



**The Moderating Role of Customer Education in the relationship  
between Digitalization and Value Co-Creation**

**Applied on Microfinance Non-Banking Companies in Egypt**

*This Research extracted from a PHD.'s Thesis*

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**The Moderating Role of Customer Education in the relationship between Digitalization and Value Co-Creation: Applied on Microfinance Non-Banking Companies in Egypt**

*Abdalla Ali Elnaggar and Dr. Abd Elaziz Ali Hassan*

**Abstract**

This research aimed to analyze the moderating role of Customer Education in the relationship between Digitalization and Value Co-Creation applied on the Microfinance Non-Banking Companies' Customers in Egypt. Based on the literature review, researchers developed the conceptual framework of the relationships between research variables (Digitalization, Customer Education, and Value Co-Creation). To collect data, researchers depended on a questionnaire which was uploaded to google drive in google form format and was shared via social media channels of the Microfinance Non-Banking Companies in Egypt. The collected responds were 421, and the valid responds were 404. The findings show that there is a significant, positive, and direct effect of Digitalization on Value Co-Creation. For Digitalization Dimensions, results showed that only three dimensions of the four significantly affect Value Co-Creation, they are: Digitalization of Service Support, Digital Analysis Support, and Digitalization of Data integration and access support. Results of the Moderation Analysis show that Customer Education Significantly moderates Three of the four sub relationships, those are: The relationship between Digitalization of sales support, and Value Co-Creation; The relationship between Digitalization of service support, and Value Co-Creation; and the relationship between Digitalization of Data integration, and Value Co-Creation.

**Keywords:** Digitalization, Customer Education, Value Co-Creation, Microfinance.

## **Introduction**

Trends in digitalization are changing the way businesses operate (Caputo et al., 2021). As an enabler of disruptive innovation, digitalization is progressively and repeatedly disrupting existing market structures and leading to an alternative business model in which unserved clients gain from quick access to formal markets (Gupta & Kanungo, 2022).

Because of their ability to favorably affect customer behavior, value co-creation and consumer-brand interaction have emerged as essential brand-building strategies in research. This impact may be seen in the development of customer satisfaction, consumer-brand connections, customer retention, brand equity, and competitive advantage (Cheung et al., 2021). In contrast to the conventional creation paradigm, in which value creation happened primarily within organizations, co-creation alters the nature of the consumer-company connection.

Customers must have the requisite knowledge and abilities as many product and service offerings become increasingly sophisticated, diversified, and difficult. Companies in numerous sectors have sought to improve consumers' product-related knowledge through customer education programs to support them (Sun et al., 2021).

Financial service organizations are progressively moving toward online and digitalized value production because of fast technology improvement (Niemand et al., 2021). This kind of services requires customers with special knowledge and experience to achieve the best benefits from the finance taken.

Therefore, current research studies the moderating role of Customer Education in the relationship between Digitalization and Value Co-creation in Microfinance Non-Banking Companies in Egypt.

### **Research Purpose**

The purpose of this research is to investigate the relationship between Digitalization and Value Co-Creation, and how Customer Education moderates this relationship applied on Microfinance Non-Banking Companies' Customers in Egypt.

### **Literature Review**

#### ***Digitalization***

Modern digitalization is an entirely new method to information retrieval, storage, and processing. The importance of information in good management decision making cannot be overstated (Ashmarina et al., 2019).

Digital changes have been thoroughly investigated by scholars. Digitization, Digitalization, and Digital transformation are terms that are often used interchangeably by management scholars (Caputo et al., 2021). However, there are differences between them (Holmström, 2022) which shown as follows:

- Digitization: A technical process of transforming analog formats into digital formats.
- Digitalization: A sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural.
- Digital transformation: The profound transformation of organizational activities, boundaries, and goals to leverage the opportunities of digital technologies.

Digitalization, digital innovation, and digital transformation are all overlapping terminology signifying major change that is dependent on digitized information (Alter, 2020). Digital technologies are rapidly influencing both customer and corporate connections, notably in areas such as finance, which is shifting to

online services. Financial service providers must respond to changes in behavior and consumer demands (Niemand et al., 2021).

However, for enterprises to successfully transition to the fourth industrial revolution, it is critical to strengthen organizational circumstances such as mutual trust, compatibility, close cooperation, and shared standards (Royo-Vela & Serrano, 2021). The shift to a new stage of the industrial revolution motivates nations to design and implement new policies with the goal of transforming numerous social institutions and processes.

All financial institutions now communicate with consumers using new financial technology such as smart phones and social networks, which has resulted in the creation of several new sectors (Suseendran et al., 2020). Digitalization facilitated faster and more efficient interoperability, as well as information openness and automated aid, while also promoting a more decentralized decision-making process (Balogun et al., 2020).

Furthermore, according to a UN Industrial Development Organization (UNIDO) research, COVID-19 is a catalyst for digital transformation. COVID-19 is emerging as an unexpected digital transformation accelerator. The crisis's disruptions are having a significant impact on the world's attitude, which is now more receptive to accepting change to mitigate the consequences of the epidemic and restore to normalcy. Indeed, because of these shocks, the globe has witnessed the most astounding digital revolution in a few months than we have seen in the previous decade (Li, 2021).

### ***Digitalization Dimensions***

Digitalization has four main dimensions (Kohtamäki et al., 2020): Digitalization of sales support, Digitalization of service support, Digital analysis support, and Data integration and access support.

### ***Value Co-Creation***

Co-creation is a process in which customers take an active role—for example, creating products/services or developing activities—and collaborate with enterprises to produce value (Za et al., 2020).

In recent years, the discipline of service marketing has changed from a product-dominant logic (PD-L), in which value is transactional and existing during an exchange, to a service-dominant logic (SD-L). According to SD-L, the client phenomenologically defines value. This move heightened interest in the notion of value cocreation, which is defined as value being generated through interactions between consumers and other agents, such as other customers, enterprises, and suppliers (Alimamy, & Nadeem, 2021).

Due to stiff competition in the consumer services industry, company owners have stepped up their game by giving more value in exchange for a larger portion of the market (Yam et al., 2021).

Manufacturing and distribution of goods and services are evolving in a variety of ways because of the expansion of information and communication technologies (ICT) and business model innovation (Betz et al., 2019).

In the same logic, as per the previous literature, current research is trying to answer the research question One through testing hypothesis One which is stated as follows:

**H1: Digitalization significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.**

### ***Value Co-Creation Dimensions***

Value Co-Creation has Two main dimensions (Yi & Gong, 2013): Customer participation behavior, and Customer citizenship behavior. Customer participation behavior has Four sub-dimensions which are:

Information seeking, Information sharing, Responsible behavior, and Personal interaction. Customer citizenship behavior has Four sub-dimensions which are: Feedback, Advocacy, Helping, and Tolerance.

### ***Customer Education***

Bell et al. (2017) defined Customer Education as a company's role in providing customers with the necessary information, skills, and abilities needed for them to become more informed buyers, is widely acknowledged as playing a key role in client satisfaction.

It is obvious that researchers and practitioners in service companies should prioritize customer education as a vital study field and a phenomenally successful service technique. Customer education has a dual purpose in the service design and delivery process; on the one hand, it assists customers in better understanding and performing their altered roles, and on the other hand, it positions the customer in a higher role preparedness (Junaid et al., 2018).

Numerous research, according to the business, has mostly focused on how Educating Customers helps establish stronger customer connections. Researchers discovered that Customer Education promotes customer confidence in a business and increases customer loyalty. Customer Education has also been proposed as a means of deepening customer relationships and increasing customer involvement (Sun et al., 2021).

Customers must be educated by service providers who explain ideas and give information to assist them grasp the service. Customers who understand more tend to become more involved. Service providers with higher emotional empathy, or the capacity to comprehend the client's emotions, issues, and sentiments, will give more polite service, increasing customer participation because of the intimacy of the connection (Silva & Santos, 2021).

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In the same logic, as per the previous literature, current research is trying to answer the research question Two through testing hypothesis Two which is stated as follows:

**H2: Customer Education significantly moderates the relationship between the Research Variables (Digitization, and Value Co-Creation).**

### **Research Gap**

Advanced technology and experience-seeking consumers have generated complex obstacles while also providing numerous possibilities for managers in the service delivery process (Junaid & Goudarzi, 2018). Digitalization enables managers to make better accurate decision (Vishnyakova et al., 2020). Digitalization in the e world provides entrepreneurs with amazing opportunity to develop their own e commerce model (Younis & Al Bakri, 2020).

Educating customers necessitates those businesses not only supply information, but also create conditions that allow customers to assess that information, enhance their level of knowledge and comprehension, and feel participated in purchase activities. In this sense, consumer education is a process by which clients increase their perceived value (Bonfanti & Brunetti, 2015).

However, the reviewed literature discussed Digitalization as a trendy concept, the literature on effect of Customer Education, Digitization, and Value Co-Creation, still lacks further research, particularly when dealing with the poor who have little experience of the digital world.

Based on literature review, the researchers noticed that there are few previous studies explored the relationship between Digitalization, and Value Co-Creation. The current research seeks to explore this relationship and analyze the moderation role of Customer Education in this relationship.

### **Research Questions**

- Q1. What is the impact of Digitization on Value Co-Creation among clients of non-banking microfinance companies in Egypt?
- Q2. Does Customer Education play a moderating role in the relationship between Research Variables (Digitization, and Value Co-Creation)?

### **Research Objectives**

- O1. Measuring the effect of Digitization on Value Co-Creation among clients of non-banking microfinance companies in Egypt.
- O2. Determining the nature of the moderating role that Customer Education plays in the relationship between the Research Variables (Digitalization, and Value Co-Creation).

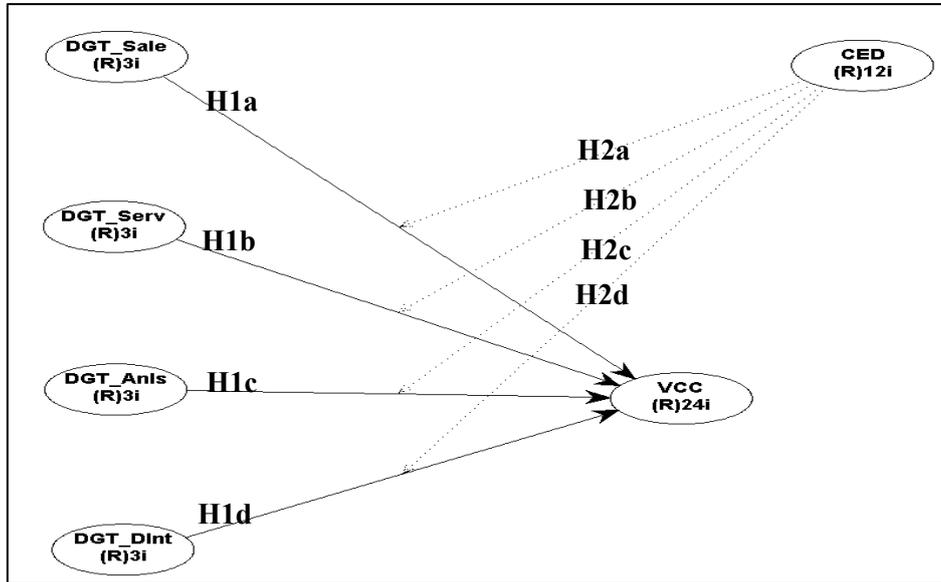
### **Research Hypothesis**

- H1. Digitalization significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.
  - H1a. Digitalization of sales support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.
  - H1b. Digitalization of service support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.
  - H1c. Digital analysis support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.

- H1d. Digitalization of Data integration and access support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.
- H2. Customer Education significantly moderates the relationship between the Research Variables (Digitalization, and Value Co-Creation).
- H2a. Customer Education significantly moderates the relationship between Digitalization of sales support, and Value Co-Creation.
- H2b. Customer Education significantly moderates the relationship between Digitalization of service support, and Value Co-Creation.
- H2c. Customer Education significantly moderates the relationship between Digital analysis support, and Value Co-Creation.
- H2d. Customer Education significantly moderates the relationship between Digitalization of Data integration, and Value Co-Creation.

### **Conceptual Framework for the relationships between research Variables**

Based on the Literature, and the research hypothesizes, Figure 1 shows the Conceptual Framework for the Relationships Between Research Variables.



**Figure 1 Conceptual Framework for the Relationships Between Research Variables**

Source: By researchers depending on Literature and Research Hypothesizes using WarpPLS 8.0

### Research Methods

There were two popular techniques (or methodology) in the social sciences in the twentieth century: quantitative research and qualitative research. The quantitative research approach is based on the collection of quantitative data through methods such as experiments, quasi-experiments, surveys, and longitudinal studies, whereas the qualitative research approach is based on the collection of qualitative data through methods such as narrative research, phenomenological research, ethnography, and case studies (Shan, 2022).

Current research depends on quantitative research methods to collect data from the targeted sample. The quantitative approaches entail developing hypotheses to guide statistical testing, employing instruments to appropriately measure the research variables, collecting data, and then statistically analyzing the data to test the hypotheses (Nardi, 2018).

### **Research Design**

There are three categories of research based on their purpose: descriptive, exploratory, and explanatory (Saunders et al., 2009). The current research is explanatory in nature, as it seeks to explain the causal link between the research variables.

### **Data Collection**

Research data was collected during the period from November 2021 to February 2022. Using Google Form, researchers designed an electronic version of the questionnaire which was published to microfinance clients through social media channels like Facebook Pages, Facebook Groups, and WhatsApp Groups interested in non-banking microfinance companies in Egypt. Total responds were (421), while accepted responds were (404). Researchers exported the collected data from Google Form to Google Sheet then to Excel Sheet in which items were coded and formatted to be ready for WarpPLS. Research used WarpPLS 8.0 to analyze research data which is a development of the PLS analysis.

### ***Types of Data***

Researchers used the Two types of data, which are primary and secondary. The primary data was collected via questionnaire which were designed on google form and shared on social media. Secondary data was the reports, literature, and data about the field available on the internet.

### ***Data Collection Techniques***

The questionnaire is a form or instrument that includes a series of questions and secure responses that respondents (from a certain demographic) fill out to provide the researchers with the information needed for the research (Taherdoost, 2021). Considering the primary data, a questionnaire survey was chosen as the data gathering strategy in the current research.

### ***Time Horizon of Collected Data***

The time horizons of the acquired data are examined after choosing the research strategy and data gathering methodologies. Research can be classified as cross-sectional or longitudinal based on the horizons of the data gathered. In cross-sectional research, data is gathered for a given phenomenon at a single moment, referred to as a "snapshot," whereas in longitudinal studies, data is collected for a specific phenomenon over a period, referred to as a "dairy." (Saunders et al., 2009). The current research used a cross-sectional design.

### **Questionnaire Design**

Current research used a closed ended questions structured questionnaire, in which respondents are instructed to select only one answer from a set of choices.

The questionnaire consisted of cover, letter, research concepts, and Two main parts. Part One consisted of five sections, while part Two contained the demographics.

Part One started by a close ended yes or no question to specify whether the respondent dealt with any of the Non-Banking Microfinance Companies in Egypt or not. If answer was "no," he/she was thanked and ended the questionnaire. If his/her answer was "yes," then will continue to the next section.

Second section of part one, and up to fifth section were the items measuring the research variables which were Likert Five Scale sentences. They were closed ended answers in which respondent could choose from the answers “Strongly Disagree,” “Disagree,” “Un-decided,” “Agree,” or “Strongly Agree.” (1) point was given to the answer “Strongly Disagree,” (2) points to “Disagree”, (3) points to “Un-decided”, (4) points to “Agree”, and (5) points to “Strongly Agree”.

Part two consisted of (7) demographic closed ended questions which were Gender, Age, Marital Status, Family Income / Month, Education Level, Living Location, and Profession.

### **Variables Measurement**

As shown in table 1, based on the literature, the researchers used dimensions and items to measure the research variables.

**Table 1 Variable dimensions as measured in Literature**

Reference	Dimensions
<b><i>Digitalization</i></b>	
1. Kohtamäki et al., (2020). The relationship between digitalization and servitization: The role of servitization in capturing the financial potential of digitalization.	- Sales support - Service support - Analysis support - Data integration & access support
2. Abou-Foul et al., (2021). The impact of digitalization and servitization on the financial performance of a firm: an empirical analysis.	- Digital components embedded in physical products. - Digital capabilities embedded in the operational processes, which improve the manufacturer’s supply chain and operational performance.
3. Schroeder & Kotlarsky (2015). Digital resources and their role in advanced service provision: A VRIN analysis.	(9) questions.

Reference	Dimensions
4. Hennelly et al. (2020). Rethinking Supply Chains in the Age of Digitalization.	
<b><i>Value Co- Creation</i></b>	
1. Yi, Y., & Gong, T. (2013). Customer value co-creation behavior: Scale development and validation.	<i>Customer participation behavior:</i> - Information seeking - Information sharing - Responsible behavior - Personal interaction <i>Customer citizenship behavior:</i> - Feedback - Advocacy - Helping - Tolerance
2. Cheung et al., (2021). Investigating the role of social media marketing on value co-creation and engagement: An empirical study in China and Hong Kong.	- No Dimensions, Overall Customer Value Co-Creation measured by (5) questions.
<b><i>Customer Education</i></b>	
1. Li Et al., (2018) Empirical Research on Consumer Expertise and Perceived Value of Fund Investors.	- Cognitive Effort - Analysis - Elaboration - Memory
2. Bell & Eisingerich, (2017). The Unraveling the Customer Education Paradox: When, and How Should Firms Educate Their Customers?	- No Dimensions, Customer Education measured by (4) questions.

Source: By researchers based on Literature.

### **Population and Sampling**

The population of the current research are customers of non-banking microfinance companies in Egypt.

As per Financial Regulatory Authority in Egypt, there are eleven non-banking microfinance companies in Egypt (Financial Regulatory Authority in Egypt, "List of authorized Microfinance Companies in Egypt", n.d.): Reefy, Tasaheel, Tanmeyah, Aman, Sandah, Tamweely, Fawry, Aloula, Basata, Pharos, Cash, Alahly Tamkeen, Our, Bedayti, Fibni, Easy credit, Thiqa, and Alkheir.

### **Sampling Unit**

The sampling unit in the current research is the customers of Microfinance Non-Banking Companies in Egypt.

### **Sampling Frame**

According to Saunders et al. (2009), the sampling frame for a probability sample is a comprehensive list that includes all units in the population from which a sample can be drawn. In the current research, the licensed Microfinance Non-Banking Companies in Egypt up to date of the current research are (18) companies with number of customers more than 1,000,000 (Financial Regulatory Authority, 2022).

### **Sample Size**

The sample size required to be large enough to generalize the findings to a population. According to Saunders et al. (2009), a sample size of 384 is required if the margin of error is 5%, which is the proportion utilized in social research, the confidence level is 95%, and the size of the society of 1,000,000.

### **Sampling Technique**

The research depended on stratified random Sample technique. Using Google Form, the researchers created an electronic version of the questionnaire, which was sent to microfinance clients in Egypt using social media channels such as Facebook Pages, Facebook Groups, and WhatsApp Groups. There were (421) total responses, while acceptable responses were (404).

### **Questionnaire Pilot Testing**

#### ***Validity***

One of the most significant qualities of a good research instrument is its validity. According to Bell et al. (2017), validity relates to how well an instrument measures what it is supposed to measure. More specifically, validity reveals the amount to which a certain variable is assessed correctly. Face validity, content validity, construct validity, and criterion-related validity are the four basic categories of validity (Saunders et al., 2009). The researchers mentioned face validity, content validity, and construct validity.

#### ***Face Validity***

The present research instrument, the questionnaire, was translated into Arabic by the researchers and forwarded to specialists for grammar, appropriateness, equivalence, and consistency checks.

#### ***Content Validity***

To ensure content authenticity, the original questionnaire was distributed to five professors<sup>1</sup> from various Egyptian Universities who specialize in business administration and marketing. Most of the

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<sup>1</sup> Prof. Dr. Talaat Asaad, Mansoura University.  
Prof. Dr. Nagi Khashaba, Mansoura University.  
Prof. Dr. Wefqy Al-Emam, Mansoura University.  
Prof. Dr. Mohamed Abdullah Al-Hendawy, Damietta University.  
Prof. Dr. Ahmed Alsetouhi, Horus University.

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comments suggested that the items directly fit their constructions, with slight rephrasing of certain things that were ambiguous to make the questionnaire more understandable to the target respondents, all of which played a significant impact in the final questionnaire design.

### ***Translation of Questionnaire***

The first questionnaire form was offered in English. It was then translated into Arabic to ensure that the questions were accurately comprehended and answered. Once again, the Arabic copy has been translated back into English to be contrasted with the main form in accordance with the validity processes of back translation methodologies approved by Saunders et al. (2009). Finally, the researchers analyzed the two original questionnaires to arrive at a final and more appropriate one.

### ***Construct Validity***

Construct validity may be divided into two types: convergent validity and discriminant validity.

**Table 2 Correlations among l.vs. with sq. rts. of AVEs**

	<b>DGT</b>	<b>VCC</b>	<b>CNG</b>	<b>CED</b>
<b>DGT</b>	<b>0.740</b>	0.267	0.516	-0.038
<b>VCC</b>	0.267	<b>0.599</b>	0.081	0.448
<b>CNG</b>	0.516	0.081	<b>0.732</b>	0.049
<b>CED</b>	-0.038	0.448	0.049	<b>0.852</b>

Note: Square roots of average variances extracted (AVEs) shown on diagonal.

Source: Prepared by the researchers according to statistical analysis.

Convergent validity reveals how closely the construct's components are connected. Average variance extracted (AVE) is used to determine convergent validity, according to Hair et al. (2010). The AVE indicates the total amount of variance in the pieces that make up a construct. On the other hand, discriminant validity translates how different one construct is from other related constructs (Tarling, 2008). Fornell and Larcker (1981) define discriminant validity as the square root of the AVE that must surpass the association between constructs.

As shown in table 3, all these construct's AVEs are greater than 0.5. Therefore, the results indicate that there is convergent validity for all the latent used in this research.

**Table 3 Combined loadings and cross-loadings**

	DGT	VCC	CED	SE	P value
DGT01	<b>0.698</b>	0.048	0.297	<b>0.045</b>	<0.001
DGT02	<b>0.658</b>	0.134	0.510	<b>0.046</b>	<0.001
DGT03	<b>0.710</b>	0.125	0.046	<b>0.045</b>	<0.001
DGT04	<b>0.688</b>	-0.049	-0.167	<b>0.045</b>	<0.001
DGT05	<b>0.932</b>	-0.031	-0.109	<b>0.044</b>	<0.001
DGT06	<b>0.830</b>	-0.147	0.203	<b>0.044</b>	<0.001
DGT07	<b>0.341</b>	0.095	-0.496	<b>0.048</b>	<0.001
DGT08	<b>0.363</b>	0.127	-0.944	<b>0.047</b>	<0.001
DGT09	<b>0.705</b>	-0.033	0.048	<b>0.045</b>	<0.001
DGT10	<b>0.868</b>	0.049	-0.437	<b>0.044</b>	<0.001
DGT11	<b>0.897</b>	-0.068	0.180	<b>0.044</b>	<0.001
DGT12	<b>0.897</b>	-0.069	0.186	<b>0.044</b>	<0.001
VCC01	-0.144	<b>0.435</b>	0.259	<b>0.047</b>	<0.001
VCC02	-0.158	<b>0.602</b>	-0.120	<b>0.046</b>	<0.001
VCC03	-0.235	<b>0.625</b>	-0.696	<b>0.046</b>	<0.001
VCC04	-0.193	<b>0.504</b>	0.154	<b>0.046</b>	<0.001
VCC05	-0.294	<b>0.696</b>	-0.921	<b>0.045</b>	<0.001
VCC06	-0.254	<b>0.649</b>	-0.390	<b>0.046</b>	<0.001
VCC07	-0.217	<b>0.676</b>	-0.057	<b>0.045</b>	<0.001
VCC08	-0.219	<b>0.750</b>	0.042	<b>0.045</b>	<0.001
VCC09	-0.159	<b>0.663</b>	-0.144	<b>0.045</b>	<0.001
VCC10	-0.268	<b>0.795</b>	0.047	<b>0.045</b>	<0.001
VCC11	-0.281	<b>0.741</b>	-0.134	<b>0.045</b>	<0.001

	DGT	VCC	CED	SE	P value
VCC12	-0.317	<b>0.702</b>	-0.413	<b>0.045</b>	<0.001
VCC13	0.572	<b>0.549</b>	0.354	<b>0.046</b>	<0.001
VCC14	0.601	<b>0.585</b>	0.340	<b>0.046</b>	<0.001
VCC15	0.603	<b>0.494</b>	0.625	<b>0.047</b>	<0.001
VCC16	0.475	<b>0.584</b>	0.720	<b>0.046</b>	<0.001
VCC17	0.470	<b>0.580</b>	0.601	<b>0.046</b>	<0.001
VCC18	0.400	<b>0.614</b>	0.555	<b>0.046</b>	<0.001
VCC19	-0.191	<b>0.664</b>	-0.809	<b>0.045</b>	<0.001
VCC20	-0.150	<b>0.634</b>	-0.421	<b>0.046</b>	<0.001
VCC21	-0.244	<b>0.349</b>	0.441	<b>0.047</b>	<0.001
VCC22	0.310	<b>0.428</b>	0.507	<b>0.047</b>	<0.001
VCC23	0.305	<b>0.372</b>	0.316	<b>0.047</b>	<0.001
VCC24	0.340	<b>0.392</b>	0.432	<b>0.047</b>	<0.001
CED01	0.015	0.083	<b>0.855</b>	<b>0.044</b>	<0.001
CED02	-0.018	0.099	<b>0.912</b>	<b>0.044</b>	<0.001
CED03	0.035	-0.054	<b>0.936</b>	<b>0.044</b>	<0.001
CED04	0.007	-0.020	<b>0.915</b>	<b>0.044</b>	<0.001
CED05	0.006	-0.068	<b>0.898</b>	<b>0.044</b>	<0.001
CED06	-0.002	-0.017	<b>0.936</b>	<b>0.044</b>	<0.001
CED07	0.043	-0.027	<b>0.808</b>	<b>0.045</b>	<0.001
CED08	0.000	-0.008	<b>0.866</b>	<b>0.044</b>	<0.001
CED09	0.021	-0.092	<b>0.755</b>	<b>0.045</b>	<0.001
CED10	-0.046	-0.004	<b>0.891</b>	<b>0.044</b>	<0.001
CED11	0.001	-0.008	<b>0.707</b>	<b>0.045</b>	<0.001
CED12	-0.069	0.130	<b>0.701</b>	<b>0.045</b>	<0.001

Notes: Loadings are unrotated and cross-loadings are oblique-rotated. P values < 0.05 are desirable for reflective indicators. Scores for each item <0.30 are desirable for sample 350 (Hair, 2009).

Source: Prepared by the researchers according to statistical analysis

### **Reliability**

To perform internal consistency reliability, the researchers rely on Cronbach's alpha coefficient ( $\alpha$ ) and Composite Reliability (CR). Cronbach's alpha and CR should be larger than or equal to 0.7. (Hair et al., 2010).

**Table 4 Composite reliability & Cronbach's alpha ( $\alpha$ ) coefficients**

<b>Composite reliability coefficients</b>		
<b>DGT</b>	<b>VCC</b>	<b>CED</b>
<b>0.931</b>	<b>0.928</b>	<b>0.969</b>
<b>Cronbach's alpha coefficients</b>		
<b>0.916</b>	<b>0.918</b>	<b>0.965</b>

Source: Prepared by the researchers according to statistical analysis

### **Sample Description**

Accepted responses to the questionnaire were (404), described as follows:

**Table 5 Sample Description**

<b>Sample Description</b>		<b>No.</b>	<b>%</b>
<b>Customers</b>	Tasaheel	59	14.6%
	Fawry	57	14.1%
	Aman	56	13.9%
	Tanmeya	53	13.1%
	Reefy	53	13.1%
	Tamweely	45	11.1%
	Sanda	31	7.7%
	ALAhly Tamkeen	20	5.0%
	Veetas	16	4.0%
	Cash	13	3.2%
	AlOula	1	0.2%
	<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Gender</b>	Male	237	58.7%
	Female	167	41.3%
	<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Age</b>	21 to <40	360	89.1%
	40 to <60	34	8.4%
	60 to >60	10	2.5%

<b>Sample Description</b>	<b>No.</b>	<b>%</b>
<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Marital Status</b>		
Married with Children	352	87.1%
Single with Children	20	5.0%
Married with No Children	19	4.7%
Single with No Children	13	3.2%
<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Income Level</b>		
2400 to <4800	195	48.3%
<2400	128	31.7%
4800 to >4800	81	20.0%
<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Education Level</b>		
High School or Lower	278	68.8%
University Degree	121	30.0%
Postgraduates	5	1.2%
<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Residency</b>		
Urban	322	79.7%
Rural	82	20.3%
<b>Total</b>	<b>404</b>	<b>100.0%</b>
<b>Job</b>		
Free Work	206	51.0%
Private Sector	80	19.8%
No Work	92	22.8%
Public Sector	26	6.4%
<b>Total</b>	<b>404</b>	<b>100.0%</b>

Source: Prepared by the researchers according to statistical analysis

### **Descriptive Statistics**

According to Byrne (2010), data analysis is a necessary step before testing the measurement model, particularly when utilizing structural equation modelling.

**Table 6 Descriptive Statistics for Each Item**

Variable	Dimension	Code	Mean	SD	Skewness	Exc. kurtosis
Digitalization	Sales Support	DGT01	3.382	0.539	1.002	-0.052
		DGT02	3.355	0.537	1.174	0.373
		DGT03	3.320	0.540	1.460	1.189
	Service Support	DGT04	3.141	0.873	-0.233	-1.451
		DGT05	2.583	0.781	0.973	-0.203
		DGT06	2.514	0.776	1.151	-0.145
	Analysis Support	DGT07	3.047	0.212	4.278	16.308
		DGT08	3.045	0.218	3.678	15.659
		DGT09	2.685	0.548	0.181	0.424
	Data Int. & Access Supp.	DGT10	2.551	0.572	0.438	-0.195
		DGT11	3.040	0.847	-0.051	-1.547
		DGT12	3.042	0.846	-0.055	-1.541
Value Co-Creation	CPB: Information seeking	VCC01	4.104	0.314	2.351	4.522
		VCC02	4.062	0.251	3.159	10.354
		VCC03	4.042	0.224	3.170	15.025
	Information sharing	VCC04	4.040	0.270	0.819	16.064
		VCC05	4.047	0.264	1.213	16.911
		VCC06	4.074	0.289	2.285	7.004
	Responsible behavior	VCC07	4.064	0.256	3.096	9.813
		VCC08	4.050	0.239	3.011	12.555
		VCC09	4.072	0.268	2.924	8.401
	Personal Interaction	VCC10	4.035	0.220	2.787	16.309
		VCC11	4.040	0.219	3.225	16.013
		VCC12	4.035	0.231	2.366	14.644
		VCC13	3.619	0.539	0.040	-0.973

Variable	Dimension	Code	Mean	SD	Skewness	Exc. kurtosis
Customer Education	CCB: Feedback	VCC14	3.609	0.546	0.110	-0.945
		VCC15	3.611	0.555	-0.185	0.039
	Advocacy	VCC16	3.916	0.363	-1.056	3.706
		VCC17	3.916	0.342	-1.357	4.385
		VCC18	3.938	0.350	-0.909	4.593
	Helping	VCC19	4.027	0.204	2.835	19.998
		VCC20	4.032	0.226	2.368	15.555
		VCC21	4.054	0.258	2.543	10.326
	Tolerance	VCC22	3.124	0.593	0.745	1.739
		VCC23	3.084	0.608	0.553	1.301
		VCC24	3.116	0.633	0.783	1.592
	Customer Education	Cognitive Effort	CED01	4.022	0.164	4.686
CED02			4.017	0.192	0.079	46.196
CED03			4.015	0.172	-0.260	65.390
Analysis		CED04	4.010	0.211	-5.422	110.723
		CED05	4.012	0.205	-5.660	123.672
		CED06	4.007	0.205	-6.143	122.624
Elaboration		CED07	4.025	0.171	4.550	29.331
		CED08	4.015	0.157	3.580	36.718
		CED09	4.020	0.156	4.825	36.165
Memory		CED10	4.007	0.165	-1.793	74.416
		CED11	4.015	0.121	8.022	62.348
		CED12	4.007	0.111	5.229	77.099

Source: Prepared by the researchers according to statistical analysis

As shown in table 5, before commencing the statistical investigation, the researchers took certain measures to confirm that the necessary circumstances for the statistical procedures were in place.

### **Structural Equation Modeling**

According to Ong et al. (2017), structural equation modelling (SEM) is a statistical tool that uses a confirmatory approach incorporating hypothesis testing to investigate a structural theory based on specific facts. SEM also denotes causal techniques that provide explanations for a wide range of variables. Such variables can be observed as either latent or manifest. The observed variable is measured directly, but the latent variable is assessed indirectly using two or more observed variables.

Furthermore, SEM investigates the links between one or more independent and dependent variables by measuring the fitness level of hypothetical constructions using data acquired. SEM is becoming more popular in the realms of psychology and social sciences, where it is recognized as a fundamental tool. The current research utilized partial least squares (PLS) analysis, precisely Warp PLS version 8.0

### **Assessing the Structural Model and Hypotheses Testing**

#### ***Model Fit Indices***

A structural model is frequently employed to address the causal links between the research's components. The structural model is also utilized to analyses the research's theoretical model (Ong et al., 2017).

**Table 7 Model Fit Indices**

<b>Fit Measures</b>	<b>Actual Values</b>	<b>P Values</b>	<b>Accepted Fit</b>
Average path coefficient (APC)	0.159	<0.001	P < 0.05
Average R-squared (ARS)	0.122	0.003	P < 0.05
Average block VIF (AVIF)	2.124		Acceptable if $\leq 5$ , ideally $\leq 3.3$

Source: Prepared by the researchers according to statistical analysis

As shown in table 6, three additional metrics were used to quantify the overall fit of the model fit indices: Average Path Coefficient (APC), Average R-squared (ARS), and Average Variance Inflation Factor (AVIF) (AVIF). According to Kock (2013), APC and ARS are significant if the P-value is less than 0.05, but AVIF must be less than 5.

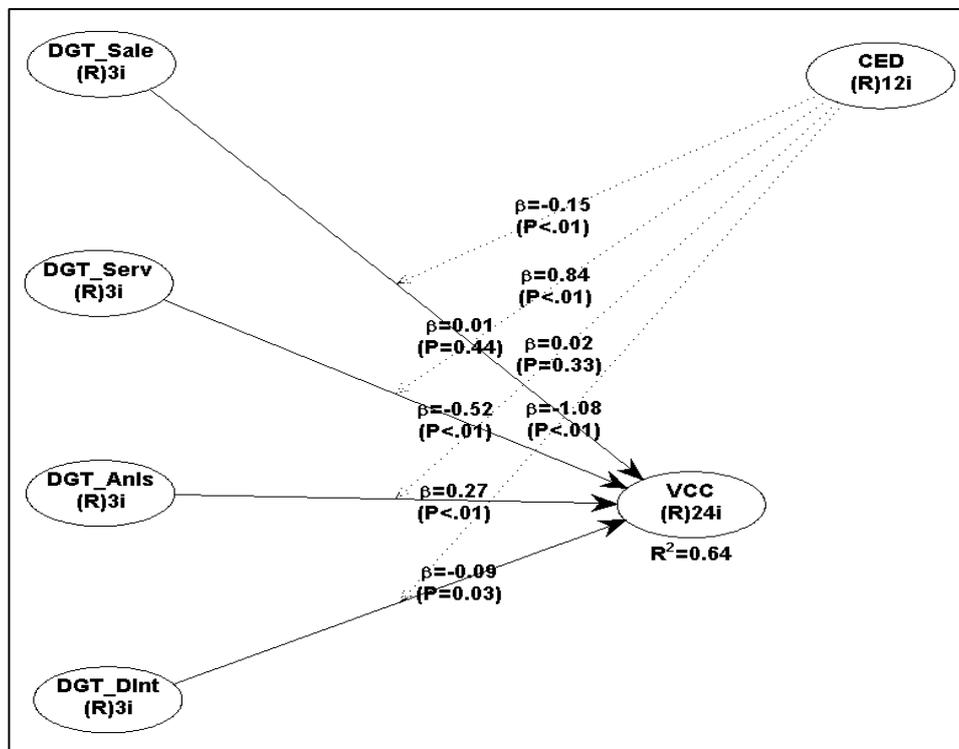
### ***Testing Hypothesizes***

Based on the statistical analysis, Digitalization significantly affects Value Co-Creation with Microfinance Non-Banking Companies in Egypt at P Value <0.01. Also, Customer Education significantly moderates this relationship at P Value <0.01. Table 7 shows the statistical analysis of the relationships between research variables.

**Table 8 Total Effects & P Values**

Variable/Dimension	Total Effect	P Value	Interpretation
<b>H1. Digitalization on Value Co-Creation</b>	<b>0.021</b>	<b>&lt;0.001</b>	<b>Partially Accepted</b>
H1a. Digitalization of Sales Support on Value Co-Creation.	0.007	0.442	Rejected
H1b. Digitalization of Service Support on Value Co-Creation.	-0.518	<0.001	Accepted
H1c. Digitalization of Analysis Support on Value Co-Creation.	0.272	<0.001	Accepted
H1d. Digitalization of Data Integration on Value Co-Creation.	-0.091	0.032	Accepted
<b>H2. Moderating Customer Education in the relationship Between Digitalization and Value Co-Creation.</b>	<b>0.017</b>	<b>&lt;0.001</b>	<b>Partially Accepted</b>
H2a. Moderating Customer Education in the relationship Between Digitalization of Sales Support and Value Co-Creation.	-0.148	0.001	Accepted
H2b. Moderating Customer Education in the relationship Between Digitalization of Service Support and Value Co-Creation.	0.845	<0.001	Accepted
H2c. Moderating Customer Education in the relationship Between Digitalization of Analysis Support and Value Co-Creation.	0.022	0.329	Rejected
H2d. Moderating Customer Education in the relationship Between Digitalization of Data Integration Support and Value Co-Creation.	-1.08	<0.001	Accepted

Source: By Researchers based on WarpPLS V 8.0 Statistical analysis.



**Figure 2** The relationships between Digitalization dimensions and Value Co-Creation, and the moderation of Customer Education

Source: By Researchers based on WarpPLS V 8.0 Statistical analysis.

## Findings

Researchers summarize the Research Questions, Objectives, Hypothesizes, and Results in table 8 as follows:

**Table 9 Research Questions, Objectives, Hypothesizes, and Results**

Research Questions	Research Objectives	Research Hypothesizes	Results
Q1. What is the impact of Digitization on Value Co-Creation among clients of non-banking microfinance companies in Egypt?	O1. Measuring the effect of Digitization on Value Co-Creation among clients of non-banking microfinance companies in Egypt.	H1. Digitization significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.	Partially Accepted
		H1a. Digitalization of sales support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.	Rejected
		H1b. Digitalization of service support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.	Accepted
		H1c. Digital analysis support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.	Accepted
		H1d. Digitalization of Data integration and access support significantly affects Value Co-Creation among clients of non-banking microfinance companies in Egypt.	Accepted

<b>Research Questions</b>	<b>Research Objectives</b>	<b>Research Hypothesizes</b>	<b>Results</b>
Q2. Does Customer Education play a moderating role in the relationship between Research Variables (Digitization, and Value Co-Creation)?	O2. Determining the nature of the moderating role that Customer Education plays in the relationship between the Research Variables (Digitization, and Value Co-Creation).	H2. Customer Education significantly moderates the relationship between the Research Variables (Digitization, and Value Co-Creation).	Partially Accepted
		H2a. Customer Education significantly moderates the relationship between Digitalization of sales support, and Value Co-Creation.	Accepted
		H2b. Customer Education significantly moderates the relationship between Digitalization of service support, and Value Co-Creation.	Accepted
		H2c. Customer Education significantly moderates the relationship between Digital analysis support, and Value Co-Creation.	Rejected
		H2d. Customer Education significantly moderates the relationship between Digitalization of Data integration, and Value Co-Creation.	Accepted

Source: By Researchers based on Literature, Conceptual Framework, and Statistical analysis.

**Table 10 Research Findings compared to Literature**

<b>Research Findings</b>	<b>Compared to literature</b>
Digitalization significantly Affect Value Co-Creation.	<i>Agree with</i> Royo-Vela & Serrano (2021); Tsindeliani et al. (2021); Osipova & Naumova (2020); Caputo et al. (2021)
Customer Education Significantly Moderates the relationship between Digitalization and Value Co-Creation.	Within the researchers' knowledge, there are no previous studies that have previously investigated this relationship

Source: By Researchers based on Literature.

### **Theoretical Implications**

The current research contributes to the body of knowledge of the existing literature of Digitalization, Customer Education, and Value Co-Creation. In addition, the research aimed to fill the knowledge gap focusing on the effect of Digitalization Dimensions on Value Co-Creation, and to analyze the Moderating Role of Customer Education in these relationships. Therefore, researchers summarize the theoretical implications as follows:

1. The current Research contributes to a broader and more comprehensive understanding of the most important Digitalization Dimensions and knowing the extent of its effect on Value Co-Creation.
2. The current research gives deeper analysis for the Moderating Role of Customer Education in the relationships between research variables.

### **Practical Implications**

The current research was prepared based on reviewing previous studies and noticing a lack of studies that focused on the link between Digitalization, Customer Education, and Value Co-Creation. Therefore, the study directed towards examining the role of

Customer Education as a moderator in the relationship between Digitalization and Value Co-Creation.

Based on the literature review, these relationships were not analyzed in the same depth before, in addition to that the application field still needs more investigation. The results of the current study provide some practical contributions as follows:

1. Providing a deeper understanding of Digitalization, and Value Co-Creation.
2. The research proved that Customer Education has a vital role on moderating the relationship between Digitalization and Value Co-Creation. Therefore, customers' knowledge of all aspects of service provided to them strengthen the studied relationships and benefit the Non-Banking Microfinance Companies in maintaining Value Co-Creation.

### **Recommendations**

In the light of the practical implications, the researchers provide several recommendations for Non-Banking Microfinance Companies in Egypt:

1. Digitalizing the whole processes of those companies is necessary, and they should be aware of the digitalization movements around the world.
2. Co-Creation of Value with customers is the recent trend to develop superior services that satisfy the needs of those customers. That is why companies are required to discuss every aspect of its services with its customers before, during, and after sales.
3. Invest in more Customer Education Activities because it will positively strengthen the relationships between Digitalization and Value Co-Creation.

## **Conclusion**

The research model of this study estimates the direct and total effects of Digitalization dimensions on Value Co-Creation, and the Moderating Role of Customer Education in these relationships.

Results showed that Digitalization significantly affects Value Co-Creation, and Customer Education significantly Moderates this relationship. For Digitalization Dimensions, results showed that only three dimensions of the four significantly affect Value Co-Creation, they are: Digitalization of Service Support, Digital Analysis Support, and Digitalization of Data integration and access support.

Results of the Moderation Analysis show that Customer Education Significantly moderates Three of the four sub relationships, those are: The relationship between Digitalization of sales support, and Value Co-Creation; The relationship between Digitalization of service support, and Value Co-Creation; and the relationship between Digitalization of Data integration, and Value Co-Creation.

## **Research Limitations**

This research has some limitations which researchers summarize it as follows:

- People: This research results are limited to Customers of Non-Banking Microfinance Companies in Egypt.
- Place: This research results are limited to Non-Banking Microfinance Companies in Egypt.
- Time: This research results are limited to the cross-sectional period in when the questionnaire was shared to customers of the Non-Banking Microfinance Companies in Egypt during the period from November 2021 to February 2022.

### **Future Research Directions**

Researchers give Future Research Directions based on what they studied in the current research as follows:

1. The Moderating Role of Customer Education Dimensions in the relationship between Digitalization and Value Co-Creation.
2. The relationship between Digitalization and Customer Education.
3. The relationship between Digital Customer Education and Customer Engagement.

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**الدور المعدل لتعليم العملاء في العلاقة بين الرقمنة ومشاركة خلق القيمة  
بالتطبيق على شركات التمويل الأصغر غير المصرفية في مصر**

عبد الله إبراهيم النجار؛ د. عبد العزيز علي حسن

**ملخص الدراسة**

هدفت هذه الدراسة إلى تحليل الدور المعدل لتعليم العملاء في العلاقة بين الرقمنة ومشاركة خلق القيمة بالتطبيق على شركات التمويل الأصغر غير المصرفية في مصر. بناء على مراجعة الدراسات السابقة، وضع الباحثان إطاراً مفاهيمياً للعلاقة بين متغيرات الدراسة. كذلك أعد الباحثان قائمة استقصاء لجمع بيانات الدراسة، استخدمها في إعدادها نماذج جوجل، ونشراها عبر صفحات ومجموعات وسائل التواصل الاجتماعي لشركات التمويل الأصغر غير المصرفية في مصر. بلغ عدد الاستجابات (٤٢١) منها (٤٠٤) صحيحة اعتمد عليها الباحثان لتحليل بياناتها والحصول على نتائج الدراسة. وجاءت النتائج لتؤكد وجود علاقة وتأثير معنوي للرقمنة على مشاركة خلق القيمة، وكذلك دور معدل معنوي لتعليم العملاء في العلاقة بين متغيرات الدراسة.