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The up-scaling organization structure - an integrative approach

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Abstract

The rapid digital change & development in various industry in the 21st century, are the main reasons underlying the importance of developing a breakthrough organization structure design. The consideration is based on balancing the technological capacity (industrial infrastructure up-scaling) and change management capability (organization up-scaling).
The research focuses on creating a design prototype for developing a new conceptual, organizational model, especially for the manufacturing industry sector based on Industry 4.0 technology integrated with a community platform based on digital connectivity, called Society 5.0. This up-scaling model, simulates plug-ins methodology that directly puts on the Techno-structure and Socio-structure aspects on an organizational platform based on the Henry Mintzberg's configuration.
The design of the next generation of organizational structure as conceptual model has been formulated by applying the adaptive platform and up-scaling configuration based on manufacturing industry process base with digital integration and adaptation.

Keywords: Industry 4.0, Society 5.0, Up-scaling, Organization, Mintzber

1. Introduction

Alfred Chandler's (1962) famous idioms "Structure follows strategy" implies that every modern organizational structure shall be developed based on the latest strategy of the organization and therefore successful implementation of an organization's strategy will depend on its primary organizational structure. This is a crucial issue considering that the firms key activities to achieve the firm's strategic purpose mainly depends on the structure of the organization.

In the 21st century, organization's structure will depend on three pillars: leadership, processes, and organization (Chowdhury, 2005). While considering a constantly changing and uncertain business environment, every businessperson must adapt to these changing patterns to remain competitive constantly. Organizations also face and undergo various changes in line with changes in the business environment. Changes can occur in an organizational structure model that becomes more efficient, effective, and conceptual. The emergence of various management and organizational changes is a challenge for every individual responsible for leading and developing the organization—considering that the concept, model, and organizational structure, in general, have not experienced much significant development during the last few decades. The management of social and business organizations also the government are required to participate in continuous transformation, as the impact of uncertain changes that are so radical and disruptive. The challenge is how the organization is managed using the 21st-century paradigm according to the latest uncertain situation and challenges by balancing the infrastructure of Industry 4.0 technology and human aspects (organizations, communities) in Society 5.0.

Organizational structures and management processes can no longer survive inheriting design and management concepts from the past, affecting long-term aspects of productivity and competition. To provide a perspective that Industry 4.0 and Society 5.0 supports organizational transformation processes both at the operational and the scope of

the related industry value chains, organizations should have a solid need to experience change and transform. An organizational structure that cannot adopt the concepts of Industry 4.0 and Society 5.0 will cause the inability of every internal element to respond to market needs with an adequate supply speed. As the result of Industry 4.0 and Society 5.0, many industries are under intense competitive pressure. Therefore, the industry must design its organizational structure to encourage continuous and progressive innovation. Centralization in organizations as an organizational structure does not reflect current needs (Çakırel, 2016). It is made possible due to the urge to use more initiative, the courage to take risks, make innovations, and individual freedom within the organization (Mintzberg et al., 2010).

The complexity of competition challenges in an industry can occur from within the organization and environmental dynamics; this means both internal and external contexts are complex. Assuming a two-way complexity effect between these two factors, the dynamic condition will always urge the organization to adapt. The level of complexity adopted by a company is an adaptation formulation that carefully considers the internal and external complexity. The ingredients of this formulation are management decision problems (Moldoveanu & Bauer, 2004).

The level of diversity and complexity of the organizational structure becomes a challenge in this study to obtain an overview of the basic organizational structure of an industry (manufacturing based). The context of up-scaling in the proposed Organizational Structure design model for companies based on the manufacturing industry measures the level of adaptation and new complexity that the industry need. The new level of complexity internally is in responding to the development of the implementation of Industry 4.0 technology in aspects of the production process and services. Meanwhile, the new competition complexity externally is the demands of B2B, supply chain, distribution line, B2C, the world of education, society, and the government as communities that must be involved and collaborated on a platform according to the demands of Society 5.0.

2. Literature review

Any today's organization is constantly faced with change (Hugentobler, 2017). Organizational transformation is an increasingly important concept and is a continuous process. The impact of a transformation process on an organization will allow it to continue developing sustainably. This transformation process is carried out to obtain a level of effectiveness and efficiency through adapting to changing opportunities and challenges (Schalock et al., 2018). The digital process, especially with the advent of Industry 4.0, has changed the format of the organization, and this change has led to several circumstances where the organization can barely cope. Organizational change or transformation challenges requires continuous organizational development (Sousa & Rocha, 2019). Therefore, continuous efforts are needed for organizations to transform from an actual physical environment and infrastructure into a virtual platform with the support of information and communication technology that continues to grow. The information and communication technology will be the primary basis of all elements of future organizational functions. The perspective of Industry 4.0 will always involve a comprehensive digitalization process with the consumer handling process to the production and service processes (Wilkesmann & Wilkesmann, 2018)

Based on the base reference above, organizational transformation is needed as the best solution in answering various challenges within the organization to adapt and optimize the added value of Industry 4.0 and Society 5.0. Thus, along with the success of the organizational transformation process challenges, the expected positive impact is the potential for improving business and service performance which can positively affect economic growth and development (Esmer & Şaylan, 2019). So, this research is basically following principal and important three questions that must be considered to avoid possible mistakes in initiating and designing/redesigning organizational structure changes (Peter et al., 2019), which are:

- How to choose the right organizational development and competition strategy?
- How to select and determine organizational performance measures in the event of a change?
- How to select adequate organizational design/redesign methodologies?

2.1 Organization structure & design

The early research on organizational design conducted by Pitts & Clawson (2008) put forward how organizational structures should be adapted and developed. Their research

confirms that organizational structures can develop optimally through the capability and culture of creativity. The research also concludes that the form of design and organizational structure will continue to evolve according to the developments and needs of the times and believes that new principles will be discovered and used. Continued by Krebs (2007), wherein in a knowledge-based economy, the impact on the industry is the emergence of dynamic needs for organizational structure transformation. The dynamic occurs across industries and has resulted in recommendations to formulate a new structural approach, which can adapt to information flow and knowledge sharing in the information age. Meško (2016) investigates the impact of Industry 4.0 complexity on the operational activities of organizations seeking to transform. The research has found that Industry 4.0 leads to an unprecedented "Cross Complexity." The term defines the existence of a new level of connectivity called IoT (Internet of Things).

IoT connects all operational networks that have extreme relevance in an industry or business and become the basis of prerequisites or standards for all operational aspects of the organization to enter the Industry 4.0 level. At the end of 2020, Aquilani & Michela's (2020) research found that the company or industry in the era of integration of Industry 4.0 and Society 5.0 is the best place for innovation processes that directly impact the community and related communities. The organization must continue with its unique structural design to be the best platform for parties' industry and community involvement. The previous related research conducted by Esmer & Şaylan (2019); recommends three main elements in the business world to collaborate and integrate. These three elements are industry, government, and community organizations. Based on those elements, changes can occur in an organizational structure model that becomes more efficient, effective, and conceptual. The emergence of various management and organizational changes is a challenge for every individual responsible for leading and developing the organization—considering the concept, model, and organizational structure, to adapt the growing innovation and significant digital integration in the last decade.

2.2 Digital organization

The term 'digital organization' is a new form of network organization format. Digital organization is a complex phenomenon that focuses on coordinating non-hierarchical structures, products and services that are detailed and rich in information and correlated with aspects of human insight and knowledge (Drucker, 2020). All of these elements are supported by information and communication systems which are important aspects of digital organizations.

Digital organization is applied when the boundaries of time, geographical space, organizational form, and access to information are completely replaced by the use of Information and Communication Technology. A digital organization can also be defined as a temporary network of independent companies - suppliers, customers - linked by information technology to share skills, costs and core competencies (Sousa et al., 2019). The introduction of digital products, services, channels and interfaces has become a challenge for leaders of non-digital companies to redesign their organizations according to digital formats and platforms. Because digital organizations must be linked and integrated into other parts of the company and their respective social environments, digital technology introduces a new dimension of organization that was previously independent. (Sousa et al., 2019). This major change shows that digital technology has transformed all types of industries today.

The Industry 4.0 and Society 5.0 will make organizations digitally transform and integrate the internet, machines, people, and things in the simplest definition. Industry 4.0, when fully adopted, will indeed change the whole concept and activity of the organization (Özsoylu, 2017). As for the hypothetical formulation, the up-scaling approach was designed to find breakthrough strategic organization competitive advancement scientifically and implementable in the industrial sector directly affected, especially manufacturing with the Industrial revolution 4.0 and The of Society 5.0. Thus, it can provide a new perspective on adaptive steps in the manufacturing industry, mainly to balance the competitive capacity development process in technological aspects related to industrial technology 4.0 improving organizational management. On the other hand, with Society 5.0, inevitably, this swift current of change will also affect organizational life and interactions. In this context, organizations need to adapt to Industry 4.0 and Society 5.0. The results obtained in the research takes a position in updating the shifting of the latest organizational structure models and concepts due to current digital industry era.

2.3 The mintzberg theory

Mintzberg (2009) describes the organizational structure as "coordination in which HR is divided into different tasks, and these tasks are reassembled for a common goal." The structure is formed with five coordination mechanisms, five organizational structural components, and nine design parameters. In addition, the primary coordination mechanism is based on mutual trust between individuals in an adhocracy organizational structure (Sunje et al., 2010). The five structural components of the organization that are the model of Mintzberg are as follows in the Figure 1:

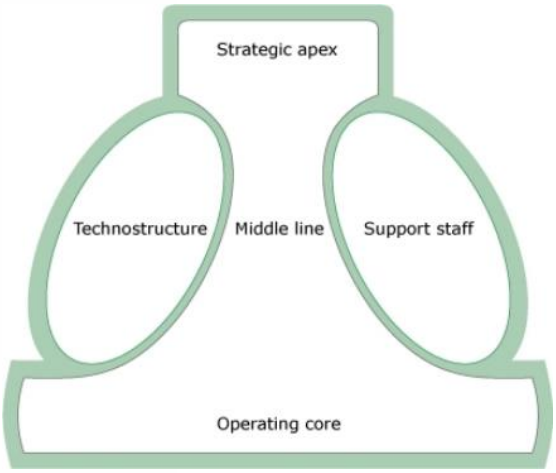

Figure 1. The mintzberg's platform

As described in the above figure 1, the five elements of the Mintzberg platform are:

- "Strategic Apex" is a collection of functions that provide organizational strategic direction and decisions
- "Middle Line" is a collection of managerial functions from the primary operations of the organization
- "Operating Core" is an organizational front-liner who is directly involved in the implementation of all operational aspects of the organization
- "Techno Structure" is a function that carries out the operational analysis process and the aspects needed for capacity building and organizational performance
- "Support Staff" are support functions within the organization that help the needs and smoothness of the organization's core operational and managerial aspects.

2.4 The industry 4.0 and society 5.0

The Industry 4.0 was first introduced in 2011 in Hannover, Germany, as a proposal for the development of a new concept of German economic policy based on a high-tech strategy (Mosconi, 2015). The concept, which was launched as the fourth technological revolution, is based on concepts and technologies that include Cyber, Internet of Things (IoT), and Internet of Services (IoS) (Hoffmann et al., 2014), based on real-time communication via the internet that enables continuous interaction and exchange of information not only between humans (C2C) and human and machines (C2M) but also between machines (M2M) themselves (Cooper & James, 2009).

As a consequence of Industry 4.0, Society 5.0 emerged, whose initiative was initiated in Japan. This new revolution initially emerged due to concerns of an aging population (Pereira et al., 2020). Society 5.0 focuses on using the tools and technologies developed by Industry 4.0 to benefit humanity. Society 5.0 focuses on positioning humans at the center of technological modification and innovation for the benefit of mankind and is considered a silent revolution that started in Japan that promises to revolutionize society (Costa, 2018). The main goal of Society 5.0 is to improve the quality of life of the community by using the potential obtained by Industry 4.0 (Ferreira, 2018).

One of the positive aspects of Industry 4.0 is creating added value effects, especially in the efficiency of operational and SCM processes with new disruptive competitive business models. However, technological changes may have positive and negative impacts on the organization format. The challenge is how to carry out the organizational restructuring process properly because some elements and functions within the organization will soon disappear (Kane et al., 2015). Thus, concerning Industry 4.0, organizational and industrial management cannot limit adjustments and adaptations only to the automation aspects of the production process. The Industry 4.0 platform is the digitalization of business processes as a whole (Meško, 2016). In addition, the added value of organizations in the Industry 4.0 era is finding creative and alternative solutions to produce new products and new competition solutions (Kane et al., 2015). In previous global-level studies, it can be seen that there is a need to explain and further examine the linkages between Industry 4.0, Society 5.0, and organizational trans-

formation. Research shows a very close relationship between Industry 4.0 and the process of organizational transformation (Esmer & Şaylan, 2019). Thus, organizations that apply the latest principles in Industry 4.0 and Society 5.0 should carry out the transformation process to address challenges and problems in business, economic, social, technological, political, and legal aspects. In addition, especially with Industry 4.0 encourages organizational formats to be digitized on every aspect of its business activities (digital organization). Without carrying out adaptation and transformation, an organization may not successfully implement the Industry 4.0 models and concepts in their entirety in their operational activities (Hugentobler, 2017).

3. Methodology

Based on the five elements in Mintzberg platform theory, it is necessary to establish a scientific platform of the proposed conceptual organizational structure, which will become the theoretical reference for the research. Based on this need, the organizational structure design developed in the modelling uses concepts based on the configuration and components of Mintzberg's organizational model. The underlying aspect is that Mintzberg's configuration has a representative platform because it has a concept with an inward-looking capacity that is integrated and adaptable to the business processes of any manufacturing industry. Despite its apparent flexibility, Mintzberg's configuration can accommodate any organizational structure model used by most of manufacturing industry. The most important aspect is the ease of customization and is scalable with the development of the industry. Another aspect of excellence is that Mintzberg's configuration was initially designed to be adaptable and flexible to the organization's external environment dynamics. This is under the research focus, which develops an outward-looking organizational structure design with the developments and dynamics of Industry 4.0 and Society 5.0. Mintzberg (2009) stated that the organizational structure must be flexible because it operates in a competitive and dynamic environment.

Mintzberg's platform will then integrate into an up-scaling organizational structure design concept based on the adoption of Industry 4.0 and Society 5.0, and the distinctive contours of manufacturing-based industries. The integration approach with an outward-looking organizational structure design perspective due to dynamic competition and challenges in today's digital economy, technological advances, new digital trends, globalization, organizational strategic issues and the growth of customer expectations (criticism) through social media. The situation triggered a model change or a paradigm shift in the function of the industry's organizational structure and management approach. These show that Industry 4.0 and Society 5.0 answered the challenges of the global industrial world, with fast processes and disruptive changes involving various other industrial sectors to improve the total efficiency of productivity and supply capability of the organization. In addition to its advantages, Industry 4.0 has become a new business model (Ibarra et al., 2018) that requires changes in the logic or operating philosophy of the organization and how the strategic issues are managed. These changes will bring impact to a need to break away from the traditional organizational structure style. These finding challenges conducting a more in-depth study of the Organizational Structure design, which is characterized by adaptive, integrated, and scalable.

It is crucial to consider the following steps before applying the organizational modelling and simulation methodology. The crucial step is modelling and simulation, where experiments have to be carried out. The results will then be analyzed within the scope of the organizational benchmarking model from the previous structure format, and the reference organization (Peter et al., 2019). The basic assumption is that if it can describe the inputs, outputs, structures, processes, and the linkages in an organization in detail, then the research model can simulate them appropriately. The better the understanding of organizational reality, the better the model can be. The organizational structure transformation methodology provides an opportunity to develop a model by supporting facts, changes, or new needs through simulation techniques. Another consideration is that all flows (processes) within the organizational structure trigger customer demand (information) or market needs. Customers can be outside and inside the organization.

3.1 The integration method

The relevant literature review is undertaken to create visual aspects in the format and contours of the proposed conceptual Organizational Structure (Up-scaling). Also, additional methods are needed to translate and articulate all the data and qualitative analysis obtained from the literature review to obtain a new meaning in the form of rational arguments that can be compared according to the research context. The steps and analysis model are described in the

Figure 2:

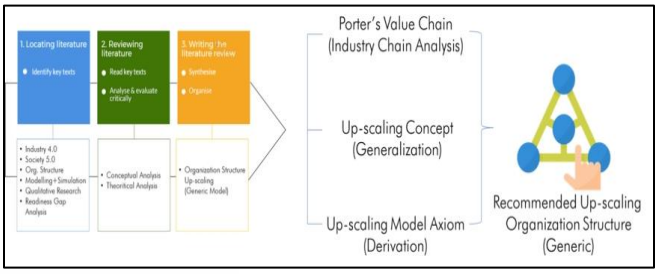

Figure 2. Integration of literature review and visualization of proposed model

In the Figure 2. Above. there are three analytical approaches to be able to articulate all qualitative data as a result of the literature review, namely:

- Porter's Value Chain, which is used as a generic competitive advancement reference for mapping an organization's internal (value) systems and analyzing supporting industry chain capacity based on the contours of the related industrial sector. With this Value Chain approach, a complete description (profile) of organizational elements will be obtained from each organization representing the related industrial sector, including industrial and social supporting communities according to the theme of Society 5.0
- Up-scaling Concept. Whereas all the literature review results on the concepts from Industry 4.0 and Society 5.0 are generalized to become the basis for the modification (Up-scaling) of Mintzberg's configuration. This concept is the primary reference for the multi-tier organizational structure development model for designing the proposed research organizational structure model.
- Up-scaling Model Axiom. At this stage, a statement or central axiom is formulated and established, as the basis for developing the up-scaling organizational structure model. This axiom is a statement put forward due to the analysis accumulated and actualized in the synthesis of design elements of the conceptual up-scaling Organizational Structure model of the research proposal.

3.2 The upscaling plug-in method

The proposed model and design of the next-generation organization structure model should meet all the required elements. To make it possible, a "plug-in" simulation process is carried out on the generic organizational design aspects and elements from Industry 4.0 and Society 5.0 in a new organizational form according to the field. This "plug-in" simulation process is carried out with Industry 4.0 in the Techno-structure aspect and Society 5.0 elements in the Socio-structure aspect as a form of modification and up-scaling of the traditional Mintzberg's platform. The simulation process of this "plug-in" can be seen in the Figure 3.

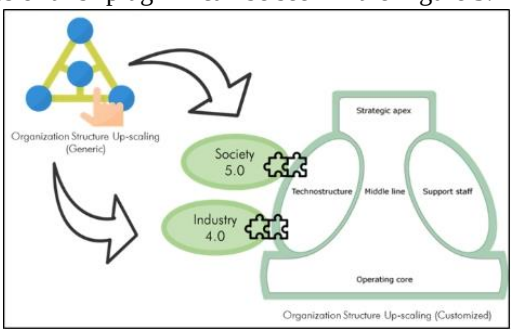

Figure 3. The plug-in simulation method

Before the plug-in process is carried out, it is necessary to reformat the organizational structure that will be up-scaled by transferring it to Mintzberg's configuration platform format by going through several stages, namely:

- Identify the main activities (core activities) of the representative Company's business processes described in the connectivity of the leading and supporting functions in the Organizational Structure.
- Identify all organic functions that exist within the organizational structure of a representative company to be aligned with the contours of the five main elements of the Mintzberg's configuration platform, namely Strategic Apex, Middle Line, Operating Core, Supporting, and Techno Structure
- Move all organic functions within the organizational structure of a representative company according to each function or element of Mintzberg's configuration.
- Ensure that all organic functions are aligned between the standard organizational model in each representative Company and the organizational model that uses Mintzberg's configuration platform.

4. Result & discussion

The diversity of organizational structures within a highly competitive industry shows how the management adapts to the unique contours of the complexity of the supporting industrial pyramid, technology, and production processes, and especially the business development strategies carried out within a company. The basis for adapting the organizational structure design applied in an industry by considering the details and contours of this complexity can be divided into three sub-components: the number of elements in the system, the number of connections between elements,

and the type of functional relationship between elements (Milling, 2002).

4.1 The axioms modeling

By considering the dynamics of Industry 4.0 and Society 5.0 as well as the results of the previous literature analysis, becomes the basis for formulating the following modelling axioms formulation:

A1: Axiom 1. (grand theory: alfred chandler)
"Organizational structure is designed to follow the development of business strategy."

A2: Axiom 2. (basic: up-scaling)
"The new organizational form is an enhancement to the contemporary application of pre-existing organizational solutions."

A3: Axiom 3. (main reference: mintzberg theory)
"The platform of the organizational structure must be flexible because it operates in a dynamic environment."

A4: Axiom 4. (basic: modeling)
"The organizational structure with the new model represents the development of the information flow management function and the adaptation of the latest operational processes of business and industry."

A5: Axiom 5. (Adaptation: industry 4.0 and society 5.0)
"Digital development focuses on adapting knowledge, business processes, supply connectivity, added value and online collaboration, thus creating opportunities for organizations to develop their forms and designs."

In equation form, the integration of the five axioms above becomes:

$$A1 \overset{\Delta}{\longleftrightarrow} A5 \otimes A4 \rightarrow A3 \oplus A1 \supseteq A2$$

Note:

$\overset{\Delta}{\longleftrightarrow}$ (defined by), $\otimes$ (relation), $\oplus$ (structure), $\rightarrow$ (logical implication), $\supseteq$(inclusion)

Thus, the next step is to integrate the basic design of the conceptual Up-scaling Organizational Structure model design. Based on the above axioms, it can be interpreted that adaptation and integration to new complexities (cross complexity) are needed in the value-added chain of the manufacturing industry. The internal and external challenges appear to the organization during the up-scaling stage of the production process infrastructure and its services towards Industry 4.0 and Society 5.0. Organization and management issues related to this new complexity occurs in changes in work procedures and production stages. It touches all organizational functions in the Strategic Apex, Middle Line, Operating Core, Support, and Techno-structure arrangements. Since it is related to the concept of Society 5.0, it is necessary to add (add-on modification) aspects within the organization with Mintzberg's format, namely Socio-structure. The point is that Industry 4.0 technology directly touches the Techno-structure aspect within the organization. At the same time, Society 5.0 requires adaptation (modification) of new elements in Mintzberg's platform concept to be integrated within the organization, namely Socio-structure.

4.2 The up-scaling structure model

For the based conceptual organization structure, adaptation is made to the organizational configuration platform on a Mintzberg's format to align with the thematic adaptation of Industry 4.0 and Society 5. As for Industry 4.0 terminology used is Digital Connectivity Operation Management (DCOM). As for thematic related to the concepts and contours of Community 5.0, the terminology used is Smart Community Connectivity Management (SCCM). According to Mintzberg's configuration, the thematic used for Strategic Apex on strategic decision-making in the manufacturing industry is “Business Management”, which is applied to the Middle Line aspect. The thematic used for the end-to-end daily operational activities of the manufacturing industry is "Operation Management." While the thematic used for the Operating Core aspect is "Production Management," this is due to the model's base design being rooted in the manufacturing industry. Furthermore, the thematic used for the Supporting aspect is "Operation Support," with the goal that all organic functions in this thematic have service competence and a pro-active attitude in supporting function and performance of all thematic within the organization.

The integration of the Mintzberg's configuration format with Axioms formula adaptation to Industry 4.0 and Society 5.0, makes the propose up-scaling organization structure as seen in the Figure 4:

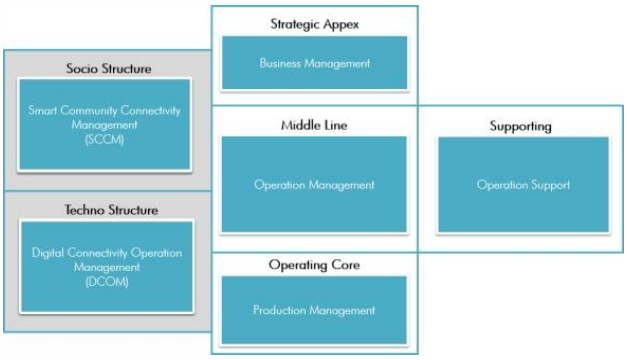

Figure 4. The up-scaling organization structure design

The structure of the up-scaling organization structure design in figure 4 above shows that the proposed platform can be implemented and adapted in the organizational structure base of the manufacturing industry. The platform also covered all business and operational processes as in the central thematic (core processes) called Business Management, Operation Management, Operation Support, and Production Management. Meanwhile, in the Techno-structure aspect, it becomes a competitive advantage option if a manufacturing industry has an organic function within its organization that optimizes technology management related to Industry 4.0 and developments in aspects of products, services, and manufacturing processes through R&D. On the other hand, the application of the Socio-structure aspect in the manufacturing industry organization is an added value and respect for the related community. The ability to have Socio-structure elements adapts to the capacity and role of the organization to its stakeholders and acceleration into the concept of Society 5.0 can only be possible after digital integration of Industry 4.0 technology within the organization.

5. Discussion

The added value of change strategy in the era of Industry 4.0 in global wide and Society 5.0 in global perspectives is a challenge to provide digital integration solutions to organizations. The important role of developing the supporting organization, can no longer be routine and administrative but must be digitally progressive. The implications of these digital strategic role are the basis for determining aspects of achieving the competitive performance targets of an organization. Management must manage the interaction of all elements inside and outside the organization with the latest approach that runs parallel to the development of business and digital technology.

The development of organization structure concept and platform with up-scaling design as conceptualized in this research is a scientific response in answering the integration of improving technology infrastructure and developing integration capacity and competitive advancement within an organization. A new organizational concept with up-scaling platform will undoubtedly have its own impact, especially in the strategic aspect where the classic organizational function, a platform in gathering all exclusive elements, becomes open with communal and inclusive team members.

Significant challenges in discussing the development of adaptation within an organization to its internal dynamics and environment will always be interesting topic to discuss for organization design enthusiast and professionals. So far, there has been a dichotomy in the concept of organizational design, whether to follow business processes that must be adapted thoroughly or to consider the dynamic demands of the related external environment. Choosing one or both will always pose challenges to the strategic aspect, which is the main element in the organization. The dimensions of the up-scaling organizational structure as a result of conceptual design will provide a new nuance in mapping the organization competitive advancement features related to product, technical aspects and behavioral elements also aspects of communication and managing relationships with the industrial community and markets and stakeholders. This competitive challenge makes the role of management and scientific researchers in organization capacity development need to look further concerning the emergence of multi-talented needs based on digital attitudes at various levels of the organizational structure.

The existence of an up-scaling organizational design concept platform has logical consequences in that all related operation functions in a modern organization, particularly one based on digital technology, must rely on internal human resource capacity and open a digital collaboration platform with its stakeholders. The strategic impact on organizational aspects is primarily how to manage and integrate the colors of corporate values and the new organizational culture based on traditional business philosophy, digitalization, and virtualization. This is a new era of strategic organization challenge in Industry 4.0 and Society 5.0, where human management touches on the virtual aspect and its seamless connectivity in the digital world, as well as physical visualization and actualization. Therefore, it is critical to use the most recent organizational platforms.

6. Conclusion

Organizing bring new competitive advancements in management; if it can be appropriately managed, it will contribute to greater operational effectiveness and efficiency in order to achieve the competition goals. In the organization, determining the optimal organizational structure needs to be done appropriately to support the business strategy.

Based on the above-defined axioms and propose conceptual design, it can be interpreted that adaptation and integration to new complexities (cross complexity) are needed in the value-added chain of the manufacturing industry. The internal and external challenges appear to the organization during the up-scaling stage of the production process infrastructure and its services towards Industry 4.0 and Society 5.0. Digital adaptation and operational management issues related to this new complexity occur in changes in work procedures and production stages. It touches all organizational functions in the Strategic Apex, Middle Line, Operating Core, Support, Techno-structure and Socio-structure. The point is that Industry 4.0 technology directly touches the Techno-structure aspect within the organization. At the same time, Society 5.0 requires adaptation (modification) of new social-related elements in Mintzberg's platform concept to be integrated within the organization.

The development of an organizational concept platform with up-scaling design as conceptualized in this study is a scientific response in answering the integration of improving technology infrastructure and developing talent capacity and decision-making competence within an organization. A new organizational concept with an up-scaling platform will undoubtedly have its impact, especially in the SCM aspect where the classic organizational function, a platform in gathering all exclusive elements, becomes open with communal and inclusive.

It is also shown that the design of the up-scaling organizational structure model has become a representative visualization that can be a scientific reference for the development of the latest organizational structure, especially in the manufacturing industry based on Industry 4.0 technology and its development towards the Society 5.0 platform.

There are several limitations to this research, which focuses mainly on developing a concept model of an organization based on Industry 4.0 and Society 5.0. Another limitation is the limited literature on Industry 4.0 and Society 5.0. As a result, future research must carefully observe the dynamics of the industrial world and digitalization in general. This is significant because the implementation aspect of the organizational structure is highly dynamic and adaptive. As for the focus of future research, it will be based on the model design from the results of this study in order to develop aspects of the scope of the Up-scaling organizational structure prototype to the smallest organizational structure level. This is necessary in order to touch the functions and positions within the organization related to operational aspects on the production floor, customer service, administration, and front-liners.

Finally, it is critical to disseminate the research findings, specifically the design of the Up-scaling organizational structure model, to relevant parties in the industrial world, academia, and the general public at both the national and international levels in order to obtain feedback for its application and further development, particularly in the field of organization development theory.

References:

Andreia G. Pereira, Tânia M. Lima, & Fernando Charrua-Santos. (2020). Industry 4.0 and Society 5.0: Opportunities and Threats. *International Journal of Recent Technology and Engineering (IJRTE),* ISSN: 2277-3878, Volume-8 Issue-5

Barbara Aquilani & Michela Piccarozzi. (2020). the Role of Open Innovation and Value Co-creation in the Challenging Transition from Industry 4.0 to Society 5.0. *Tuscia University Press*, Italy
https://doi.org/10.3390/su12218943

Chandler, Alfred. (1962). *Strategy and Structure: Chapters in the history of industrial enterprise*, Doubleday, New York.

Chowdhury, S. (2003). *Organization 21C: Someday, all organizations will lead this way*. Prentice-Hall.

C. M. Ferreira, & S. Serpa, (2018). *Society 5.0 and Social Development: Contributions to a Discussio*n. Sciedu Press, 2018, Vol. 5, pp. 26-31.

Cooper, J., & James, A. (2009). Challenges for database management in the Internet of things. *IETE Technical Review*, 26, 320-329. doi:10.4103/0256-4602.55275

Drucker, Peter F. (2020). *Management Essentials*, Harvard Business Review Press ISBN: 1633699676

Henry Mintzberg, Bruce Ahlstrand, & Joseph Lampel. (2010). *Management – is not what you think*. AMACOM; Illustrated edt. ASIN: 0814416845

Holbeche, L. (2006). *Understanding change: Theory, implementation and success*. Oxford: Butterworth-Heinemann.

Hugentobler, H. K. (2017). Hacking the Organization: Organizational Transformation by Design. *The Design Journal.* 20(1): 522-530. doi:10.1080/14606925.2017.1353001

Ibarra, D., Ganzarain, J., & Igartua, J. I. (2018). Business Model Innovation through Industry 4.0: A Review. *Procedia Manufacturing*, *22*, 4–10. https://doi.org/10.1016/j.promfg.2018.03.002

İraz, R., & Şimşek, G. (2010). The Role of Leadership in Realizing Organizational Change: A Study of Transformational Leadership. *Selcuk University Journal of Social and Economic Research*.

J. M. Costa. (2018). Dinheiro Vivo. https://www.dinheirovivo.pt/opiniao/sociedade-5-0-o-futuro-pelo-presente

Kane, G. C., Palmer, D., Phillips, A. N., & Kiron, D. (2015). Is your business ready for a digital future? *MIT Sloan Management Review.*

Hoffmann, M, Lasi, H., Fettke, P., Kemper, H.G., & Feld, T. (2014). Industry 4.0. *Business & Information Systems Engineering*, 6, 239-242. DOI:10.1007 /s12599-014-0334-4

Maja Meško. (2016). A complexity view of Industry 4.0. *University of Primorska Article in SAGE Open.* DOI: 10.1177/2158244016653987

Maria José Sousa. (2017). Organizational Culture and Behavior: Concepts, Methodologies, Tools, and Applications: Management in Modern Organizations, ISCTE-Instituto Universitário de Lisboa, DOI: 10.4018/978-1-5225-1913-3.ch010

Maximiliane Wilkesmann, & Uwe Wilkesmann. (2018). Industry 4.0 – organizing routines or innovations? VINE*, Journal of Information and Knowledge Management Systems.*

Milling, P. M. (2002). Understanding and managing innovation processes, *System Dynamics Review*, 18(1), 73–86. https://doi.org/10.1002/sdr.231

Mintzberg, Henry. (2009). Managing, *Berrett-Koehler Publishers*

Mintzberg, H., Ahlstrand, B. W., & Lampel, J. (2010). *Management? It's not what you think!* AMACOM.

Mosconi, F. (2015). *The new European industrial policy: Global competitiveness and the manufacturing renaissance*. London, England: Routledge.

Moldoveanu, M.C., & Bauer, R.M. (2004). On the Relationship between Organizational Complexity and Organizational Structuration. *Organization Science*, 15 (1), pp. 98–118.

Özsoylu, Ahmet Fazıl. (2017). Industry 4.0. *Journal of Çukurova University Faculty of Economics and Administrative Sciences.* ISSN 1300-3747

Parker, M. (2003). Business, ethics and business ethics: Critical theory and negative dialectics. *Thousand Oaks.* CA: Sage.

Petar Stanojevic, Mirjana Misita, Jeftic Zoran, & Milosevic Mladen. (2019). Organizational Design Based on Simulation Modeling. University of Belgrade. *International Journal of Advanced Manufacturing Technology.* 104(4). DOI: 10.1007/s00170-017-1453-0

Schalock, R. L., Verdugo, M. A. & Loon, J. V. (2018). Understanding Organization Transformation in Evaluation and Program Planning. *Evaluation and Program Planning.* 67, pp. 53-60

Sousa, M. J., & Rocha, Á. (2019). Digital Learning: Developing Skills for Digital Transformation of Organizations. *Future Generation Computer Systems*, 91, pp. 327-224. https://doi.org/10.1016/j.future.2018.08.048

Stephan Billinger & Maciej Workiewicz. (2019). Fading hierarchies and the emergence of new forms of organization. *Journal of Organization Design*

Stokes, P. (2011). Critical concepts in management and organization studies, *New York: Palgrave Macmillan*.

Sunje, A., Pasic, M., & Karic, E.A. (2010). Operational Adhocracy as Basic Organizational Configuration – Case "Sumaprojekt" Sarajevo. Sarajevo Graduate School Research Department. Bosnia and Herzegovina

Tammy Pitts, James B., & Clawson. (2008). Organizational Structures. *University of Virginia.* USA. https://researchgate.net/publication/228144159

Toker, K., Cakirel, Y., & Cinar, D. (2013). An investigation on a production company via the scope of Mintzberg's ADHOCRATIC organization structure. *International Journal of Research in Business and Social Science (2147-4478)*, *2*(1), 22–30. https://doi.org/10.20525/ijrbs.v2i1

Valdis E Krebs. (2007). Managing the 21st Century Organization. *The University of Michigan USA press.* https://researchgate.net/publication/26432536

Wray-Bliss, E. (2009). Ethics: Critique, ambivalence, and infinite responsibilities. *Oxford handbook of critical management studies*. Oxford: Oxford University Press.

Yasin Çakırel. (2016). An Investigation on a Production Company via the Scope of Mintzberg's Adhocratic Organization Structure. *International Journal of Research in Business and Social Science.* Kirklareli University. Turkey

Yusuf Esmer, & Onur Şaylan. (2019). the Link of Industry 4.0 and Organizational Transformation. *Bilge International Journal of Social Research* e-ISSN: 2602-2303

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