Leonard Barolli *Editor*

Complex, Intelligent and Software Intensive Systems

Proceedings of the 16th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2022)

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Welcome Message of CISIS-2022 International Conference Organizers

Welcome to the 16th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2022), which will be held from June 29 to July 1, 2022, in conjunction with the 16th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2022).

The aim of the conference is to deliver a platform of scientific interaction between the three interwoven challenging areas of research and development of future ICT-enabled applications: software-intensive systems, complex systems and intelligent systems.

Software-intensive systems are systems, which heavily interact with other systems, sensors, actuators, devices, other software systems and users. More and more domains are involved with software-intensive systems, e.g., automotive, telecommunication systems, embedded systems in general, industrial automation systems and business applications. Moreover, the outcome of web services delivers a new platform for enabling software-intensive systems. The conference is thus focused on tools, practically relevant and theoretical foundations for engineering software-intensive systems.

Complex systems research is focused on the overall understanding of systems rather than its components. Complex systems are very much characterized by the changing environments in which they act by their multiple internal and external interactions. They evolve and adapt through internal and external dynamic interactions.

The development of intelligent systems and agents, which is each time more characterized by the use of ontologies and their logical foundations, build a fruitful impulse for both software-intensive systems and complex systems. Recent research in the field of intelligent systems, robotics, neuroscience, artificial intelligence and cognitive sciences is very important factor for the future development and innovation of software-intensive and complex systems.

This conference is aiming at delivering a forum for in-depth scientific discussions among the three communities. The papers included in the proceedings cover all aspects of theory, design and application of complex systems, intelligent systems and software-intensive systems.

We are very proud and honored to have two distinguished keynote talks by Prof. Keita Matsuo, Fukuoka Institute of Technology, Japan, and Dr. Anne Kayem, Hasso Plattner Institute, University of Potsdam, Germany, who will present their recent work and will give new insights and ideas to the conference participants.

The organization of an international conference requires the support and help of many people. A lot of people have helped and worked hard to produce a successful technical program and conference proceedings. First, we would like to thank all authors for submitting their papers, the program committee members, and the reviewers who carried out the most difficult work by carefully evaluating the submitted papers. We are grateful to Honorary Chair Prof. Makoto Takizawa, Hosei University, Japan, for his guidance and support.

Finally, we would like to thank Web Administrator Co-chairs for their excellent and timely work.

We hope you will enjoy the conference proceedings.

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CISIS-2022 Keynote Talks

Design and Implementation Issues of Omnidirectional Robots and Their Applications for Different Environments

Keita Matsuo

Fukuoka Institute of Technology, Fukuoka, Japan

Abstract. Intelligent robotic systems are becoming essential for increasing Quality of Life (QoL) and keeping health for growing population of elderly people. In our research, in order to solve human health problems and support elderly people, we consider the design and implementation of omnidirectional robots. In this talk, I will introduce our results to show how omnidirectional wheelchair robots can support people with disabilities at home and at workplace. In our work, we also consider the use of the omnidirectional wheelchair robots for playing tennis and badminton. I also will present the application of omnidirectional robot as a mesh router in Wireless Mesh Networks (WMNs) in order to provide a good communication environment.

Is Privacy the Same as Security, or Are They Just Two Sides of the Aame Coin?

Anne Kayem

Hasso-Plattner-Institute, University of Potsdam, Potsdam, Germany

Abstract. Almost every digital device either generates or consumes data in some form. The result is that the volumes of data collected grow exponentially each day. Data analytics proponents have mooted that it is now possible in some cases to actually predict future human behaviors based on data collected through tracking and various other means. On the other parallel, the question of privacy has become ever more important as users increasingly seek ways of guarding their personal data from exposure. This as such raises the question of what the distinction between privacy and security (data protection) is, and what the boundary between the two should be. For instance, the 2014 incident of a hacker faking the German minister of defense's fingerprints was considered to be a security breach. However, a closer look at this issue highlights the fact that distinguishing between whether or not this was a privacy breach that enabled a security breach, or vice versa, does not have a straightforward answer. In this talk, I aim to explain why in my view privacy is different from security and, while though both privacy and security are mutually interdependent, why it is important to make the distinction. The talk will be supported by various examples to characterize privacy and distinguish it from security. At the same time, I will also explain why the two concepts are in fact two sides of the same coin.

Contents

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The Role of Holistic Value Co-creation Capability in Improving Sustainable Relationship

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Abstract. This study examines a model that links Holistic Value Co-Creation Capability (HVCC) with Sustainable Relationship (SR). HVCC is the perception of Sharia insurance customers that Sharia insurance salesmen can participate actively, to create not only transactional values but also religious values. This study was conducted on 177 sharia insurance customers in Central Java. The sampling technique used was purposive sampling. The regression analysis technique is used to observe the relationship between variables using SPSS version 16 software. The results showed the perception of sharia insurance customers on the ability of salesmen to be actively involved in creating holistic value co-creation had been proven to strengthen customers' desire to establish long-term relationships. The capability of the "people" element in insurance services can be used as a solid basis as a unique and inimitable differentiation for the sustainability of the service industry that offers religious products. The results of this study have succeeded in completing the concept of value co-creation by internalizing religious values, especially Islamic values.

Keywords: Holistic Value Co-creation Capability · Sustainable relationship

1 Introduction

This study focuses on value creation when frontline staff and customers meet in interactive marketing activities due to the inherent inseparability of services. The concept of value creation is the most significant factor for the company's success and has been believed to be an essential source of competitive advantage [1]. This concept is a derivative of the Service-Dominant Logic concept, which involves producers, consumers, suppliers, and other stakeholders in the service system. These groups integrate various resources and collaborate by sharing to establish a co-creation value system [2]. [3] stated that in an increasingly saturated market condition and limited resources, companies should no longer focus on optimizing internal resources but must be able to explore external resources, including involving customers in the co-creation value. Collaboration between internal and external resources results in optimal value creation.

Co-creation Value can be developed from 4 values, namely functional, social, emotional, and economic values [4]. Another opinion was expressed by [5–7]. Based on the literature review on value co-creation, the search for meaning in the value creation process proposed by previous researchers has not reached the religious aspect. Religious values are essential in consumer buying behavior [8], including halal products. Therefore, this study aims to refine the dimensions of the value co-creation concept by adding one more dimension, namely Religious Value Co-Creation (RVCC), which is defined as the interaction between salesmen and insurance customers to establish co-creation value by reinforcing mutual beliefs and Sharia product knowledge. The religious dimension becomes very important when an organization offers products based on religious values. This dimension can presumably improve the interest of Islamic insurance customers to establish sustainable relationships.

Through the additional religious dimension, the co-creation values will strengthen the beliefs of both parties; thus, they can provide wider benefits. This uniqueness is believed to bring strong differentiation through values superiority that has reached the level of non-transactional motives; therefore, it strengthens sustainable mutual relationships.

2   Literature Review

The theory of value (TOV) is the foundation of Service-Dominant Logic (SDL) which then derives the concept of Value Co-Creation (VCC) as a value construction. Value is customer-centric and is co-created by the company and the customers. [2] stated that value co-creation can be started by creating meaning through interaction, collaboration, mutual exchange, evaluation of job performance, and resource integration. SDL postulates that when customers engage in exchanging shared values, they actively create meaning from the process, thereby increasing value [7].

Religious value co-creation is value creation related to religious values. The value obtained from religion is related to its religious commitment [8]. The religious commitment shows how far a person believes in his religious values and practices them in everyday life, including the desire to do da'wah through the buying process. Da'wah has the potential to form harmony between humans to create group cohesiveness [9]. Da'wah contains elements of two-way communication. When someone does da'wah, he not only spreads religious values but will mutually get feedback from his da'wah material. Therefore, RVCC contains elements of contribution and elements of collaboration. The command to give charity is contained in the Holy Qur'an. An-Nissa verse 114. And among the most important alms is the charity of knowledge. As stated by the Prophet Muhammad narrated by Ibn Majah: "The most important charity is when a Muslim learns a knowledge, then teaches it to other Muslim brothers."

2.1 Sustainable Relationships

Individuals are willing to carry out sustainable relationships due to their engagement with the products they consume and with the organization. The concept of engagement is derived from the partnership theory developed by [10]. Engagement is defined as a state of being involved, focused, fully centered, or captivated by something, so that it grabs

his attention and creates attraction [11]. Engagement is a unidimensional concept that involves emotional, cognitive, and behavioral aspects. Individuals who wish to establish long-term relationships will be more ready to get involved and participate because there are customer interactions and creative experiences with the company [11]. [12] stated that when a relationship is considered satisfying and has an emotional bond, it will strengthen the level of engagement.

Nowadays, customers are no longer seen as passive recipients of marketing cues but as proactive parties to create shared value. Customer engagement will create experiences and co-creation value and contribute to innovation [13]. Customers who are willing to maintain a relationship with an organization are satisfied and loyal and want to recommend the company's products and services to others [14]. This statement is reinforced by [15], which stated that a good relationship that is carried out through customer-company interactions contributes to creating satisfied customers who will not only make repeat purchases but also be committed to the company and recommend products and services to other customers. The indicators used to measure Sustainable Relationships are: willing to continue the Relationship, Being the first choice, having no desire to move, willing to increase involvement.

2.2   Holistic Value Co-Creation (HVCC)

A co-creation value will be completely valuable when it contains two kinds of benefit, namely the benefit of the world and the hereafter, by involving religious elements. However, prior researchers' value co-creation has not reached religious aspects. Therefore, this study attempts to complement the value co-creation concept offered by [6], namely religious value co-creation through a religious dimension. Hopefully, by adding a religious dimension, this concept will become broadly and holistically meaningful.

Functional Value Co-creation Capability (FVCC). Functional value is related to how far the product has the desired benefit [4]. This value is based on the assumption that individuals are rational problem solvers [16], including their members' information needs, leading to financial savings and high quality of services. The FVCC in this study is more directed to frontline staff's ability to actively participate in creating functional value of halal products to be more beneficial, qualified, and innovative [17].

Therefore, when consumers believe that frontline staff can interact with them to strengthen their belief in the benefits of halal products, consumers will be more confident in their choice and willing to continuously use the products in a long-term period. Based on this explanation, the proposed hypothesis is:

H1: The higher the functional value co-creation capability, the stronger the sustainable relationship.

Social value co-creation capability (SVCC). It is a process where the service providers and customers create social value for themselves through mutually beneficial dialogue and interactions. Social value is a perceived utility obtained from an alternative association with more particular social groups [18] (Sheth *et al.* 1991). Efforts to establish social identity are related to how individuals see themselves in product choices according to their social identity, especially for a more prominent identity. For the consumers, the prominent self-identity role will determine the consumption based on social

expectations of a particular identity [19], such as feeling accepted, how an individual is perceived, impression to others, and social approval [4].

SVCC, in this study, is more directed to the salesman's capability of actively participating in assuring the consumers that there are many consumers in their groups who use halal products. It will further strengthen their desire to continue their relationship for a long-term period, and there is no hesitation from themselves to move to other products. Based on these explanations, the proposed hypothesis is:

H2: The higher the social value co-creation capability, the stronger the sustainable relationship.

Emotional Value Co-creation Capability (EmVCC). This emotional value is related to customers' pleasure and enjoyment from using products and services [18]. Since the product is specifically designed to provide enjoyment, the emotional value derived from using products is likely to affect the significance of product user identity and probably recommend the product to others [19]. This emotional value concerns the enjoyment in use, the desire to continue using the product, feeling comfortable, protected, safe, pleased, relieved, and proud of using the products [20].

In this study, EmVCC is more focused on the salesman's capability to actively improve consumers' confidence that halal products will make them feel protected and comfortable. This perception will strengthen consumers' desire to make halal products their primary choice and not move to consume non-halal products. Based on this explanation, the proposed hypothesis is:

H3: The higher the emotional value of co-creation, the stronger the sustainable Relationship.

Economic Value Co-Creation capability (EVCC). The economic dimension of customer values addresses monetary aspects such as price, resale price, discount, investment, and more. It refers to product value that is stated in monetary units. It becomes essential because the consumer also attempts to minimize costs and other sacrifices that are probably involved in purchasing, ownership, and using certain products [4].

In this study, EVCC is more directed to frontline staff's capability to actively create co-creation value. Thus, they can produce the most profitable economic cost agreement. The increased consumer confidence resulting from interaction with frontline staff will strengthen their desire to continuously use halal products. Based on those explanations, the proposed hypothesis is:

H4: The higher the economic value co-creation, the stronger the sustainable Relationship.

Religious Value Co-Creation Capability (RVCC). A value is phenomenologically determined by the customer [21]; thus, personality traits play an essential role in the appraisal process. Therefore, an opened personality will support determining the result and the process of sharing mutual experience, particularly in the new object [22].

Religious value co-creation is a value creation related to religious values. The value obtained from religion is related to its religious commitment [8]. The religious commitment shows how far someone believes in religious values and applies them in everyday life. In this study, RVCC is associated with frontline staff capability of actively participating in establishing values in halal and haram laws of the product, resulting in

strengthening and broadening knowledge of halal products. Strengthening consumers' beliefs that consuming haram products is a big sin and will not bring any blessing will further increase their beliefs that halal products should become their first choice [23]. Based on those explanations, the proposed hypothesis is:

H5: The higher the religious value co-creation, the stronger the sustainable Relationship.

The empirical model that shows the relationship between variables can be found in Fig. 1.
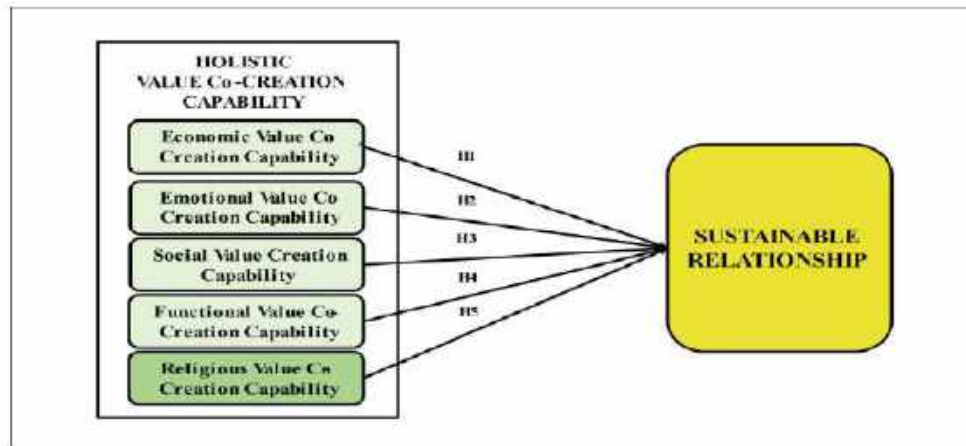
Fig. 1. Empirical model

3   Research Methods

The population used in this study was sharia insurance customers. The sampling technique used was purposive sampling. Non-random sampling was used in the sampling technique because the number of the population was unknown, so it was not possible to make a sampling frame as the basis for using random sampling. By using a measuring instrument SEM-PLS. The samples collected were 177 of the 200 target respondents. The number of samples was determined based on the opinion [24], which stated that the sample size was sufficient for social research between 100 to 200 respondents. The sample of Islamic insurance customers in this study was taken based on the following criteria: (1) had joined Sharia insurance for at least one year, (2) was able to make decisions independently, (3) knew Sharia insurance.

Questionnaires were delivered by officers who had been trained beforehand to respondents who were selected as sample members. The description of the respondents consisted of 68% men and 32% women aged between 32 years to 65 years. The last education of respondents consisted of high school graduates (28%), Bachelors (72%).

3.1 Analysis Techniques

Regression analysis was used to test the empirical research model. The goodness of fit model was determined to determine whether the variation in the independent variable could explain the variation in the dependent variable. A model has well goodness of fit model if the F test produces a p-value that does not exceed 0.05. The coefficient of determination was then determined to determine the percentage of variation in the independent variable that explained the variation in the dependent variable. In addition, the variance inflatoir factor (VIF) test in multiple regression analysis was also used to explain that there was no multicollinearity in the specified regression model. The test results showed that the VIF exceeded 10, so it was considered as there was no multicollinearity in the regression model. Regression analysis was performed using SPSS software version 16.00.

4   Finding

4.1   Reliability Dan Validity

Investigation of the internal consistency of latent variables using Cronbach's alpha required that all variables in the model exceed the recommended minimum of 0.6 [25]. To test the indicator validity was done by calculating the p-value in the t-test to the correlation coefficient of the indicator item score with the total score. The p-value produced a value less than 0.05 indicating high validity. The results of data analysis showed that the Cronbach alpha of all constructs ranged from 0.650 to 0.948 indicating good reliability.

Operational definitions and indicators in this study are described in Table 1. below:

4.2   Hypothesis Testing Results

Regression analysis showed the excellent goodness of fit model because the Anova test produced an F value $= 18,441$ and a p-value of 0.000. The normality assumption test with Kolmogorov-Smirnov $Z = 1.061$, p-value $= 0.11$ indicated that the data was not normal, but this did not mean anything with a sample of 177 or more than 100. A VIF value less than 10 indicated that there was no multicollinearity. The coefficient of determination for this model was shown by R2 0.34. It means that 34% of the data variation in Sustainable Relationships could be explained by data variations in the Functional Value co-Creation, Social Value co-Creation, Emotional Value co-Creation, Economics Value co-Creation, and Religious Value co-Creation. Meanwhile, the remaining 66% explained the variation of other variables outside the model.

Regarding hypothesis testing, the regression model confirmed the regression of Functional Value co-creation and Sustainable Relationship ($\beta = 0.412$, p-value $= 0.034$ or <0.05) indicating that Functional Value co-Creation had a direct effect on Sustainable Relationship. Meaning that, this study accepts H1. Furthermore, the research findings confirmed the regression of Social Value co-Creation on Sustainable Relationship ($\beta = 0.372$, p-value $= 0.022$ or <0.05), Emotional Value co-Creation on Sustainable Relationship ($\beta = 0.251$, p-value $= 0.053$ or <0.10), Economic Value co-Creation on Sustainable Relationship ($\beta = 0.161$, p-value $= 0.076$ or <0.10) and Religious Value co-Creation on Sustainable Relationship ($\beta = 0.277$, p-value $= 0.027$ or <0.05). These results provided support for H2, H3, H4 and H5 (Table 2).

Table 1. Variable dan indicator

Construction and instrument

A sustainable Relationship is the desire of customers to establish long-term relationships and increase engagement

Indicators

- Willing to continue the Relationship
- Being the first choice
- Having no desire to move
- Willing to increase engagement

Functional Value Co-Creation Capability is the customer's perception that salesmen can actively participate in creating the functional value of Sharia insurance

- Salesmen are capable of actively participating in improving the quality of products or services
- Salesmen are capable of actively participating in increasing the benefits of products or services
- Salesmen are capable of actively participating in providing products with the desired characteristics

Social Value Co-Creation Capability is the customer's perception that salesmen can actively participate in creating social value for Sharia insurance

- Salesmen can actively participate in helping customers improve customer status
- Salesmen can actively participate in helping customers improve brand image perceptions
- Salesmen can actively participate in helping customers to improve customer self-image

Emotional Value Co-Creation Capability is the customer's perception that salesmen can actively participate in creating the emotional value of Sharia insurance

Indicators:

- Salesmen can actively participate in helping customers create a more comfortable product perception
- Salesmen can actively participate in helping customers create a safe product perception
- Salesmen can actively participate in helping customers create a more calming product perception

Economic Value Co-Creation Capability is the customer's perception that salesmen can actively participate in creating economic value for Sharia insurance

- Salesmen can actively participate in convincing customers of premium choices
- Salesmen can actively participate in convincing customers of alternative investments
- Salesmen can actively participate in convincing customers of profitable product choices

Religious Value Co-Creation Capability is the customer's perception that salesmen can actively participate in creating Islamic insurance religious value

Indicators:

- Salesmen can actively participate in convincing customers about the intrinsic benefits of halal products
- Salesmen can actively participate in convincing customers about the sin of consuming usury
- Salesman can actively participate in strengthening customer knowledge about halal products

Table 2. Regression analysis

Hypothesis	Regression	Std β	Unstd β	SE	p-value	VIF	Information
H1	FVCC → SR	0.412	0.428	0.146	0.034	3.349	Accepted
H2	SVCC → SR	0.372	0.391	0.132	0.022*	3.630	Accepted
H3	EmVCC → SR	0.251	0.331	0.174	0.053**	3.413	Accepted
H4	EVCC → SR	0.161	0.184	0.113	0.076**	2.854	Accepted
H5	RVCC → SR	0.277	0.329	0.189	0.027*	3.772	Accepted

Notes: * sig at level 0.05
** sig at level 0.10

5 Discussion

This study investigates the effect of Holistic Value co-Creation (HVCC) on Sustainable Relationships (SR). This study has proven the role of sharia insurance customers' perceptions of the salesman's ability when cooperatively creating holistic values will establish a desire to have a long-term relationship. [15] stated that a good relationship carried out through customer-company interactions contributes to creating satisfied customers.

The results of this study completed the previous studies on the role of co-creation value in establishing a sustainable relationship between the parties involved in purchasing religious-based products through the internalization of Islamic values. Furthermore, this study also provides new insights on how to create customer loyalty through a religious value approach that has received little attention so far. Involving religious values in consumer purchasing decisions is very important, especially for purchasing religious-based products such as sharia insurance. As per the opinion [8], religiosity affects consumer decisions in buying a product.

The first objective of this study is to analyze the effect of Functional Value co-Creation on Sustainable Relationships. The results of hypothesis testing proved that there is a strong relationship between the two variables. This finding shows that sharia insurance customers are rational individuals through consideration of the value of the product they get [16] By means that, when sharia insurance customers have the perception that salesmen can actively participate in improving the quality and benefits of products or services and can provide products with the desired characteristics, it will further strengthen customers to consume sharia insurance services. The salesperson's ability to encourage positive interactions with customers makes intense communication in understanding the main functions of insurance products. Confidence in the benefits of sharia insurance products and services makes customers not hesitate in continuing consuming sharia insurance through their willingness to establish long-term relationships with salesmen as representatives of sharia insurance companies.

Consuming a product is not only a matter of function but also about its social value. Customers in a consumer group with firm religious beliefs will feel more accepted when group members also consume religious-based products. Thus, if sharia insurance salesmen are perceived to have the ability to improve the religious image of sharia insurance services and convince the importance of a religious self-image, customers

will be more confident in choosing sharia products as their primary choice. Throughout a good interaction in creating shared value related to other people's impressions about the identity of customers who consume sharia products, it will further reduce their intention to switch to non-sharia insurance types. These social expectations have been shown to determine consumption choices [19].

This study has also successfully proved a positive influence between Emotional Value co-Creation and Sustainable Relationships. It proves that in the buying process, consumers also involve affective aspects. [12] stated that when a relationship is considered satisfying and has an emotional bond, it will strengthen the level of engagement. Customers' perceptions of the salesperson's ability to create a sense of security and comfort in consuming sharia insurance have been proven to make sharia insurance the first choice. The interaction between salesmen and customers about the meaning of being safe in the hereafter in buying sharia products makes customers feel comfortable both physically and mentally. Low-risk perception when buying an essentially intangible service makes customers more confident to continue buying sharia insurance.

The effect of Economic Value co-Creation on Sustainable Relationships is also proven in this study. Although economic factors are not the main factor influencing the customer's desire to continue using sharia insurance, this need is still worthy of being considered in the co-creation value. The consumer's perception of the ability of sharia insurance salesmen to explain financial benefits such as premium and investment benefits has proven to be one of the factors considered by customers. Reciprocal interaction during the co-creation value makes customers the best and most profitable choice in choosing sharia products.

This study also successfully complements prior studies on co-creation value with the proven Religious Value co-Creation in influencing customers' decisions to continue to join sharia insurance. The value obtained from religion is related to its religious commitment [8]. Strengthening the religious value of halal products, especially insurance, makes customers more confident in their product choices. Halal and haram legal beliefs about insurance as known by salesmen would make customers feel guilty if they consume usury products, thus making sharia insurance the first choice.

6 Conclusion

Holistic Value Vo-Creation, which has five dimensions, namely Functional Value co-Creation, Social Value co-Creation, Emotional Value co-Creation, Economic Value co-Creation, and Religious Value co-Creation, has proven to increase the Sustainable Relationship of sharia insurance customers. This study further confirms the role of religious values in perfecting the concept of value co-creation so that it becomes a more excellent concept. For religious-based markets such as sharia insurance, co-creating value through mutually reinforcing religious beliefs can be a distinguishing factor from non-sharia insurance. Unique differentiation and inimitability, especially those originating from the element of "people" or salesmen, further strengthen the competitive advantage of organizations that offer religious-based services. Religious customer beliefs about the existence of the afterlife encourage them to be more active in co-creating value interactions discussing halal and haram laws so that holistic value can be created and proven to make customers more confident in their choices.

Therefore, the moment of truth that happened during the service delivery process is an essential element and should not be ignored. Choosing a salesman with a strong religious basis and mastering the law of halal and haram and its implementation is the key factor when forming a sales team. The selected salesmen should have a high level of religiosity and have a strong understanding and belief in the religious values that they will create together with customers. It is essential considering the salesman is a representation of the organization. In addition, the elements involved in the value co-creation process, such as information seeking, information sharing, responsible behavior, personal interaction, feedback advocacy, and helping behavior must continually be reviewed for their effectiveness during the shared value creation process [25]. This dimension is still very interesting to explore because it will likely affect the value co-creation quality process during interactive marketing.

However, this study still has several limitations: first, with a cross-sectional research design, this study cannot perfectly predict the causal Relationship specified in the hypothesis. Therefore, further research can apply a longitudinal design approach. Furthermore, the low response rate of the respondents indicates potential limitations. Future research may focus on the broader financial industry to validate the results and increase the study sample size.

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