PROJECT AND PROGRAM MANAGEMENT ACUMEN: THE CATALYST FOR INDUSTRY 4.0 ORGANIZATIONAL SUCCESS

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Abstract

The shift from computerization and automation of Industry 3.0 to innovation based on combinations of complex digital Industry 4.0 enabling technologies, is forcing organizations to reexamine the manner in which they operate and do business. It is evident that technology changes are not enough to achieve expected results, as was the case in the past. Critical integrators of new value chains and business processes are collaborative projects and programs that act as organisational vehicles and enablers of novelties, transformation and change, technologies, and systems. A profound ability to make good judgments and take quick decisions is of paramount importance. This article discusses achievement of organizational success through enhanced project and program management practices with respect to Industry 4.0.

Keywords: *Industry 4.0, virtual organizations, new business models, new competencies, program and project management acumen, collaboratist leadership.*

1. Industry 4.0 - The Advent of New Business Needs and Competencies

The world is witnessing profound transformation and change in all areas of private and public corporate life in the Industry 4.0 economy. Organizational and private lives are becoming highly volatile and value-driven, demanding continuous innovation and learning. These changes, caused by the inflow of new digital enabling technologies intertwining with our daily lives, influence the way we are performing our organizational activities and daily chores. Moreover, this is only the first taste of dramatic changes in the years to come.

The Third Industrial Revolution (Industry 3.0) saw computerization, optimization and automation of organisational resources as major success factors. The Fourth Industrial Revolution (Industry 4.0) business ecosystem in which the world now finds itself does not depend only on computerization, automation, innovation, optimization, and competitiveness of resources, but also on inter-organizational value chain innovativeness, complementary partner technologies, innovative products, digitization and supporting services systems.

According to the World Economic Forum, Industry 4.0 affects four main organizational elements, i.e. customer expectations, product enhancement, collaborative innovation, and organizational forms. Customers are increasingly at the epicentre of the economy. Leaders and managers have a duty to ensure that design for customer needs delivers a competitive advantage. In the Industry 4.0 economy an effective and efficient design capability has emerged as an important competitive key success factor. The advent of modern key enabling technologies (KETs) and

virtual networks of organizational and knowledge-worker partners are supportive of the above. The Industry 4.0 explosion of complexity is caused by rapid development of global markets and the continuous creation of new technologies and products. This stimulates the emergence of new forms of organizations and competences (Steyn and Semolič, 2016).

The aim of key enabling technologies is overall digitalization with the internet of things (IoT) and services. Industry 4.0 strategic transformation and change, driven by modern information and communication technologies (ICT) artefacts, allow for the introduction and integration of new business models of vertical and horizontal supply and value chains. Moreover, the dynamic complexity of the modern technologies – robotics, artificial intelligence, mass data, IoT, and the integration of information technology and operations technology, to name but a few – calls for specialization and sustainable collaboration among partner organizations, and also demands appropriate organizational forms, mindsets, and human talent (Semolič and Steyn, 2017).

It is evident that technology changes are not enough to achieve expected results, as was the case in the past. Renown American trend forecaster, Gerald Celente (1997), on the issue that futurists often equate advances in technology with advances in civilization, opines that it requires a good understanding of how novelties will affect personal and business lives, organizations of all kinds, and how it will reshape organizational landscapes, societies and culture. He claims that it is therefor vitally important to gain a holistic understanding of the risks involved and to plan appropriate solutions for the timely mitigation of the risk and associated complexity. This is where we are in the current Fourth Industrial Revolution. The burning question is how organizations can successfully cope with such complex strategic transformation and change processes. Knowledge and insight into every segment of Industry 4.0 technology and businesses complexity phenomena are needed to understand and manage it successfully.

Consequently, organization design, development, and governance have entered a challenging new phase with project management acumen as foundation. Innovative interorganizational value and supply chains are created in collaboration with partners, and these resultantly operate in a local, regional and global collaborative organizational ecosystem. Innovative product, service, as alo, process design and development have become complex and highly important project-driven competitive factors. The emergence of new business models means that organizational culture, the harnessing of human talent, and organizational forms need profound adjustment. Importantly, supply chain- and project processes are being shaped cross-functionally in the Industry 4.0 organizational value chain and are program-managed. The shift from computerization and automation of Industry 3.0 to innovation based on combinations of complex Industry 4.0 technologies, is forcing organizations to re-examine the manner in which they operate and do business (Steyn and Semolič, 2018).

In addition to new technologies, business models and systems, the Industry 4.0 economy demands new relationships, enhanced personal competencies, and a sound corporate culture. A critical integrator of new value chains and business processes are collaborative research, innovation and development projects and programs that act as organizational vehicles and enablers of novelties, transformation and change, technologies, and systems. Project- and program management now play a central role in strategic and operational governance of Industry 4.0 organizations, and are the proverbial 'blood vessels' of organizational and inter-organisational supply chain and project systems. Success is embedded in possessing the project management skills that form the foundation of program and portfolio management, and integrating them into a workable value-driven cross-functional organizational system. Modern technology-driven organizations require a high level of technology literacy, skills in technoentrepreneurship, and innovation. Importantly, they need to demonstrate exceptional project management acumen.

Organizations are compelled to transform by abolishing bureaucratic practices and structures while adopting knowledge-based virtual dynamic learning paradigms and designs. This demands sound governance,

supported by collaborative transformational leadership excellence (termed "collaboratist leadership" by the current authors) and knowledge of systemic project and program management. Collaboratist leadership with an unwavering commitment to continuous improvement is of paramount importance. Organizational improvement and performance profoundly depend on it (Steyn and Semolič, 2017 March).

Effective and efficient cross-functional and inter-organizational management of supply chain- and project portfolios combined with virtual networks of partners is a key factor of success in the Industry 4.0 economy. Partners may be small, medium-sized and/or large organizations. Valuable opportunities are emerging for the creation of new small and medium-sized entrepreneurial enterprises. This will boost opportunities for job creation, and grow economies. Entrepreneurship accordingly has a pivotal role to play in Industry 4.0. Entrepreneurs use creative faculties to generate new products and services, and exploit a new generation of opportunities in the developing collaborative market.

It is essential that the modern workforce be educated and skilled to cope with the Industry 4.0 dispensation. When human resources are elevated to higher levels of education, the benefits are exponential. Hitachi Corporation's Hiroaki Nakanishi believes that Industry 4.0 will require a radical shift in how people are educated and trained in order to sustain their personal value to society and the workplace. Program management has evolved to become the kingpin for leading, managing and governing Industry 4.0 entities (Steyn and Zovitsky, 2018). Moreover, cross-functional program-managed structures and paradigms combined with effective and efficient collaboratist leadership, management and governance is the ideal vehicle for delivering the integration, coordination, collaboration and synergy required for mitigating risk and complexity, while achieving essential organizational performance, strategic benefits and value add in the Industry 4.0 environment (Steyn 2001, 2010 June, 2010 July, 2012 and 2013).

In the introductory paragraphs the four aspects most affected by the Industry 4.0 economy, i.e., customer expectations, product enhancement, collaborative innovation, and organizational forms were highlighted. In all four aspects project and program management principles, techniques, and skills that embed project and program management acumen in the mindsets of leaders and followers, play a decisive role in achieving organizational success effectively and efficiently through program-managing the cross-functionally structured value chain.

2. The Complexity of Industry 4.0 Innovation Programs and Projects

Today we are facing an explosion of complexity caused by the rapid development of global markets and the continuous inflow of new technologies and products supporting the emergence of new forms of organization. The complexity is related to new products, services, technologies, emerging industries, new business models, organization systems, programs, and projects (Semolič and Steyn, 2018). Perusal of this mix of technical and non-technical areas of complexity assist practitioners in figuring out how to deal with complexity in the business environment.

Knowledge of and insight into all segments of complexity phenomena are needed to understand and manage it successfully. This must be achieved through system analysis of structuring and describing all relevant aspects of the complexities, and explaining the different forms of system formalization (Figure 1). This codified knowledge is an input for a better understanding of the project business case or program, and its innovation ecosystem. A sound foundation for effective and efficient leadership results, based on a good understanding of the concomitant business case.

Industry 4.0 projects and programs are complex, multidimensional, and dynamic. As illustrated in Figure 2, Semolič (2018) argues that the Industry 4.0 program and project complexity comprises the following dimensions:

- Business complexity - industry complexity, value chain and partnering complexity, client maturity complexity, stakeholder complexity, and project

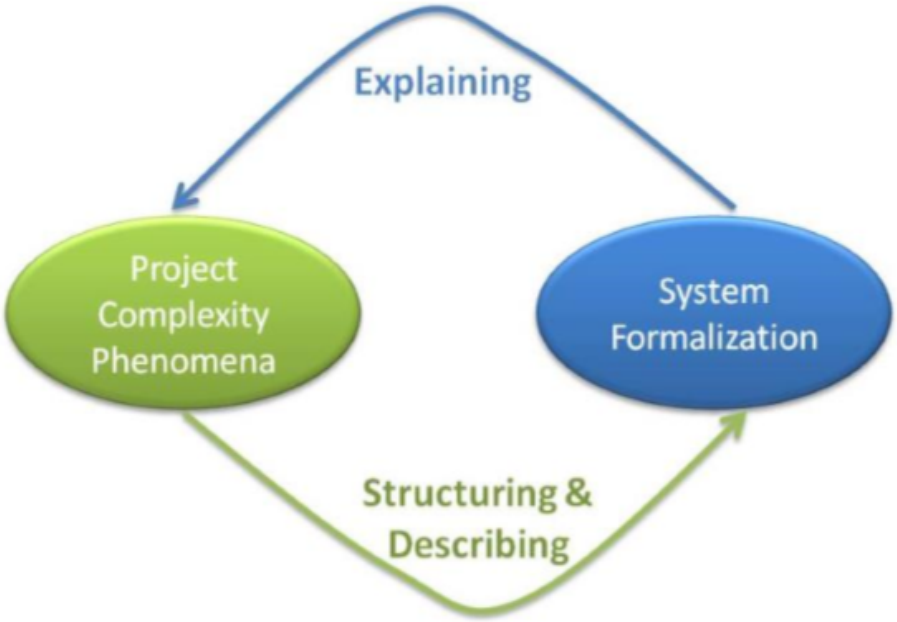

Figure 1: *Systemic exploration and explanation of the project complexity phenomena*

or program business case complexity;

- Technology complexity - product/service technology complexity, technology maturity complexity, technology engineering complexity, technology process complexity, technology infrastructure complexity, technology scenario complexity, and innovation ecosystem complexity;
- Organizational complexity - supply chain management complexity, organization structure complexity, business process complexity, governance and management systems complexity;
- Competence complexity - competence complexity of different professions involved, regulation complexity of associated professions;
- Cultural complexity - corporate cultural complexity, networks of partner organisations cultural complexity, professional communities cultural complexity, regional and national cultural complexity, project and program management cultural complexity.

It is imperative for Industry 4.0 program and project managers to recognize all complexities with respect to their duties, and deal effectively and efficiently with them to achieve optimal value chain performance.

Figure 2: *Industry 4.0 program and project complexity dimensions (Semolič, 2018)*

3. Project and Program Management Acumen (PPMA)

Acumen is defined as the ability to make good judgments and take quick decisions (LEXICO, Oxford Dictionary, 2019). Possessing project and program management acumen (PPMA) means having profound knowledge of project management principles, tools, techniques and skills, and the effective and efficient application of this knowledge to strategically manage cross-functional supply chain- and project portfolios constituting the organizational value chain, with the aim of achieving optimal performance. This includes understanding program and project stakeholder needs and expectations, tracking industry trends, and mitigating risk and complexity.

Figure 3 illustrates the PPMA agile governance and management cycles embedded in an Industry 4.0 open innovation ecosystem. Of paramount importance is the program or project business case which presents strategic intentions, background contextual information, and a framework of customer expectations with respect to planned work. Together with the master plan (see centre of the figure) the document represents the primary baseline for governance and management cycles of leading, creating, implementing and improving stakeholders' satisfaction. Changes in programs and projects resulting from external and internal factors require corrections and adaptations of business cases and concomitant implementation plans. Changes often emanate from innovative ideas proposed by persons and organizations forming part of the innovative ecosystem not directly involved in the program or project initiative. In this way customer value, project, program and organizational success are enhanced.

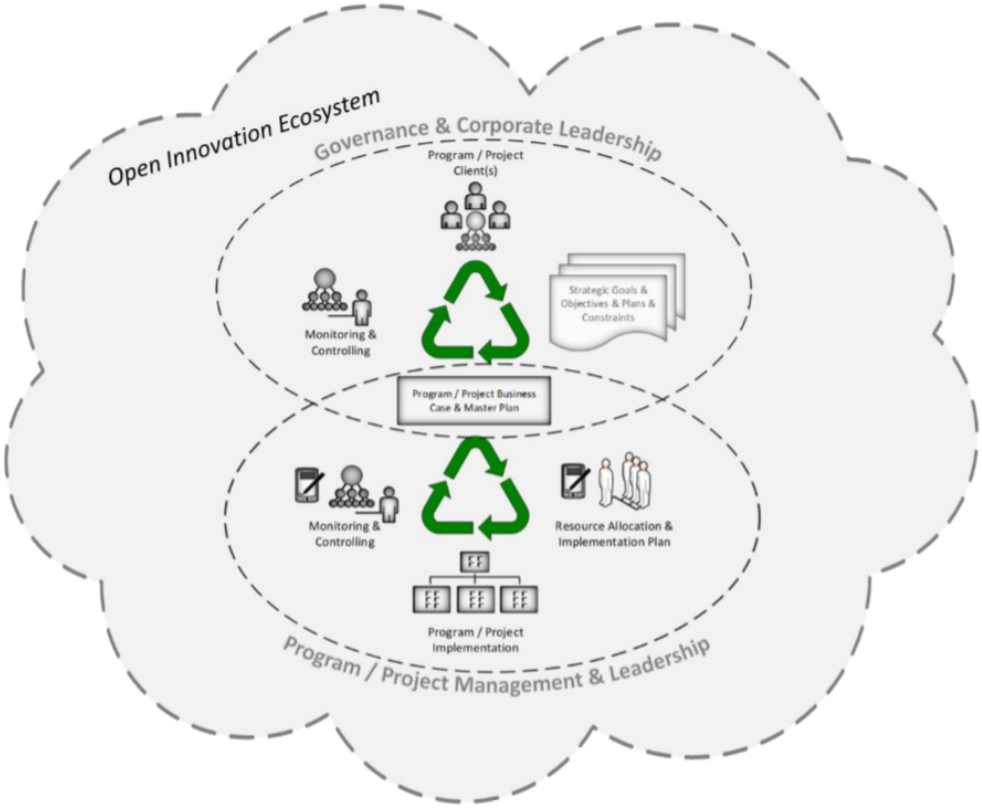

Figure 3: *PPMA agile governance and management cycles (Semolič, 2016)*

Encouraging internal and external innovation is largely dependent on appropriate allround leadership qualities. Continuous improvement is an essential Industry 4.0 organizational strategy to embrace culturally in the quest for organizational success. A critical element of success is having an organization

wide ability to make good judgments and take quick decisions in a governance and management system characterised by flexibility and agility.

4. Conclusions

With respect to customer expectations project and program management acumen (PPMA) delivers a crucial customer focus; regarding product enhancement PPMA delivers the required innovative continuous improvement projects; regarding collaborative innovation PPMA delivers the dynamic agile learning mindset in the culture of the organisation; and finally, PPMA delivers the matrix methodology to lead manage and govern the cross-functional processes of new organizational forms and its associated virtual networks of partners in the Industry 4.0 business ecosystem. Hence, it is patently clear that project and program management acumen is the catalyst for organisational success in the Fourth Industrial Revolution economy.

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