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Research paper

Digital Transformation in the Age of Industry 4.0: Acceleration of Transformational Performance through Business Model Innovation and Co-Creation Strategy in Indonesia ICT Firm

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Abstract

Industry 4.0 has significant impact in accelerating the firm performance across industries. This paper aims to discuss how the ICT firm could manage the transformational performance by integrating the business model innovation and co-creation strategy. The construction model of Transformational Performance and Co-creation strategy is expected to contribute to theory of performance and co-creation. Both of literature based on Indonesia ICT phenomenon. Indonesia ICT Industry has gained attention to be studied since it is one of the emerging markets that has the unique market characteristics. It has numerous opportunities but lack with the digital infrastructure. The digital transformation is required to assure the firm could sustain their business. Measurement of the succeed in implementing transformation is one of key success factor. The construction of transformational performance variable is driven from theory of quality management, balance score card and digital maturity. This construct could contribute as a reference model for tracking transformational firm performance. In digital transformation and disruptive era, business model and co-creation are key factors to drive performance. Business model innovation through collaboration and partnership, called as co-creation is the integrated strategy to perform in the market. In order to elaborate model, we develop prototype using 35 samples of Indonesia ICT Firm senior leader. The statistical used to analyze through Partial Least Square (PLS). The finding shows that firms transformational performance is significantly influenced by business model innovation and co-creation strategy. Further finding shows that in digital transformation, the all core capability could not be fulfilled by firm, it requires the collaboration and it could be created crowd-sourced. Our selected examples are only prototypical of research model and our implications are limited to their particular context. Ultimately, our research model requires further research and validation. However, our work allows us to develop further research and testing.

Keywords: *Transformational Performance, Co-creation strategy, Business Model Innovation, industry 4.0.*

1. Introduction

Industry 4.0 is driven from digital and mobile technology that has ability to shape the industry, impact Globalization [35]. Currently, digital technology is become the major driver in changing and taken place in daily activities, influences to customer behaviors [5] [32]. Furthermore, the digital technology could make shorten the distribution process and improve the personalized individual [23]. As a result, the market industry is changing quickly [38]. Beside that the ecosystem is also changing [47]. The main drivers of industry 4.0 are innovation, collaboration, interoperability, horizontal and vertical integration of production processes through the ICT system. In response to the challenges of industry 4.0 [30] [6]. With such product complexity, not all value chains can be fulfilled by internal capabilities, therefore the collaboration with stakeholders is the most important collaboration to accelerate the process and innovate the business model to provide co-creation [27] and it require the transformation of the firm to be more innovative, standardized, modular, interoperable, decentralized, real-time, virtualized and service oriented [25]. The measurement of transformational performance is important part to ensure that the transformation on the right track.

With the transformational performance, the phenomenon of disruptive innovation where the incumbent fails to sustain their market leader position [12] can be anticipated as early as possible. The fails of the established firms mostly are caused by the established company could not anticipate the new business model of new entrance that bring the service with simple, cheaper and faster.

The key success of business model innovation relies on the ability of the firm to collaborate and provide co-creation value to stakeholders, such as the case with Apple that co-created the business with software developers [4] [54]. In Indonesia, cases such as Gojek, Tokopedia, and Traveloka that are not only doing economy sharing but also co-creation with communities and enterprises to create business together. The empirical research conducted by International Business Machines (IBM) through the IBM CEO Survey [26] have demonstrated that 69% of CEO respondents indicated that earning the highest achievement of innovation requires strong motive from CEOs to collaborate and provide co-creation value with partners [26]. Another study done by Giesen, Berman & Bell et al. [19] shows that new partnerships and collaboration or called network plays are the most common form of business model innovations in established firms. Since the business model innovation was designed as network-centric, where the biggest value was created through co-creation value, despite limited research on the strategy [14]. Hence, the study of business model innovations as part of strategy

implementation with co-creation strategy to support transformational performance is important to explore. Particularly within the ICT industry, where the incumbent fails to benefit from new business models since the existing business model still has significant contribution. Exploring new business models also require higher investment and complementary assets that may not guarantee improved performance.

The ICT industry in Indonesia is unique enough to be explored, since the market has the most demography benefits based on its population, age, and natural resources. According to Das et al. [15], Indonesia is still at an early stage of digital resolution, especially for ICT and digital infrastructure [24]. However, Indonesia is categorized as the country with the highest rate of digital innovation (HBR, 2017). This is indicated by the number of startup companies in Indonesia, which places Indonesia at number 6 for the most number of startups in the world [46]. In a study conducted by Das et al. [15], it is demonstrated that in some aspect, Indonesia has better opportunities in developing digital businesses compared to other country.

Based on that background, this paper aims to discuss how the ICT firm could manage the transformational performance by integrating the business model innovation and co-creation strategy. The model construction of Transformational Performance and Co-creation strategy is expected contribute to theory of performance and co-creation.

To that end, the paper will be organized as follows. Firstly, we explore the theoretical background for our study by describing former research and construct variable of co-creation strategy and transformational performance as well as the business model innovation. Afterwards, we explain our methodological approach, research model and hypothesis. In the findings section, we present and discuss the management analysis and further research opportunity. Finally, we derive implications for research as well as practice and present our concluding thoughts.

With our findings, our study contributes to a digital transformation theory especially in constructed the variable of co-creation strategy and transformational performance. Furthermore, it extends the understanding of digital technology as an enabler for business transformation [48] and enrich the research on digital innovation [23] [51].

2. Literature Review

2.1. Business Model Innovation

The business model is an integrated framework with existing assets and capabilities to generate revenue and profitability by creating, capturing, delivering, and communicating value to customers [1] [10] [55]. The business model describes the system of interdependent activities performed by a focal firm and its partners and the mechanisms that link these activities to each other, either internal and external. Business model with the innovation is a strategic implementation to achieve competitive advantage [4]. Due to digital technology, business models concept is gaining more and more intention [10] [55], especially the Internet. It has created a new market and business models also known as disruptive innovation [12] [11].

Zott et al., [54] [55] acknowledge business models as a new holistic, integrated and systematic way for organizations to provide the operation of innovations in order to create value in a dynamical environment through collaboration with their internal and external stakeholders consists of content innovation, structure and governance innovation. This paper is used the concept of Amitt and Zott in cascaded into three dimensions example Content innovation, Structure Innovation, and Governance Innovation Delivery.

2.2. Co-creation Strategy

The concept of co-creation is derived from marketing literature, where the marketing transaction is transform into collaboration with customer as the main focus companies [36] [41][45. This is changing the concept of customer. The previous concept customer as the object, with co-creation concept customer become a subject where actively involves in value chain business. The issue in involving customer in innovation has been discussed intensively and called as an open innovation [11]. With the co-creation concept the value is no longer on the product only but also involving the intangible service that depend on the relation to customers. The customers select the product is not only looking at the product and service but on top of them is the social or ecosystem and value impact to customers. In digital disruptive era, Personalization become a key therefore the collaboration ranging from co-design, co-production, co-delivery, co-promotion will become the important things [39] [40] [44]. Those collaboration is part of the process and innovation. Hence in the developing of co-creation will be more holistic if use the value chain approach.

Driven from the marketing perspective of co-creation, we combine with new 7s Mc kinsey framework to put the co-creation as part of business strategy [16]. The strategy could be go beyond mass customization to satisfy specific individuals and integrate, interconnect with internal activities. By the end of the day, the whole activities require the quality of revenue and minimize the cost to compete in anticipating new entrance that coming with new business models [12].

In this study, co-creation strategy is assessed by the dimensions of Real Time Learning, Interoperability & Integration, Interconnect & Collaboration, and Quality, Revenue & Cost.

2.3. Transformational Performance

The concept of performance management has been developed intensively. with the new 7s Mc Kinsey framework in facing hypercompetition [16] the measurement shall cover 3 visioning categories which are superior stakeholder satisfaction and strategic Soothsaying. Secondly, it also need to measure positioning that including positioning for Speed and Surprise and lastly the measurement shall ability to measure tactical that are Shifting the rules of competition, Signaling strategic intent and Simultaneous and Sequential strategic trust.

We construct the transformational performance is a combination of quality management with balance score card and digital maturity [7] [28] [29]. With the transformational performance, the phenomenon of disruptive innovation where the incumbent fails to sustain their market leader position [12] can be anticipated early as possible. The fails of the established firms mostly are caused by the established company could not anticipate the new business model of new entrance that bring the service with simple, cheaper and faster. They are four dimensions to measure the transformational performance in this study, ie Financial Performance, Customer performance, Learning & growth, and Ecosystems.

3. Methodology

3.1. Sample

This study conducted through empirical research using 35 samples of Indonesian ICT firm as a prototype of research model in co-creation strategy. The analytical approach and the solution technique that is used as the analysis tool in this research is Partial Least Square (PLS). Respondents participated in this research are persons held managerial position in ICT industry, with distribution of respondents are as follows:.

Table1: Sample of Respondents

Segment	Board/C Level	VP Levels	GM Level	Mgr Level
NetworkProvider	3	16	3	1
Service Provider	2	1	3	0
Partners	4	0	1	1
TOTAL	**9**	**17**	**7**	**2**

The sample used 35 respondents, where 26% was board or c level, 49% was VP level, 20% was GM and only 6% was manager level. The sample use the criteria senior level who manage and involve in decision making. 65% responders were in network provider, while 17% in service provider and the rest 17% was in partners who support network and service providers in supply chain and collaboration. Used Sampling are probability sampling which is simple random sampling.

3.2. Hipothesis Development

The notion of value in business models is no longer perceived only within the company, but the understanding has also extended to the whole network in order to leverage performance [34]. This has also been discussed in empirical studies about travel management [21] and tourism [8]. However, there is fundamentally a significant impact of strategy on performance [20] hence the basic choices for co-creation strategy will significantly drive the transformation performance.
Similar to the co-creation strategy, Akram [2] pointed out in his study that within the digital ecosystem, technology architecture is important in the design of platform to leverage the innovation of products, services and business models to achieve superior performance in order to maximize the value of the firm. Business model innovation could help the company avoid value traps in the business model and renew the growth and profitability [10]. By using business model innovations, an established company could diversify the business and capture the opportunities that are aligned with the transformation. This happened in Apple and HTC [4]). This also applies in the study on business model innovations using Pay As You Grow to increase profitability [17]
Based on past studies, the hypothesis can be formulated as following:
Hypothesis 1: Co-creation strategy and business model innovation influences the transformation performance in Indonesian ICT industry.

3.3. Research Model

The research model is cascaded from strategy formulation framework [49] based on strategic framework formulation.

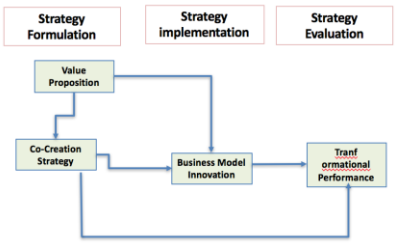

Figure 1: Research Model framework

From those framework, we develop the relation of strategy formulation and strategy implementation as impact to transformational performance.

4. Result and discussion

4.1. Analysis of structural model (Inner Model) and measurement model (Outer Model quations

Partial Least Square (PLS) consists of inner and outter model. The analysis of inner model shows the relationship between latent variables - dimensions and indicators. Inner model is evaluated by using Goodness of Fit Model (GoF), that show the difference between the values of the observations result with the values predicted by the model. with distribution of respondents are as follows:.

Table2: Goodness of fit model

Variable	Cronbachs Alpha	Composite Reliability	R Square	Q square
BUSINESS MODEL INNOVATION	0.951	0.958	-	0.717
CO –CREATION STRATEGY	0.962	0.967	-	0.727
TRANSFORMATIONAL PERFORMANCE	0.931	0.944	0.839	0.689

Source:SmartPLS v2.0

This test is indicated by the value of R Square on endogenous constructs and Prediction relevance (Q square) or known as Stone-Geisser's used to know the capability of prediction with blinfolding procedure. If the value obtained 0.02 (minor), 0.15 (medium) and 0.35 (large), and only used for the endogenous construct with relective indicator. Refer to Chin (1998), the value of R square amounted to 0.67 (strong), 0.33 (medium) and 0.19 (weak).
The table2 shows that the value of R2 of Transformational Performance as endogenous variable is in the Strong criteria (>0.67), and the value of Q square is in the large criteria (>0.35), so that can be concluded that the research model is supprorted by empirical condition, or the model is fit.

4.1.1. Measurement Model (Outer Model)

Analysis of outer model used as validity and reliability test to measure latent variable and indicator in measuring dimension that is construct. It can be explained by the value of Composite reliability and Cronbachs Alpha that is to see the reliability of dimension in measuring variables. Composite reliability and Cronbachs Alpha of variables> 0,70 (Nunnaly,1994) shows that all of variables in the model estimated fulfill the criteria of discriminant validity. Then, it can be concluded that all of variables has a good reliability.

Table3: Goodness of fit model

Indicator-Dimension	λ	SE (□)	t-value
BUSINESS MODEL INNOVATION -> Content innovation	0.939	0.012	79.834*
CI1 <- Content innovation	0.798	0.044	18.159*
CI2 <- Content innovation	0.858	0.019	44.729*
BUSINESS MODEL INNOVATION -> Structure Innovation	0.975	0.005	209.344*
SI1 <- Structure Innovation	0.948	0.013	74.492*
SI2 <- Structure Innovation	0.951	0.013	74.333*
SI3 <- Structure Innovation	0.917	0.022	40.978*
BUSINESS MODEL INNOVATION -> Governance Innovation Delivery	0.971	0.006	152.355*
GI1 <- Governance Innovation Delivery	0.840	0.037	22.879*
GI2 <- Governance Innovation Delivery	0.836	0.043	19.485*
GI3 <- Governance Innovation Delivery	0.871	0.027	31.696*
GI4 <- Governance Innovation Delivery	0.877	0.019	45.028*
CO –CREATION STRATEGY -> Real Time Learning	0.903	0.027	33.067*
RTL1 <- Real Time Learning	1.000	-	- *
CO –CREATION STRATEGY -> Interoperability & Integration	0.947	0.012	76.040*
II1 <- Interoperability & Integration	0.882	0.023	37.718*
II2 <- Interoperability & Integration	0.899	0.012	72.768*
CO –CREATION STRATEGY -> Interconnect & Collaboration	0.969	0.008	125.897*
IC1 <- Interconnect & Collaboration	0.907	0.021	44.081*
IC2 <- Interconnect & Collaboration	0.888	0.030	29.824*
IC3 <- Interconnect & Collaboration	0.878	0.022	40.549*
IC4 <- Interconnect & Collaboration	0.885	0.025	36.094*
CO –CREATION STRATEGY -> Quality, Revenue & Cost	0.958	0.009	107.725*
QRC1 <- Quality, Revenue & Cost	0.919	0.023	40.054*
QRC2 <- Quality, Revenue & Cost	0.931	0.014	67.807*
QRC3 <- Quality, Revenue & Cost	0.886	0.020	44.931*
TRANSFORMATIONAL PERFORMANCE -> Financial Performance	0.955	0.012	78.050*
FP1 <- Financial Performance	0.904	0.018	51.510*
FP2 <- Financial Performance	0.867	0.022	39.431*
FP3 <- Financial Performance	0.911	0.018	50.686*
TRANSFORMATIONAL PERFORMANCE -> Customer performance	0.854	0.020	43.100*
CP1 <- Customer performance	1.000		-*
TRANSFORMATION AL PERFORMANCE -> Learning & growth	0.823	0.031	26.352*
LG1 <- Learning & growth	1.000	-	- *
TRANSFORMATIONAL PERFORMANCE -> Ecosystems	0.907	0.029	31.190*
ECO1 <- Ecosystems	0.918	0.014	63.909*
ECO2 <- Ecosystems	0.905	0.020	45.228*

*valid (t value >2.03 (t table at $\alpha = 0.05$))

The result of measurement model of latent variables on their dimensions shows to what extant the validity of dimensions in measuring latent variables.
Following figure show the complete path diagram

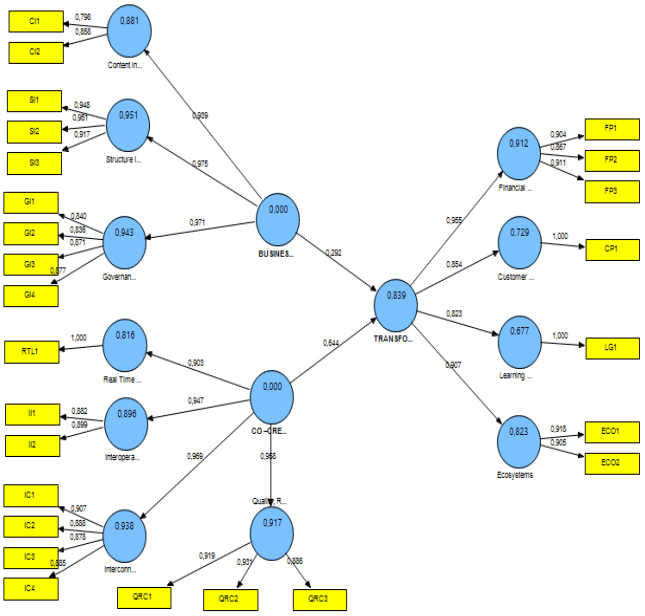

Figure 2: Path Diagram of Research Model

4.1.2. Structural Model

Based on the research framework, then obtained a structural model as follow:

$\eta = 0.292\xi_1 + 0.644\ \xi_2 + \zeta_1$

η=Transformational Performance

ξ_1= Business Model Innovation

ξ_2= Co –Creation Strategy

ζi =Residual

4.2. Hypothesis Testing

4.2.1. Simultaneous Hypothesis testing

Below is the result of simultaneous testing of hypothesis:

Table 4: Simultaneous Testing of Hypothesis

Hypothesis	R^2	F	Conclusion
Business model innovation and Co –Creation Strategy -> Transformational performance	**0.839**	**85.876***	**Hypothesis accepted**

* significant at α=0.05 (F table =3.295)

Based on the Table 4. it is known that within the degree of confidence of 95% (α=0.05) simultaneously there is the influence of Business Model Innovation and Co–Creation Strategy to Transformational performance amounted to 83.9%, while the rest of 16.1% is effected by others.

4.2.2. Partial Hypothesis Testing

Table 5: Below is the result of partial testing of hypothesis:

Hypothesis	γ	SE(γ)	t	R2	Conclusion
BUSINESS MODEL INNOVATION -> TRANSFORMATIONAL PERFORMANCE	0,292	0,117	2,488*	0,255	Hypothesis accepted
CO –CREATION STRATEGY -> TRANSFORMATIONAL PERFORMANCE	0,644	0,120	5,363*	0,584	Hypothesis accepted

Partial Testing Analysis

* significant at α=0.05 (t table =2.03)

The table show that partially, Business Model Innovation and Co–Creation Strategy influential significantly to Transformational performance, which is Co –Creation Strategy has a greater influence (58.4%).

Based on the hypothesis testing, resulted the finding as figured out below:

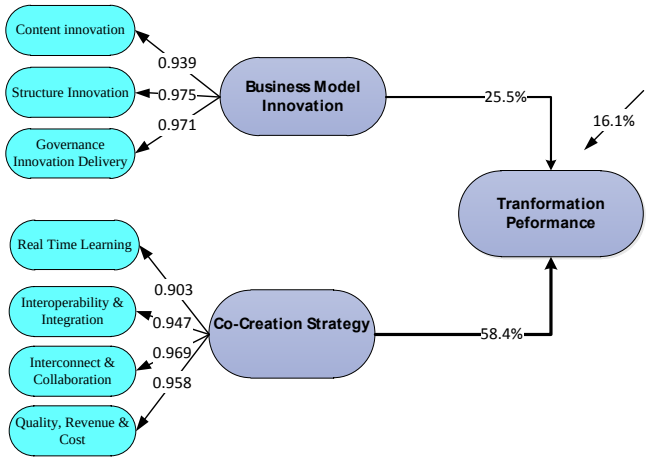

Figure 3: Research Finding

The findings of this study indicate that there is a significant positive effect of business model innovation and co-creation strategy on transformational performance indicating that the hypothesis is accepted. Co-creation strategy has a greater influence (58.4%) than business model innovation (25.5%) in improving transformational performance.
The finding shows that firms transformational performance is significantly influenced by business model innovation and co-creation strategy. Further finding shows that in digital transformation, the core capability is not the only factor can be fulfilled by firm, it requires the collaboration and it could be created crowd-sourced.
Based on these findings, it can be said that the development of transformational performance in the age of Industry 4.0. of the Indonesian ICT firm required the development of co-creation Strategy that supported by the development of business model innovation

The development of co-creation strategy inthe Indonesian ICT firms are prioritized through the development of interconnect & collaboration, that supported by the development of quality, revenue & cost; interoperability & integration, as well as the real time learning. In addition, the development of business model innovation in ICT industry should be based on the development of the structure innovation, followed by the development of governance innovation delivery and content innovation.

5. Conclusion and recommendation

The findings of this study support the hypothesis that there is significant effect from business model innovation and co-creation strategy to transformational performance. Co-creation strategy has a greater influence than business model innovation in improving transformational performance.
The study has practical implication as a reference model that illustrates how the firms create co-creation strategy in interconnected activities to boost transformational performance. Further the firms may benefit from managing co-creation strategy to improve business model since it could be integrated with value chain of business. This study is also could contribute in decision support of Firm senior leaders in implementation of co-creation strategy.
The construction of co-creation strategy and transformational performance is contributing to the theory of co-creation and performance measurement to be part of transformation model to ensure the collaboration strategy is constructed and can be measured to ensure the transformation in the track.
Our selected examples are only prototypical of research model and our implications are limited to their particular context. Ultimately, our research model requires further research and validation. However, our work allows us to develop further research and testing.

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