

Exploring Sustainable Organization Ecosystems Anchored in Collaborative Decision Making

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Abstract – *Current disruptions and changes evoke organizations to increase their capacity in adapting to these changes. Maintaining organizations to be able to survive in these agile conditions must include such holistic approach, yet not much research covers this topic to address such challenges. This paper aims to explore the elements of sustainable organization ecosystem and collaborative decision making and then build sustainable organization ecosystem based on the model of collaborative decision making. This research collected relevant literatures about both topics, summarized the specific theme, and analyzed using content qualitative analysis approach. This study concluded that it is feasible to build the preliminary model based on existing literatures with further testing application of the framework in the real industry in the future.*

Keywords – *Sustainable organization ecosystems, collaborative decision making, preliminary model, organization performance, stakeholder engagement.*

I. INTRODUCTION

The need for developing sustainable development that would address the climate, societal, and economic changes is increasing. Today, many organizations do not have the ability to adapt themselves to changing world. These organizations in general still adopt traditional business model, sole decision-making process, and top to bottom authority. However, in today's world, there should be more innovation and rapid adaptation to changes. With the traditional way of how organizations work, it could have detrimental effects to the future of organization's performance. That is why introducing holistic approach is necessary in providing organizations to survive in the long run [1]. That includes the understanding that organizations should interconnect with other organizations while maintaining the internal performance [2].

In current world, organizations face rapid challenges. To address the complex societal changes

in organizations, there should be changes done in many levels and paths that would in the end showed transformation effects in positive ways [3], [4]. Our way of thinking in organizational level should also need to be transformed, from the soft approach to the radical approach [5]. Organizations have their own reasoning on why they need to change their ways of thinking. Some are technology advancement [6], globalization [1], political climate [7], and society (mueller) [8]. Therefore, there should be some transformations or indications that organizations should consider that there are interconnectivities between stakeholders not only outside but also inside the organization to achieve sustainable organization. There are many ways to maintain organization sustainability because it considers not only the tangible but also intangible aspects, such as culture, environment, and societal. There are many models that explain sustainable organization systems, yet they are either too broad or concentrating on specific theme, mainly environment due to the sustainability terminology. Hence, it opens much broader coverage on the sustainable organization. From one side, covering broader aspects in sustainable organization is beneficial for holistic approaches, inclusion of overall stakeholders, and long-term goals; but also, moving focus from prioritization on some problems faced, slowing decision-making, and complexity in implementing solutions or policies may be detrimental. Therefore, when building a sustainable organization ecosystems, there should be at least prioritization on aspects that should be focused on prior building. If everything is a priority, nothing is. Hence, understanding the objective before building is significant.

With that ground, Sustainable Organization Ecosystem (SOE) should be built based on objectives in mind. Many models on sustainable organization models had been made in the past, and with different purposes. Some models focused on facilitating changes within organization [4], innovation [9], [10], resource optimizations [11], (Mustapha) and others [12], [13].

Several approaches in delivering SOE are management systems that are integrated, continuous

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improvement and evaluations, and also overall stakeholders' engagement. Integrated management systems utilize frameworks to piece together environmental, social, and economic properties that would improve organization efficiency [14], [15]. Continuous monitoring and evaluation approaches would oversee the performance regarding sustainability, and then adapt strategy or solution to constructed ecosystem [16], [17]. Last but not least, the involvement of stakeholders in the SOE. It implies that stakeholders are considered highly in every interaction, dynamics, and even the systems in the SOE to be able to function properly. The stakeholder involvement means engaging multiple stakeholders in their decision-making process. Meanwhile, collaborative decision-making is mainly focusing on having a certain approach within groups' diverse perspectives to achieve certain goals. It encompasses the gathering of knowledge and skills [18], [19], [20], aggregation instead of compromise [21], and building consensus that satisfy everyone's needs [22], [23], [24]. With its own challenges [22] [24], collaborative decision-making is still considered one of the best approaches to decision making in organizations.

Despite growing research attention to SOE and collaborative decision-making (CDM) as separate subjects, their connection or interaction is not explored much. SOE particularly concerns on policies and strategies between organizations, while CDM emphasize on organizations' efficiency and stakeholder engagement. This creates a gap on the existing research that CDM also has a crucial role in determining the SOE. Hence, this paper's purpose is to explore the principles of collaborative decision making and sustainable organization ecosystem and then build preliminary model of Sustainable Organization Ecosystem based on the principles of Collaborative Decision-Making.

II. LITERATURE REVIEW

A. Collaborative Decision-Making

CDM has been implemented in many areas, especially in organization context. In modern world, collaboration is often being the principles for getting into one's goals. Thus it is not different from how organizations generate decisions. However, there are some key points that should be noted, particularly in this paper. Key concepts of CDM involve joint contribution, elevation of sense of understanding, and shared power and responsibility to the decision and effect of decisions. CDM concerns two or more people contributing their perspectives, knowledge, and expertise to the decision process [25] – [28]. The multi-participant decision units are classified by [23] into two: collectivity and collaborative groups. Collectivity is generally used when there are negotiations involved because parties have conflicting

goals or in a crisis management circumstance. Meanwhile, collaborative groups are used to achieve effectiveness, efficiency, and congruency [29].

There are several approaches of CDM mechanisms,

However, the bottom line on building the mechanism is to understand the characteristics of CDM itself, which has been explained by Owen. Owen [21] used psychological approach to transform decision analysis to collaborative decision making. These characteristics included comprehension aggregation, collaborative frame, wide range of alternatives, understanding value and risk, building hybrid strategy, commitment, and structured dialogue and facilitation. Meanwhile, [30] stated that internal organization for organization ecosystem framework included extent, composition, structure, and the underlying functions and processes that gave services. Meanwhile, the components that influence human well-beings are security, basic material, health, good social relations, and freedom of choice and action.

Reference [31] summarized three phases of CDM, there are intelligibility, accountability, and instauration. We used this base of CDM framework that would be more suitable for organization. The base of CDM in reference [31] is based on [32]'s model for decision making process. These are preparation, collective understanding of problem, solution generation, negotiation and communication, decision, and monitoring.

Reference [33] broke down the process of multi-participant decision making are as follows:

- Preparation. Here we define problem and the decision units.
- Collective understanding of the problem. In this phase, we contribute to the common goals and receive validation from other participants.
- Solution generation. Here, we identify and formulate alternatives or system to solve the problem.
- Negotiation and confrontation of viewpoints. In this phase, all parties argue and present their contributions to receive support.
- Decision. We finally generate the decision that is supported by most parties or, even better, achieve consensus.
- Monitoring. Final phase is with the decision finalized, parties supervise the process and implementation; and conclude report.

Meanwhile, in terms of approaches used in CDM, there are two approaches: consensus mechanism and crowdsourcing [23]. Consensus mechanism projects to achieve agreement among all parties involved. The process has two steps: building consensus among parties and choosing recommended solutions. Many activities involve in the process including negotiation, change of preferences. Crowdsourcing is a type of soft collaboration where large group of people are

proposed as which assignment to take openly. Parties contribute their expertise and experience voluntarily that would lead to mutual benefit for both initiator and assigned parties. This particular approach is suitable when there are large-scale and complex problems.

Another seminal research presented by [34] concluded that they presented four stages in the CDM in multi-agent system model. Those are practical starting-point, group determination, reasoning in relation to practice and social, and negotiation. These concern mainly on the process part of CDM.

Aspects that should be considered in CDM are participants, process, power, and tools. Technology is essential in supporting the process of CDM [35], [23], [36]. [21] presented different view of traditional CDM by integrating psychological aspects, how to aggregate different perspectives, and structuring interactions. Hence, instead of negotiating or compromising, this framework collects shared understanding from every parties.

There are several types of CDM based on recent research. First is the most common type is consensus-based decision making. [23] is mainly used in organization because it aims on agreements among all group members or stakeholders. Consensus-based decision making generally has two phases: building the consensus among parties and choosing solution recommended and agreed by all. This involves gathering preferences from parties, combining preferences, leveling the consensus, and then revising preferences based on consensus. Second, is crowdsourcing. Crowdsourcing is a softer collaboration form where problems are assigned to the undefined group of people, and they openly express their opinions and decide the solutions. Crowdsourcing is usually conducted online [23].

Third, is the majority or democratic rule. Unlike consensus-based that needs to have 100 percent agreement, democratic or majority decision making has several conditions to be met. Decision could be implemented or passed if it has more support than disagreement among voters [37]. The variables or threshold should be agreed before voting occurs. While majority rule could be used as an extension when consensus is not achieved, it could eliminate the voices of minorities, which could also lead to further division of groups [38], [39]. Fourth is Delphi method. Delphi method is one of the types of CDM where there is structured process followed by experts and achieve consensus. In Delphi method, experts argue or discuss in rounds. The process is iterative and continuing until consensus is made [40]. Here, experts give their opinions and vote anonymously, and feedback is given after voting session [41], and this method is useful for complex decisions with the need of involvement for expertise from different aspects [42], [43]. Delphi method is highly recommendable for specific decisions to be made, but it consumes longer time because of the iterations of voting.

Fifth, is MCDA (Multi-Criteria Decision Analysis). MCDA supports multi attributes and involves weighting and aggregating parties' preferences. It could be utilized in complex settings with stakeholders in various fields [44 - 47]. SMART (Simple Multi-Attribute Rating Technique) is a part of MCDA techniques that has specific steps from problem and objective identification until decision and analysis. SMART simplifies the process that would quantify and weigh each alternative based on attributes considered by parties [48]. Last but not least is collaborative modelling or group model building. This method is more of an approach in CDM in order to develop mental model more than deciding particular problem [21] [49]. Collaborative modelling emphasizes on creating shared vision and model with understanding via open dialogue [50] [51].

Research about implementation of CDM were many in healthcare [52], [53], [19], [54]. Air traffic management [55], and supply chain network [56]. Meanwhile, in business settings, CDM is also often applied and experimented. Reference [57] implements CDM to generate decision on product design, market definition, and hiring process. One highlighted result from this study was CDM was only implemented best of there were criteria for members to consider alternatives and decisions objectively.

Second, is implemented CDM in modeling business process, where members of the organization were gathering to elaborate and design business processes. The key point taken in this research is that motivation became the main enforcer of collaboration qualities. Third, solution implementation in corporations. Reference [58] concluded that common information, communication, and facilitators were significant in completing the project; online discussion forums also had been a seminal medium for collaboration within the company. This implies that information system implemented in an organization is also essential in forming the CDM. Lastly, is implementation in supply chain management. Reference [59] presented that joint decision was supported by collaborations between facilitators and drivers.

B. Sustainable Organization Ecosystems

Since there are limited previous research about sustainable organization ecosystems, we divide this section into two terminologies explanations: sustainable organization and organization ecosystems. Then, we conclude similarities and consistencies in explanations to both terminologies. Sustainability itself is highly varied [56], resulting in the lack of definitive meaning [61] [62].

Based on existing literatures, sustainable organization combines economic, environmental, and social aspects to achieve organizations' objectives. These aspects become the basic of every strategy and policy made in organization for the sake of future

sustainability [19] [63]. Others define sustainable organization as not only based on the mentioned three aspects, but it has to depend on particular context of the organization, as well as the nature and purposes of said organizations due to the agility of sustainability's terminology. Therefore, the definitions could vary [16] [34], [36]. Another take on sustainable organization's definition is with dynamic and systemic characteristics, where organizations need to adapt and innovate to achieve sustainability into their short- and long-term strategies [63], [64]. The reason why there are many definitions of sustainable organization is because the term sustainable or sustainability itself is used to describe many aspects as mentioned previously, hence there is uncertainty on the principles to define sustainable organization.

Based on its definitions, we concluded several key elements are essential in defining sustainable organization. First is economic responsibility when the goal is to ensure long-term organization's financial health. Another key elements is the concern about environments and how it will minimize unwanted impacts and generate benefits to the environment .

Implementation-wise, sustainable organizations were applied mainly in companies [65], and higher education institutions [66], [67]. In addition, reference [16] constructed a organizational sustainability framework that emphasized on change processes. This constitutes that sustainable organization starts from basic principle of certain topic or point of views. Another interesting finding about organizational sustainability when reference [68] stated that organizational sustainability leads how managers conducted decision-making process that would profit the organizations.

Stakeholder involvements being a crucial influence for determining actions and strategies in organizations need to be addressed. [55] referred that stakeholder involvements could lead to substantive changes needed, whereas stakeholders could involve in encouraging sustainability.

Meanwhile, there are also varied definitions of organization ecosystems. The concept of ecosystems themselves is also generating different meanings. Ecosystems are identified as structural, which are interdependent and having such activities that are different from other constructs [69]. Ecosystems also enable the coordination through shared participation and regulation but not hierarchy [70], [71], thus we cannot assume that it is like organization structures. According to [72], ecosystems consist of many roles that each would complement each other.

In terms of previous usage of ecosystems research, there are types of ecosystems. A systematic literature reviews from [73] there are four types of ecosystems in close relation to academic and business settings mentioned: business, innovation, knowledge, and entrepreneurial ecosystem. Business ecosystems include the co-evolution of cooperation to innovate,

selecting partners, governances, and also the structure of them [32]. Business ecosystem is mainly purposed for inventing new products, meeting customers' needs, and facilitating future innovation, while focusing on the relationships of firms and their environment that are beyond the industries [73]. Innovation ecosystem comprises of arrangements that companies combine to provide for consistent solutions for customers' needs; it emphasizes the innovation development based on joint cooperation to create value proposition [74]. Meanwhile, knowledge ecosystem highlights the interactions of knowledge between stakeholders to progress new knowledge; it also concerns about mechanisms for boundary definition, business models, and knowledge creation and exchange [75]. Lastly, entrepreneurial ecosystem is for entrepreneurs to create new values, combined with method of governance, and helping create economic growth [76 - 79]. Through these types of ecosystems, it is expected that in the future, there will be a conversion from firm-level objectives to system-level objectives. Moreover, the focus on value creation between actors will rise [39].

Ecosystems in business contexts described above gives clear understanding on which context should one research identify. However, the terminology of organization ecosystem has never been identified previously with exact words. Here, we attempted to define what organization ecosystem is with limited resources or previous research. There are several key focuses on the definition. First, is the co-creation of values between elements of the organization, whether we are talking about firm-level or system-level. Value co-creation pushes organization to create outputs that would benefit more than one party [37], [80]. Second key focus is the nonhierarchical and collaborative governance that leads to dependencies between parties [81].

III. METHODOLOGY

This study adopts a qualitative content analysis approach to further explore and integrate key indicators and conceptual elements from existing literature on CDM and SOE [82]. This design was chosen to enable an in-depth examination of text-based data and to identify patterns, themes, and conceptual linkages between the two topics [83]. There are three types of qualitative content analysis: conventional, directed, and summative. In this paper, we are using conventional method, where little to no existing previous data about SOE, while CDM has many diversifications of theoretical and applied research.

With utilizing conventional approach, we followed three steps. First, we prepared related literatures about CDM and SOE. Then, we organized these literatures based on themes or categories. Lastly, we

reported these findings by building preliminary framework of SOE elements with interconnectedness using types of CDM.

IV. FINDINGS AND DISCUSSION

As previously mentioned, CDM has a very broad spectrum. Definitions, types, similar terminologies, and other things that define CDM. We search several types of CDM that would define that these are CDM. Even there are many types, models, processes of CDM, we concluded that there are six models of CDM that could be beneficial to be applied in organizations, especially for the purpose of sustainability for organizations.

These CDM models are consensus-based, crowdsourcing, democratic rule, Delphi method, MCDA, and collaborative modeling or group model building. We assess these models that would be mostly appropriate to implement as the connection between elements of SOE.

Meanwhile, we did not find exact definitions of SOE. However, we concluded based on the definitions of sustainable organization and the principles of ecosystem. We found that the main characteristic of ecosystem is the interconnectedness and network form instead of hierarchy. From here, we design the model based on these principles, that the organization is not based on hierarchy, meaning it does not involve organization structure in our model. Another characteristic, interconnectedness, is how we embed the CDM model that would best describe the connections that would eventually enhance organization's sustainability. Hence, we concluded that instead deciding based on singular person that may have short term effect, making decision within parties involved has longer effect in terms of the longevity of benefits for the organization.

We also excluded several references due to the exclusion of environmental aspects of the ecosystem, which a large number of literatures presented models for organization ecosystem with triple bottom line elements (economics, social, and environment) into our model. Then, our limitation is to exclude the interorganizational relationships. Our research is limited to the internal organization elements with having sustainable organization goals in mind.

From exploring previous literatures, we captured several significant elements of Sustainable

organization. These elements are (1) research and development; (2) management and strategy; (3) organizational systems; (4) governance; (5) service provision; (6) assessment and reporting that we adopted from [23]. We transformed these themes with the same principles and in the context of organization in general instead of the parts of the change process as described by Filip.

Therefore, we constructed the elements to: (1) innovation and knowledge; (2) strategic leadership; (3) organizational infrastructure and processes; (4) sustainable governance; (5) value delivery; and (6) monitoring and reporting. Additionally, we also adopted the economic, cultural, and social aspect of an organization from [50]. Selected indicators are: (7) financial sustainability and transparency, (8) social impact initiatives, and (9) cultural continuity.

With these descriptions, we build the framework of SOE based on CDM principles. The framework is visualized below.

The interconnections between SOE elements are colored based on types of CDM are suitable in each connection. Green represents consensus-based decision making, blue represents crowdsourcing, purple represents democratic rule, red represents Delphi method, orange represents MCDA, and black represents collaborative modeling.

We discuss the connection of CDM type in each color. First, is the consensus-based CDM. Consensus is best used in connection between sustainable governance and social impact initiatives, cultural continuity and social impact initiatives, and financial sustainability and transparency and social impact initiatives. The connection between sustainable governance and social impact initiatives involves how the governance of an organization would need to balance the stakeholders and the need to facilitate everyone in order to create optimal social outcomes. Social impact initiatives and cultural continuity's interconnectedness is mostly suitable to be represented by consensus based. It is due to the creation of value that would represent sustainable organization culture while building social impact in the organization. Lastly, social impact initiative and financial sustainability and transparency create dual value where social initiative could generate both social and financial returns for an organization.

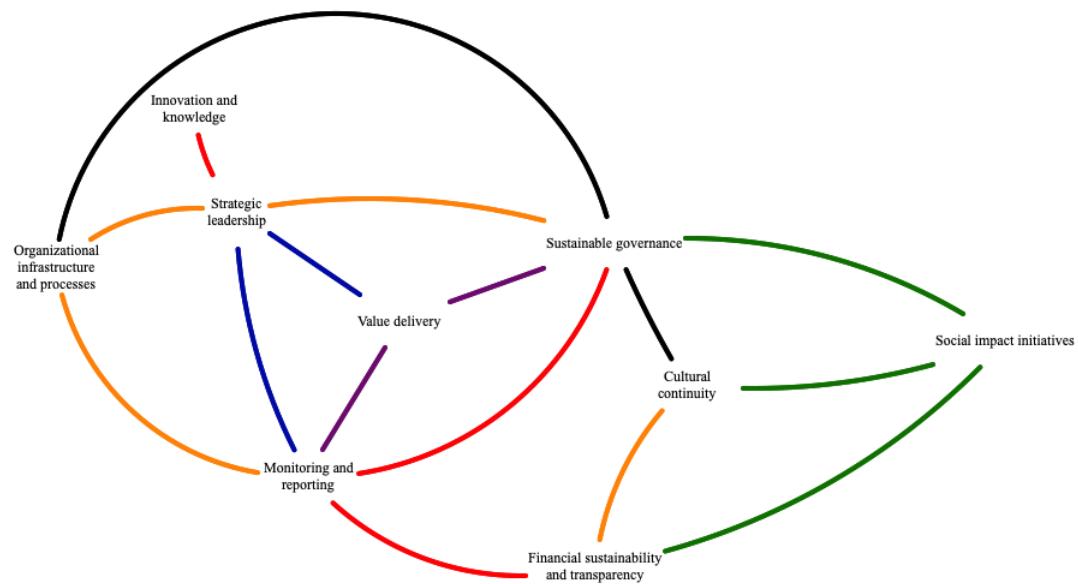


Figure 1 Sustainable Organization Ecosystem based on Collaborative Decision Making

Second category is crowdsourcing type of CDM. First connection is between strategic leadership and value delivery. Whichever policies created by the management (strategic leadership) would directly influence and be influenced by how the value of the organization is delivered. Similar argument is also applied between strategic leadership and monitoring and reporting. During the end of term, monitoring and reporting should be conducted by having feedback from every layer of organization to strategic leadership, or management. The relationship should be between management and every part of the organization, where anonymity should also be applied to give feedback to avoid conflict.

Next CDM type discussed is democratic rule (purple), where to make decisions there should be requirements and usually it is through voting. With this principle, value delivery and both sustainable governance and monitoring and reporting would be provided by democratic rule. These connections would have best applied since legitimacy through participation is more significant than expertise contribution for optimization. Similar principle applies between value delivery and sustainable governance. Even though consensus could be suitable, but organization should choose priorities where parties have equal level of opinions.

Fourth CDM is Delphi method, which is represented with red lines. With this method, the iterative and involvement of expertise would be significantly displayed between innovation and knowledge and strategic leadership. Innovation and knowledge contribute much on the development of products and services that organizations provide. The second and third one is between sustainable governance and

monitoring and reporting. Monitoring and reporting coming from both sustainable governance and financial sustainability require expert judgment to assess every result of governance and financial reports to comprehend implications and assess performance.

Fifth is MCDA (orange). In this model, MCDA is the most to define connectivity among all six types of CDM. MCDA's main characteristic is the systematic evaluation on any performance, including making decisions. The most distinct connection in using MCDA is between strategic leadership and both organization infrastructure and processes and sustainable governance. Another interesting connection is between financial sustainability and cultural continuity. This connection, even not very common, involves conflicting objectives between financial outcomes and the significance of cultural behavior. Last connection is between organizational infrastructure and processes and monitoring and reporting. The justification for having MCDA as the connection is due to how the systems that organizations implement should be monitored and reported based on quantifiability and objectivity. Hence, using MCDA is mostly appropriate for these connections.

The last one is collaborative modeling, which is represented by black line. There are two connections that are best described by collaborative modeling: connection between organizational infrastructure and processes and sustainable governance, and between sustainable governance and cultural continuity. The use of collaborative modeling is mainly to create or generate a model using shared vision from the stakeholders in organizations. Using this requires high level of complexity, understanding the system, and comprehend the complicated relationships. For

example, sustainable governance and cultural continuity has intangible relationships where both correlate in terms of how the system of how organizational culture is highly influenced by sustainable governance. The similar case of organizational infrastructure and processes and sustainable governance. These have more complex relationships between the organizational systems and govern the organization that would require comprehending each roles and responsibilities and find optimal solution for sustainable organization.

Lastly, there are several limitations, as explained previously. First, due to the wide topic selected, we excluded specific topics such as environmental aspect. Another limitation is while there are heavy differences between research about SOE and CDM, we find literatures and cited references that have the most relevant significance to our study. Hence, there is a possibility that some seminal papers were not covered in our study due to wide search results.

V. CONCLUSION

Our conclusion of this paper is that we explore the possibility of building SOE based on CDM principles. SOE mentioned in this study has not been studied diligently. From the result of content qualitative analysis approach, we concluded that there are six CDM models or types explored in this study to explain the interconnectedness between elements of SOE. These six CDM models are consensus-based, crowdsourcing, Delphi method, democratic rule, MCDA, and collaborative modeling. Meanwhile, there are Nine elements of SOE that from previous literatures emerged. These SOE elements are innovation and knowledge, strategic leadership, organizational infrastructure and processes, sustainable governance, value delivery, monitoring and reporting, financial sustainability and transparency, social impact initiatives, and cultural continuity.

Consensus-based apply the connections between (1) sustainable governance and social impact initiatives, (2) cultural continuity and social impact initiatives, and (3) financial sustainability and transparency and social impact initiatives. Crowdsourcing best applies the relationships between (1) strategic leadership and value delivery and (2) strategic leadership and monitoring and reporting. Third is democratic rule, which connect between (1) value delivery and sustainable governance, (2) value delivery and monitoring and reporting, and (3) value delivery and sustainable governance. Next is Delphi method. Delphi method best connects (1) innovation and knowledge and strategic leadership and (2) sustainable governance and monitoring and reporting, and (3) monitoring and reporting and financial sustainability.

MCDA connects (1) strategic leadership and organization infrastructure and processes, (2) strategic leadership and sustainable governance, (3) financial sustainability and cultural continuity, and (4) organizational infrastructure and processes and monitoring and reporting. Lastly, collaboration modeling defines the connections between (1) organizational infrastructure and processes and sustainable governance and (2) sustainable governance and cultural continuity.

Since this study is still in its preliminary stage, there are still many tasks to do. Future development of the model is highly feasible after data collection in real organizations context. Meanwhile, we concluded that applying certain types of CDM could enhance the ecosystem of organizations for sustainability benefits.

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