digital banking solutions**

**Monetary sacrifice: perceived fee**

The perceived price signifies the overall cost of acquisition and implementation of a technology. Some studies have found that perceived fee directly influences the perceived value. Research in marketing reveal that the perceived monetary costs and perceived value are negatively related. We therefore hypothesized;

**$H_4$ Perceived fee has a negative effect on the adoption of microservices architecture in digital banking solutions**

**Adoption Intention**

The economic utility theory asserts that customers attempt to gain maximum satisfaction with their resource constraints. The study hence compared benefits with sacrifices as an indicator of adoption intention in line with the Value Based Technology Adoption Model. The fundamental ideology of the value concept is measured over perceived gains and losses to some central of neutral reference point, implying that users tend to align with cognitive comparisons as opposed to absolute levels, implying that sacrifices hurt more than the satisfaction given by benefits. We therefore hypothesized;

**$H_5$ Perceived Value has a positive effect on the adoption of microservice architecture in digital banking solutions.**

## 3. RESEARCH METHODOLOGY

Descriptive research design was adopted for the study. The target population for the study was 38 commercial banks licensed by the Central Bank of Kenya in 2023. The sample size for the study was 76 respondents selected through clustered random sampling. The study employed survey questionnaires dispatched through Google Surveys. Respondents were divided into three clusters the first cluster comprised of senior heads of ICT departments, the second group comprised of resources involved in ICT projects implementations in Banks and the third cluster comprised of system end users. Descriptive statistics as well as regression analysis were used to analyse the collected data. Findings were presented through descriptive statistics.

## 4. FINDINGS

The research sough to determine the influence of benefits on perceived value of microservices adoption in digital banks among Kenyan commercial banks. The study adopted five constructs from the Value Based Technology Adoption Model with benefits constructs (usefulness and Enjoyment) and Sacrifices constructs (Technicality and Fee) being moderated by perceived value to influence adoption intention of microservices architecture.

The study sought to establish the effect of Benefits (Usefulness and Enjoyment) on perceived Value of Microservices Architecture adoption in digital banking solutions in Kenyan Commercial banks, the effect of Sacrifices (Ease of use and Perceived Fee) on perceived Value of Microservices Architecture adoption in digital banking solutions in Kenyan Commercial banks and the effect of perceived value on the adoption of microservices architecture in digital banking solutions among Kenyan Commercial Banks.This section provides descriptive statistics from the analysis of the Likert scale responses. The rating was from 1 – 5 (strongly disagree to strongly agree).

**Table 1: Descriptive Statistics**

| | N | Mean | Std. Deviation |
|---|---|---|---|
| AdoptionIntention | 34 | 4.35 | .646 |
| PerceivedValue | 34 | 4.2745 | .40594 |
| Usefulness | 34 | 4.6588 | .30956 |
| Enjoyment | 15 | 4.4444 | .41148 |
| Technicality | 34 | 4.4559 | .46657 |
| Fee | 14 | 4.43 | .852 |
| Valid N (listwise) | 0 | | |

The means as well as standard deviations of the study variables are summarized in Table 1. All the responses for the variables had means above 4 indicating agreement with the research questions statements. We also carried out Realiability measurement using Cronbach's Aplha coefficient as shown in Table 2, with a coefficient above 0.70, the research instruments were deemed as reliable (Bland and Altman, 1997). The variables internal consistency was acceptable given that it was above 0.70.

**Table 2:**

| | Reliability Statistics | | |
|---|---|---|---|
| | Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| Perceived Value | .762 | .767 | 3 |
| Usefulness | .719 | .721 | 5 |
| Enjoyment | .778 | .773 | 3 |
| Technicality | .781 | .783 | 2 |

**Hypothesis test**

The researcher carried out a Pearson Correlation analysis and one sample t-test to test hypothesis. This was calculated for variables measured as ordinal data. Simple correlation among study variables. The regression model was tested for multicollinearity as shown in Table 3 through use of collinearity statistics and the variance inflation factor. A general rule

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is that where the variance inflation factor of a variable is more than 10, the variable is deemed to be highly collinear and would pose a challenge during regression analysis. The variance inflation factor values ranged from between 1.261 and 2.221 with tolerance values ranging from 0.046 and 0.903, suggesting that multicollinearity would not threaten the study parameter estimates.

**Table 3: Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Tolerance | VIF |
| 1 | (Constant) | .888 | 3.175 | | .280 | .787 | -6.432 | 8.209 | | |
| | PerceivedValue | .112 | .427 | .091 | .262 | .800 | -.874 | 1.098 | .793 | 1.261 |
| | Enjoyment | .021 | .448 | .021 | .046 | .964 | -1.012 | 1.054 | .450 | 2.221 |
| | Usefulness | .477 | .528 | .387 | .903 | .393 | -.741 | 1.694 | .520 | 1.924 |
| | Technicality | .146 | .390 | .141 | .375 | .718 | -.753 | 1.046 | .672 | 1.488 |
| | Fee | .033 | .450 | .033 | .073 | .944 | -1.004 | 1.070 | .471 | 2.123 |

a. Dependent Variable: AdoptionIntention

One sample Test was adopted for Hypothesis testing. The *t* column in the results table is the value of *t* -test statistic, the larger the value t, the smaller the probability that the results occurred by chance. The df column shows the degrees of freedom which signifies the size of the samples used. Sig (2-tailed) is the significance level (also called the probability or *p*-value) shows the likelihood that the results have occurred by chance. To interpret the *t*- test results, focus is mainly focusing on the "Sig." column which is the *p* value for the test. If this value, $p < 0.001$ it means there is a significant relationship between the factors. Results are presented in Table 4.

The first hypothesis being tested was:

$H_1$ Perceived usefulness does not have a positive effect on the perceived value of adoption of microservices architecture in digital banking solutions.

The results of the *t*- test yielded t (33) = 13.212, p (0.000) < 0.001. This means that there is a positive relationship between perceived usefulness and perceived value of adoption of microservices architecture in digital banking solutions. Since Perceived usefulness index is $\mu > 3.5$, this implies that the mean score of perceived usefulness index is above the neutral position. The researcher concluded that perceived value of adoption of microservices architecture is positively influenced by perceived usefulness and hence the hypothesis was rejected.

The second hypothesis of the study was:

$H_2$ Enjoyment does not have a positive effect on the perceived value of adoption of microservices architecture in digital banking solutions.

The results of the *t*- test returned t (14) = 6.614, p (0.00) < 0.001. Enjoyment index $\mu > 3.5$, as illustrated in Table 1. The study therefore, based on these results, concludes there is a significant relationship between Enjoyment and perceived value of adoption of microservices architecture in digital banking solutions. The hypothesis does not hold true and is therefore rejected.

$H_3$ Technicality does not have a negative effect on the adoption of microservices architecture in digital banking solutions.

The *t*- test results for the third hypothesis yielded the following findings; t (33) = 9.546, p (0.00) < 0.001. Similarly, Technicality had an index $\mu > 3.5$. This implies that there is a significant relationship between Technicality and perceived value of microservices architecture adoption in digital banking solutions. The hypothesis does holds true and is therefore accepted.

$H_4$ Perceived fee does not have a negative effect on the adoption of microservices architecture in digital banking solutions.

The *t*- test results for the fourth hypothesis yielded the following findings; t (13) = 5.752, p (0.00) < 0.001. Similarly, Perceived Fee had an index $\mu > 3.5$. This implies that there is a significant relationship between Perceived Fee and perceived value of microservices architecture adoption in digital banking solutions. The hypothesis holds true and is therefore accepted.

$H_5$ Perceived Value does not have a positive effect on the adoption of microservice architecture in digital banking solutions.

The moderating variable perceived value returned the following results from the *t*-test t (33) = 7.648, p (0.000) < 0.001, $\mu > 3.5$. This shows that the mean score of Perceived Value index is above the neutral position, as such, that there is a positive relationship between Perceived Value and Microservices Architecture adoption in digital banking solutions. The study therefore concludes that Perceived Value has a mediation effect on the adoption of microservices architecture in digital banking solutions. Consequently, the hypothesis is rejected as well.

**Table 4: One-Sample Test**

| | Test Value = 3.5 | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | |
| | t | df | Sig. (2-tailed) | Mean Difference | Lower | Upper |
| H1 | 13.212 | 33 | .000 | 1.118 | .95 | 1.29 |
| H2 | 6.614 | 14 | .000 | .833 | .56 | 1.10 |
| H3 | 9.546 | 33 | .000 | .912 | .72 | 1.11 |
| H4 | 5.752 | 13 | .000 | 1.000 | .62 | 1.38 |
| H5 | 7.648 | 33 | .000 | .706 | .52 | .89 |

## 5. DISCUSSION

The study sought to assess the Benefits and Sacrifices of microservices adoption in digital banking solutions among Kenyan commercial banks. The dependent variable was the adoption Intention while Benefits (Enjoyment and Usefulness) and Sacrifices (Perceived Fee and Technicality) were the independent variables. The study revealed that 75% of the respondents were from institutions that had adopted Microservices architecture in their digital banking solutions, with only 25% having not adopted the technology. Respondents who had not implemented microservices architecture were not allowed to provide responses for the study questions as they were deemed not to have the necessary knowledge to provide useful responses. The study also revealed that 94.1 percent of the respondents had future plans to adopt microservices architecture in their solutions. This is a strong indicator that the architecture is widely accepted in the financial services industry, perhaps due to its potential.

The findings from the study also partially supported the validity of the adopted research model (Value Based Technology Adoption Model). The model asserts that technology adoption is ascertained by perceptions of the value of the technology which are in turn determined by perceptions of the usefulness, enjoyment and sacrifices technicality and fee of the technology adoption. The study findings support three of the five hypotheses, indicating that benefits influence customer's intention to adopt microservices architecture. However, costs (Technicality and Fee) which according to the model ought to negatively impact adoption of microservices had positive effects as well. This is agreement with a study by (Chesbrough, 2023) which found out that benefits of open source software exceeded the costs.

In the banking industry technology is a major investment and a huge cost element every year, as such most respondents didn't believe that the cost of adoption was unreasonable especially in comparison to their current technologies as well as what microservices offers them. According to Liao, et al., 2022, the intention of behavior of consumers via new technology is influenced by the value that they get from the service which is the perceived fee. Where the value that they get from the technology is higher than the costs that they spend, then the intent of the purchaser shall be formed (Liao, et al., 2022). On the technicality element which the study adopted the Ease of use construct, respondents were also of the opinion that microservices architecture though complex to implement would translate to positive effects to maintain as well as significant performance benefits on the application levels. Some studies revealed that reliability may affect the risk perception and consequently the satisfaction which individually influences the intention to adopt a technology (Park, et al., 2015; Regan, 2014; Martinez-Torres et al, 2008). This implies that where the anticipated reliability is greater, consumers are willing to forego risk elements such as costs and complexity and proceed to adopt a newer technology.

A regression of perceived value with the two benefits constructs (Usefulness and Enjoyment) revealed an R squared of 0.821. while a regression with sacrifices constructs (Ease of Use and Fee) shows a lower r squared of 0.672. This suggest that costs do not deter customers more than they are attracted by benefits. In agreement with the Value Based Technology Adoption Model, the study established that indeed Banks are extrinsically and extrinsically to adopt Microservices Architecture in the Digital Banking Solutions. Enjoyment is an intrinsic influencer of perceived Value, while usefulness occurred as an extrinsic factor influencing the perceived value of adoption of Microservices architecture. Notably, usefulness was a primary concern for Banks in adopting Microservices Architecture, with the study revealing that constructs around usefulness had higher means as opposed to enjoyment constructs with means of 4.65 as opposed to 4.4. One possible reason for this is that for Banks, solutions could always be fine-tuned to meet the specific enjoyment needs of customers, however, its usefulness must be first determined before making a purchase decision. Furthermore, Microservices architecture majorly guides how digital solutions are designed and built, this is where it offers more usefulness than existing architectures, on the other hand, with regard to enjoyment, we have existing architectures that are also doing very well in delivering solutions that are enjoyable to end users.

## 6. CONCLUSIONS

The aim of this study was to assess the determinants of adoption of microservices architecture in digital banking solutions among Kenyan commercial Banks. These study findings have improved the industry understanding of the determinants that influence technology adoption and specifically microservices architecture. The paper offers deep insights into the microservices architecture adoption drivers, it highlights the essence of benefits and sacrifices in new technology adoption. A number of measures could be put in place to improve user perceptions particularly with regard to benefits and sacrifices of new technologies. For instance, training users in anticipated benefits along with the sacrifices to implement new technologies will give inexperienced users an opportunity to understand the implementation ecosystem as well as justifications for embracing the technologies. Furthermore, understanding the relationship between the identified determinants is important if top ICT personnel are to understand their effects with regard to microservices implementation. This could be helpful in modelling adoption, usage as well as strategic positioning of partnerships and related innovative technologies to realize overall value for the respective organizations. For instance, all technologies adopted by a bank should be compatible or already architectured in a microservices standard. A better understanding of determinants for microservices architecture adoption is also useful to key decision makers and ICT staff as they design and roll out new technology solutions. Importantly, knowledge gained could be helpful in realizing better throughput by coming up with actionable strategies on opportunities for improving microservices architecture adoption success. It would also be worthy to consider organizations culture and structures. Conway's law asserts that software's reflect the communication structure of an organization. Given the interdependence of project teams is critical to microservice architecture implementation, it is also necessary to consider organizations command and communication levels.

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