

Transforming into Sustainable Innovation-driven Digital Co-creation: The Role of Experience, Community and Agility

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Abstract: Sustainability is a critical element in creating long-term values for service creation, especially for in-service providers in the Information Communication and Technology (ICT) industry. Sustainable values through co-creation involve crucial stakeholders, especially customers, organizations, and social communities to maximise the captured total value. Past studies have explored the concept, system and role of those stakeholders, however the sustainability of co-creation in the digital era has not been covered. Therefore, this paper aims to provide an understanding of the key concepts and models that would support practitioners in building sustainable innovation-driven digital co-creation. The study was conducted using 195 samples representing Indonesian ICT firms. Findings demonstrate that digital co-creation plays a significant role as an intervening variable in the relationship between customer experience orientation, social community, and organization agility and transformational performance.

Index Terms: organizational agility, social community, customer experience orientation, digital co-creation, sustainability.

I. INTRODUCTION

The advancement of the Internet, mobile, cloud, and computing technology in industry 4.0 brings a huge impact on the opening of markets globally. It also shortens the product lifecycle and enables new entries into market. This leads to firms having to look out for other sources of value outside of the company to be able to innovate as well as sustain the competitiveness within the market. The source of value could be created out of the firm's agile capabilities in order for the organisation to adapt to the changes (Arbussa, Bikfalvi, and Marquès, 2017; Teece, Peteratd, and Leih, 2016). An organisation's agility involves some critical components such as people (Crocitto and Youssef, 2003), culture (Carvalho, Sampaio, Rebentisch, Carvalho, and Saraiva, 2017; Felipe and Rold, 2017), and process (Seethamraju and Krishna Sundar, 2013). Organization

agility and digital technology also results in social communities becoming a more important and popular source for value creation. It also allows for collaborations through co-creation in the digital era (Richter, Trier, and Richter, 2017; Wüstenhagen, Sharma, Starik, and Wuebker, 2008).

Social communities in this study refer to communities with a purpose to create innovative values for the company and its customers. It includes online communities shaped through virtual relationships (Füller, Bartl, Ernst, and Mühlbacher, 2006) and communities shaped through real, physical relationships.

Another source of value in shaping co-creation comes from customer experience, which takes on a crucial role in creating value (Sjödín and Kristensson, 2012). Customer experience focuses on the firm's capability to provide a solid customer journey to realise their needs (Lemon and Verhoef, 2016; Ramaswamy, 2011). This makes customer experience central in the development of digital co-creation that involves customers in the company's process of innovation. Fuller (2010) in a past study has clearly defined the boundaries and roles between firms and its customers. He identifies how in a co-creation concept, the customers are highly involved and are highly appreciated for their participation and creativity for the company. Platforms today in the digital era enables for collaboration and participation from customers by using their knowledge to maintain a long lasting relationship with the company and help shape its culture (Sawhney, Verona, Prandelli, 2005; Vincenza Ciasullo, Troisi, Cosimato, 2018). Cultural changes also leads to capabilities transformation, particularly in terms of processes modernization. The measurement of performance during this transformation is also known as transformational performance (Wei and Xuexun, 2010).

Past studies on creating the value of co-creation mostly focus on how companies sustain existing performances through creating, delivering, and capturing economic value. However, they mostly are limited to or less focused on social values. Since incumbent firms are facing a hard time to deliver and sustain an effective customer experience through digital technology (Loucks, Bradley, Macaulay, Noronha, and Wade, 2015; Pérez, Dos Santos Paulino, and Cambra-Fierro, 2017), they would need to have a wider range of stakeholders that emphasises on social communities. They are also required to raise the need for

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sustainable value creation.

This study focuses on the development of digital co-creation based on the development of social communities, customer experience orientation, and organizational agility to boost transformational performance in the Indonesian ICT industry to head towards a more sustainable development. Findings of this study are applicable in the ICT industry, especially with the rise of companies going green and more environmentally friendly, particularly in use of power consumption. This also applies to the rapid growth of online communities as well as contributing to literature on digital transformation models. The ICT industry is important, given its predominance in generating values of economic growth and strengthening the competitive advantage of a country (Pradhan, Mallik, and Bagchi, 2018).

This paper includes review of relevant literature, hypotheses, research methodology, results, and a discussion of the results and findings that also includes implications on the digital transformation model as well as its limitations and suggestions for future studies.

II. LITERATURE REVIEW

The development of co-creation innovation in forming a sustainable development requires incremental innovation as well as the change paradigm through transformation (Ramaswamy, 2009; Trencher *et al.*, 2017). To ensure that the transformation phase drives changes, it also requires a new measurement on transformational performance by integrating concept of digital maturity (Valdez-de-leon, 2016) and performance management (Latham, 2013). It should also have a balance between the existing and potential performance based on innovation and development of ecosystem performance to support the digital transformation (Wei and Xuexun, 2010). Transformational performance derives from the sustainable business strategic matrix (Voglander *et al.*, 2014), in which it should not only rely on the economic value, but capturing all the values including the social values, as illustrated in Figure 1 (Wüstenhagen *et al.*, 2008).

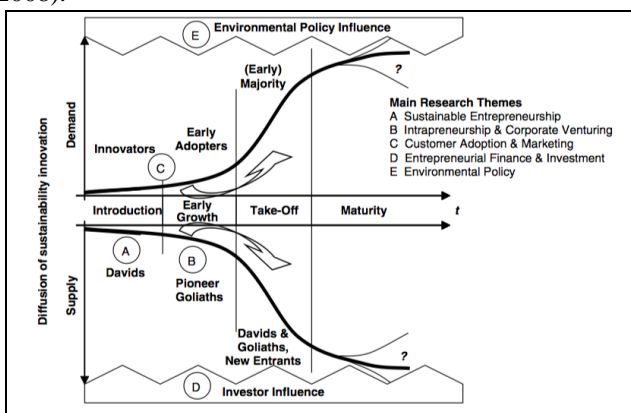


Figure 1. Sustainable innovation-driven co-creation and customer experience (Wüstenhagen *et al.*, 2008)

Wuestenhagen, *et al.* (2008) provides the framework of a whole system that helps firms to understand more about long-term sustainability. It helps firms to focus on where to start the changes as well as understand all the parties involved and how they interact. This is important, as it could help identify more opportunities to create sustainable value.

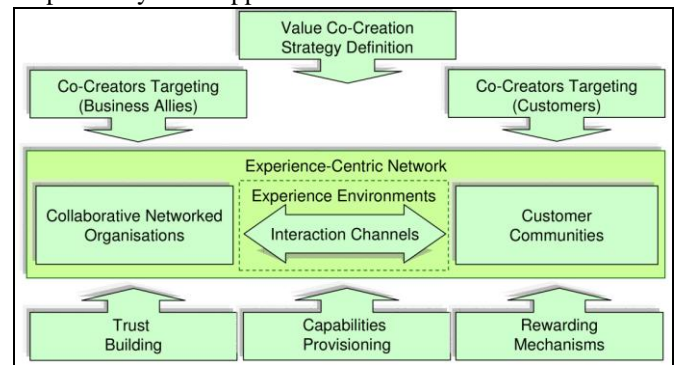


Figure 2. The value co-creation framework (Romero and Molina, 2009)

Romero and Molino (2009) enrich the way in capturing value co-creation in terms of co-creating experience for a more sustainable development. Digital co-creation consists of the strategy in creating value co-creation including the development of vision, capability, and tactical implementation. Creating co-creation-experience also requires the development of experience ecosystem, which is highly determined by interactions and collaborations between multiple experience channels that allow customers to shape their own experiences. This includes the forming of social communities through virtual and physical interactions. To support the experience-centric network, the organizational agility is also important in building trust, capability, and reward mechanism. The agility of an organization itself is defined as the operational capabilities to adapt to changes as fast as the market or customer requirements. This also provides flexibility to adjust its internal structures and processes in response to the changes (Trinh-Phuong, Molla, and Peszynski, 2010).

Organizational agility consists of people agility, process agility in adapting to change, and culture agility (Crocitto and Youssef, 2003; Nold and Michel, 2013). Through the digitization process, organizational agility has significant influence in shifting manual processes to be automated in order to step up a company's processes internally and boost the firm's performance (Chakravarty, Grewal, and Sambamurthy, 2013; Lu and Ramamurthy, 2011). Therefore, the first hypothesis is formulated as the following:

Hypothesis 1: Organizational agility has a significant impact on transformation performance

Past studies have shown that organizational agility creates an environment that enables collaboration and encourages the creation of digital co-creation between customers and firms (Sharma, Conduit, and Hill, 2014). Romero and Molino (2009) have found in their study that there is a significant link between organizations and social



communities to perform co-creation value. Online communities provide companies with new interaction channels to co-create value by involving enthusiastic consumers that would be difficult to reach without the support of technologies (Richter *et al.*, 2017). Choosing the right channels to target the right co-creators is important in order to perform creation partnerships with customers and provide them with new experiences. Not all customers can be good co-creators, it depends on the knowledge, skills, expertise, and behaviours while undergoing co-creation, especially in digital era (Mittal, 2014; Shrivastava, 2016; Sjödin and Kristensson, 2012). Hence, the third hypothesis is formulated as the following:

Hypothesis 2: Organizational agility, social communities and customer experience orientation has a significant impact on digital co-creation.

Firms that focus on customer experience could leverage its overall performance (Fatma, 2014; Mihardjo, Sasmoko, Alamsjah, and Elidjen, 2019), and digital co-creation is strongly correlated to firm performance, especially at a transformational stage (Hamidi and Shams Gharneh, 2017; Mihardjo, Alamsjah, Elidjen, and Sasmoko, 2018; Restuccia, 2009). The past studies lead to the formulation of the last two hypotheses:

Hypothesis 3: Customer experience orientation has a significant impact on transformational performance

Hypothesis 4: Digital co-creation has a significant impact on transformational performance

The research model for the current study is demonstrated in Figure 3.

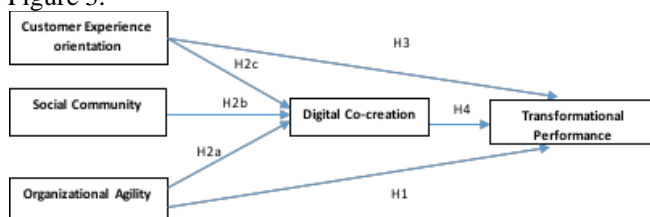


Figure 3. Research model

III. METHOD

Research design:

The research design used to assess the sustainable co-creation model with a focus on the relationship between organizational agility, social community, and customer experience orientation with digital co-creation to boost transformational performance in the Indonesian ICT sector.

Population and sample:

377 ICT firms are currently operating in Indonesia according to the Ministry of Information and Communication (2017), which is the population of the current study, which consists of service providers. According to Slovin's (1960) calculations, an appropriate sample size for a study such as

the current one would be 195 firms, with 0.05% error rate. This sample is higher than minimum rule of thumb for sample selection amounting to 35 samples (Cohen, 1992). Smart PLS was used to analyse and process the collected data.

Sampling method:

Simple random sampling was used to allow respondents to have equal chances to be selected for data collection (Hair, Ringle, Sarstedt, and Vinzi, 2014), with the firms as the units of analyses. A seven-point Likert scale ranging from 1 ('Not at all satisfied') to 7 (very satisfied') was used to examine the response for each construct of the study.

IV. RESULT

The comparison result of completion rate and single easy question test between diaspora Indonesia in Malaysia and Indonesia can be shown in Table 1. The completion rate indicates the users accomplishment task in certain time and single easy question (SEQ) is questionnaire result of the user perception when using the applications.

Table 1. The Result of Completion Rate and SEQ

Test Items		Malaysia		Indonesia	
		Completion Rate	Single Easy Question	Completion Rate	Single Easy Question
1	Voice call	0%	4	0%	5
2	SMS call	50%	4.6	50%	5.5
3	Free chat	20%	2.8	20%	4
4	Video Call	0%	3.5	0%	2
5	Check of balance	70%	5.5	70%	6
6	Voice package purchasing	70%	5.5	60%	4.5
7	SMS package purchasing	70%	4.8	60%	4.8
8	IDD Call	80%	6.3	80%	6.5
9	Transfer balance apps	70%	4	50%	3
10	Transfer balance Operators	70%	4.5	50%	5
11	Prepaid electricity payment	10%	3	10%	4

Based on the data The System Usability Score, the result shows that the score of Indonesia diaspora in Malaysia was 44% while score in Indonesia was 39% less than expected SUS score on 68% and NPS score for diaspora Indonesia in Malaysia and Indonesia was 0 and 10% respectively less than average NPS application was 31% (Telin, 2019)

Figure 4 shows the result of measurement test using SEM PLS. To validate the latent variables, dimensions, and indicators, the measurements test was conducted to ensure the consistency, reliability, and validity of respective variables, dimensions, and indicators. The loading factors of Cronbach's Alpha (CA) and composite reliability



(CR) above 0.7 are used to determine the reliability and validity. The average variance extracted (AVE) also exceeds 0.5. The overall results are shown in Table 1. Assessment on

the discriminant validity as demonstrated in Table 2 below uses a cross loading test, in which the values should be higher than 0.6.

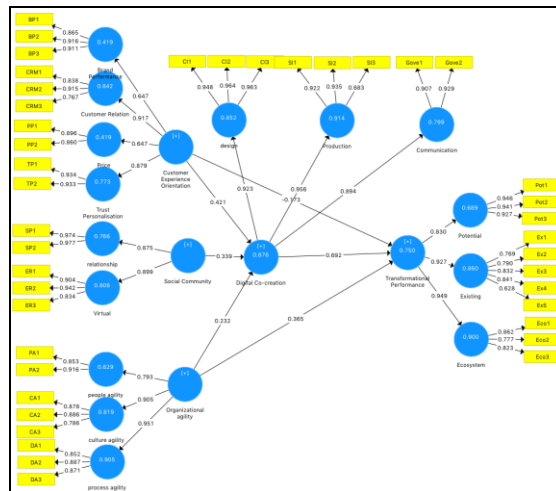


Figure 4. Measurement Result

Table 2. Construct Reliability and Validity

No	Variables	1	2	3	4	5	Remarks
1	Organizational agility	0.788					Valid
2	Operational Efficiency	0.780	0.815				Valid
3	Customer Experience Orientation	0.759	0.806	0.877			Valid
4	Business Model Innovation	0.785	0.803	0.845	0.900		Valid
5	Transformational Performance	0.769	0.793	0.834	0.861	0.866	Valid

Table 2. Cross Loading test result

	Brand Perf	Communication	Customer Relation	Ecosystem	Existing	Potential	Price	Production	Trust Personal	Virtual	Culture Agility	Design	People Agility	Processes Agility	Relationship
BP1	0.865	0.443	0.3	0.049	0.427	0.316	0.545	0.165	0.215	0.339	0.349	0.171	0.054	0.305	0.323
BP2	0.916	0.647	0.601	0.248	0.609	0.505	0.383	0.442	0.369	0.338	0.609	0.293	0.312	0.588	0.547
BP3	0.911	0.535	0.489	0.165	0.561	0.441	0.411	0.396	0.38	0.34	0.524	0.315	0.189	0.433	0.491
CA1	0.357	0.427	0.507	0.484	0.492	0.629	0.297	0.53	0.365	0.425	0.878	0.442	0.62	0.758	0.544
CA2	0.491	0.337	0.394	0.278	0.423	0.491	0.182	0.396	0.255	0.18	0.886	0.229	0.38	0.707	0.449
CA3	0.592	0.74	0.576	0.535	0.688	0.789	0.478	0.675	0.463	0.47	0.786	0.575	0.517	0.799	0.781
CI1	0.118	0.604	0.62	0.569	0.512	0.529	0.559	0.75	0.753	0.644	0.425	0.948	0.519	0.497	0.616
CI2	0.331	0.776	0.688	0.668	0.675	0.591	0.606	0.855	0.824	0.719	0.471	0.964	0.476	0.541	0.706
CI3	0.396	0.784	0.732	0.666	0.707	0.694	0.628	0.857	0.813	0.732	0.546	0.963	0.572	0.62	0.804
CRM 1	0.418	0.519	0.838	0.392	0.484	0.667	0.356	0.648	0.526	0.482	0.569	0.603	0.616	0.648	0.716
CRM 2	0.273	0.444	0.915	0.444	0.422	0.582	0.351	0.735	0.735	0.475	0.47	0.681	0.609	0.577	0.672
CRM 3	0.667	0.609	0.767	0.448	0.677	0.455	0.52	0.562	0.672	0.587	0.451	0.508	0.428	0.438	0.509
DA1	0.316	0.469	0.485	0.517	0.487	0.712	0.021	0.558	0.242	0.195	0.717	0.372	0.592	0.852	0.546
DA2	0.404	0.681	0.63	0.524	0.545	0.737	0.397	0.74	0.521	0.362	0.771	0.685	0.632	0.887	0.73



DA3	0.604	0.592	0.592	0.477	0.658	0.797	0.407	0.634	0.431	0.441	0.844	0.438	0.56	0.871	0.743
ER1	0.373	0.515	0.425	0.544	0.582	0.336	0.638	0.429	0.45	0.904	0.306	0.486	0.447	0.225	0.464
ER2	0.435	0.647	0.528	0.594	0.695	0.449	0.654	0.505	0.55	0.942	0.439	0.565	0.554	0.334	0.554
ER3	0.211	0.668	0.665	0.64	0.573	0.592	0.62	0.692	0.788	0.834	0.408	0.871	0.587	0.457	0.712
Eco1	0.126	0.517	0.245	0.862	0.706	0.619	0.316	0.467	0.283	0.497	0.424	0.403	0.482	0.491	0.522
Eco2	0.27	0.646	0.677	0.777	0.713	0.685	0.319	0.781	0.753	0.555	0.584	0.743	0.618	0.637	0.752
Eco3	0.061	0.466	0.346	0.823	0.624	0.37	0.34	0.503	0.382	0.602	0.267	0.5	0.426	0.292	0.383
Ex1	0.528	0.769	0.561	0.611	0.789	0.598	0.534	0.689	0.572	0.743	0.514	0.662	0.438	0.493	0.659
Ex2	0.295	0.623	0.417	0.778	0.79	0.587	0.453	0.511	0.488	0.55	0.454	0.543	0.378	0.461	0.5
Ex3	0.34	0.629	0.479	0.767	0.832	0.688	0.343	0.638	0.418	0.435	0.52	0.555	0.503	0.645	0.652
Ex4	0.734	0.745	0.634	0.56	0.841	0.693	0.382	0.595	0.424	0.571	0.542	0.443	0.517	0.551	0.714
Ex5	0.617	0.506	0.335	0.394	0.628	0.308	0.4	0.347	0.395	0.374	0.49	0.299	0.191	0.3	0.376
Gove1	0.71	0.907	0.52	0.522	0.78	0.729	0.595	0.653	0.48	0.543	0.584	0.581	0.356	0.606	0.709
Gove2	0.44	0.929	0.618	0.684	0.781	0.676	0.459	0.733	0.623	0.712	0.533	0.796	0.611	0.628	0.717
PA1	0.252	0.45	0.478	0.582	0.511	0.394	0.27	0.434	0.362	0.586	0.468	0.44	0.853	0.465	0.424
PA2	0.16	0.495	0.661	0.528	0.458	0.726	0.143	0.638	0.356	0.49	0.59	0.518	0.916	0.717	0.66
PP1	0.352	0.504	0.46	0.449	0.527	0.352	0.896	0.445	0.634	0.689	0.403	0.62	0.315	0.317	0.477
PP2	0.505	0.494	0.393	0.23	0.409	0.264	0.86	0.302	0.508	0.559	0.27	0.469	0.059	0.252	0.343
Pot1	0.37	0.682	0.636	0.625	0.658	0.946	0.372	0.76	0.446	0.533	0.729	0.639	0.689	0.826	0.852
Pot2	0.482	0.688	0.644	0.651	0.721	0.941	0.286	0.723	0.452	0.43	0.725	0.545	0.55	0.808	0.79
Pot3	0.502	0.776	0.614	0.652	0.771	0.927	0.337	0.806	0.474	0.508	0.69	0.598	0.603	0.788	0.882
SI1	0.39	0.776	0.729	0.703	0.75	0.849	0.374	0.922	0.629	0.603	0.598	0.779	0.703	0.759	0.901
SI2	0.345	0.695	0.735	0.584	0.634	0.718	0.358	0.935	0.721	0.526	0.521	0.834	0.509	0.626	0.836
SI3	0.264	0.418	0.484	0.524	0.457	0.472	0.394	0.683	0.442	0.442	0.54	0.56	0.325	0.5	0.47
SP1	0.538	0.746	0.751	0.601	0.696	0.894	0.453	0.846	0.649	0.595	0.682	0.708	0.583	0.76	0.974
SP2	0.483	0.768	0.713	0.713	0.78	0.859	0.466	0.882	0.648	0.68	0.703	0.74	0.639	0.759	0.977
TP1	0.381	0.588	0.721	0.483	0.565	0.472	0.645	0.62	0.934	0.6	0.378	0.763	0.384	0.432	0.629
TP2	0.311	0.542	0.719	0.585	0.538	0.439	0.577	0.708	0.933	0.669	0.433	0.792	0.369	0.434	0.612

Table 1 and table 2 demonstrate that the all variables, dimensions, and indicators are valid, therefore direct hypotheses testing can be performed to assess the direct significant relationships between two latent variables.

H1: The first hypothesis examines the relationship between organizational agility and transformational performance. Tests show that the t-value is 2.222 and $p < 0.05$, therefore H1 is accepted.

H2: Investigations on the relationship between ‘organizational agility and digital co-creation’ ‘and digital co-creation’ and ‘customer experience orientation and digital co-creation’, consisting of H2a, H2b, H2c, respectively. Results show the t-values and p-values as 2.337 and $p < 0.005$,

2.134 and $p < 0.05$ and, 2.153 and $p < 0.05$ respectively; therefore, H2a, H2b, H2c is accepted.

H3: The third hypothesis investigates the relationship between customer experience orientation and transformational performance, with results showing the t-value as 0.836 and $p > 0.005$; therefore, H3 is rejected.

H4: The fourth hypothesis investigates the relationship between digital co-creation and transformational performance, with results showing the t-value as 2.963 and $p > 0.005$; therefore, H4 is accepted.

The overall research model based on SEM-PLS can be shown in Figure 5.

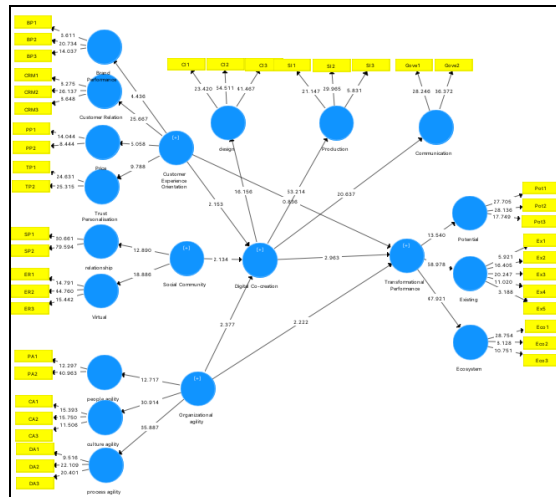


Figure 5. Research model Result

The Table 3 below demonstrates the direct relationships within the study.

Table 3. Direct hypothesis testing Result

	Hypothesis	Standard Deviation	T Statistics	P Values	Remarks
1	Organizational agility -> Transformational Performance	0.166	2.222	0.026	Significant
2a	Organizational agility -> Digital Co-creation	0.099	2.337	0.018	Significant
2b	Social Community -> Digital Co-creation	0.159	2.134	0.033	Significant
2c	Customer Experience Orientation -> Digital Co-creation	0.193	2.153	0.032	Significant
3	Customer Experience Orientation -> Transformational Performance	0.206	0.836	0.404	No Significant
4	Digital Co-creation -> Transformational Performance	0.232	2.963	0.003	Significant

The next step investigates the mediating relationship according the research model to assess the indirect effects, shown in table 4.

Table 4. indirect hypothesis testing Result

Hypothesis	Standard Deviation	T Statistics	P Values	Remarks
Organizational agility -> Digital Co-creation -> Transformational Performance	0.146	1.965	0.050	Significant
Social Community -> Digital Co-creation -> Transformational Performance	0.136	1.958	0.050	Significant
Customer Experience Orientation -> Digital Co-creation -> Transformational Performance	0.137	1.977	0.048	Significant

Table 4 demonstrates the role of digital co-creation as a central intervening variable to shape the relationships between organizational agility, social community, and customer experience orientation with transformational performance.

V. DISCUSSION

Findings of the current study have implications on the model of sustainability in a digital transformation as shown in Figure 6. The model consists of 3 parts:

The first part consists of social community, which shows how social community has a significant influence in the development of digital co-creation. Therefore, in order to capture value creation, firms would require improving the

quality of decisions, which should not only be based on economic values. These decisions need to have a more diverse viewpoint, which could potentially lead to a better understanding of the challenge to be able to think outside of the box and take social communities into consideration. Based on the findings, virtual or online communities have a higher, significant impact on digital co-creation. This shows how the development of digital co-creation can effectively improve. Integrating communication policies through multiple channels, including online and physical communities would be one way to make this possible.



The second part of the model is related to the shaping of collaborations and experience through digital co-creation. Findings show that the experience of a customer can be developed with significant impact when companies have a close relationship with them. Customer experience orientation enables for technological platform collaborations to expand to any size and scale to offer the best products and services. Whereas building a good customer relationship would place customers as co-creators. This allows them to share their knowledge and creativity as a trusted partner to support brand performance. To perform experience-collaboration in digital co-creation, organizational agility as a term of process and cultural perspective has a significant influence in shaping collaboration in order to support the development of sustainability policy.

Other than that, findings also show that social communities are also an influence in pushing companies to take an action from the top management. This involves diverse stakeholders in a constructive dialogue and autonomy as part of organizational success.

The third circle is sustainability and firm adaptability. Being involved with diverse stakeholders in the decision and design process of new processes, methodology, people, culture development to perform the organizational agility could enable the firm to act on the holistic matter to perform adaptability and sustainability in the longer term. The firm has the capability to 'adapt' to the changing circumstances. However, they still contribute to the initial strategy that they were a part of by taking the feedback from any diverse stakeholders into consideration.

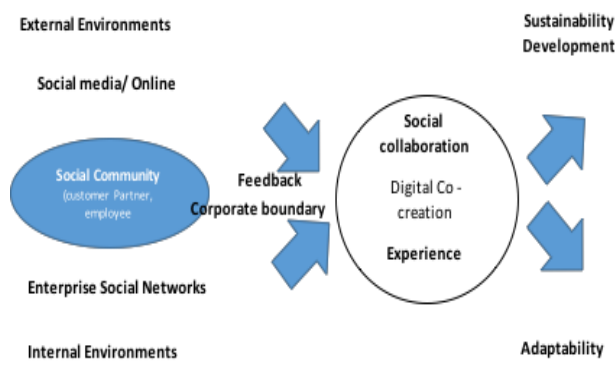


Figure 6. Sustainable Co-creation based on Agility and Experience
(Romero & Molina, 2009)

The model of sustainability has implications of the firm to focus on the development of digital co-creation based on experience, community, and agility.

VI. CONCLUSIONS

The study have found that sustainability based on agility, communities, and experience models demonstrate how organizational agility, social communities, and customer experience orientation have a significant role in the development of digital co-creation to support for a more sustainable development. The study helps the ICT sector to focus on effective decision making to consider the economic

values as well as the social values to provide fast and flexible decisions. This is important in the transformation of performance and to shape the sustainability development. The study contributes towards the initiation of a valuable model of transformation by prioritising programs on organizational agility, social communities, and customer experience orientation. All of which has significant contributions in the development of digital co-creation. Further studies could be expanded through increasing the model to not only social communities but also biosphere variable in relation to the green development model.

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