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A Viable System Model Reinforced by Meta Program Management

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Abstract

The global markets are embroidered by profound complexity woven by the persistent worldwide economic recession, the EURO crisis and shift of economic powers as well as escalating competition among traditional and emerging suppliers of hard products. Many companies with hard products are facing their eroding competitiveness as they base their corporate value on excellent, yet locked-in hard capabilities. Especially, the Japanese leading electronics companies have reported shaky business performances in business year 2011 while other Japanese companies with systems products are performing well over the Japanese industry average. Against these rugged performances of the Japanese companies, a natural question arises as to what makes such a difference now among those in the same manufacturing industry which used to be generally performing well in a line; whether an enterprise viability system problem exists with the troubled companies; and what are solutions that project and program management can contribute to in the complex market environment as now. This paper configures a resilient enterprise system model in the Japanese “monodukuri” industry, or, the industry of manufacturing and systems environment integration, which would enable companies to consistently cope with changing environment and produce corporate value out of ecosystem adaptation and systems integration capabilities on the foundation of meta program management.

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Keywords: Viable system model (VSM); complexity; balanced enterprise innovation model; meta program management; constructivist paradigm

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1. Background of the research and the research framework

From the viewpoint of the author as an industry practitioner-cum-researcher of project and program management founded on the constructivist paradigm and on the basis of his recent, applied project management research in the field of innovation programs, the author has been motivated to analyze the background of rugged performances demonstrated by different companies in the Japanese “monodukuri” industry, or the industry of manufacturing and systems environment integration, equally staffed with well trained, experienced employees; having excellent technologies and production processes; and using standard marketing capabilities. Then, the author has tried to hypothetically relate the problems of those companies incurring a serious deficit to the absence of dynamic adaptation to the ecosystem, namely, their market and more widely, the political, economic, social, technological, legal and ecological environment of the world.

The financial performances of the major Japanese companies in business year 2011 belong either to the sunny side, or the dark shadow side, e.g. ranging from those having yielded a record high net profit, through the top three electronics appliances companies, Panasonic, Sony and Sharp, with catastrophic combined net losses of US\$20.7 billion, to those coming under restructuring such as Japan’s top electric power company and leading LSI manufacturer.

Although it is not the scope of this paper to closely analyze, based on detailed factual data, factors that have led to the mentioned sharp contrast of financial performances, it is possible to qualitatively state that:

- The deeply suffering three electronics companies depend heavily on few home appliances products and have not shown successful diversification of product lines in which fact lies a corporate monoculture and presumably over confidence in the success of the past and in discrete technology platforms.
- The fact that Samsung Electronics and LG Electronics of Korea are performing by far the better in the same global marketplace signifies that there has occurred a structural shift, in both, horizontal domains of end products and vertical layers of customer segments, of the home electronics market, and there is a gap between the Japanese and non-Japanese Asian companies in their corporate capabilities in swiftly adapting to the complex and moving markets by means of flexibility rendered by systemic product mixing and global market integration systems.
- The three electro-mechanical companies in the same industry branch, Hitachi, Toshiba and Mitsubishi Electric, who are performing well with combined net profit of US\$ 6.8 billion in business year 2011, have a more balanced and market-focused product portfolio and proven hard systems integration capabilities to the market requirements.
- Another important observation is that the engineering-based total program management capability of leading Japanese engineering and construction companies (also called EPC companies), is being highlighted as a resilient viable enterprise system model. While they maintain their top-tier status in the world’s relevant industry by mastering the complex project system, they are also applying their innovation program forming capability to a surging market of packaged infrastructures.

On the basis of the research motivation mentioned above, the research has been conducted in the framework in the order of 1) set the postulate: the corporate system viability of monodukuri companies are challenged to a varying degree, 2) analyze the complexity of the market and the eco-system, 3) review the viable system model, 4) review scientific methodologies to support an enterprise viability system, including systems approach; the “creative routine” theory; process-based project management; and meta program management based on constructivist paradigm, 5) identify missing links, 6) propose a conceptual model for a viable enterprise system supported by meta program management, and 7) conduct an initial case review to support the conceptual model.

The research questions raised are:

- What are the complexity factors that significantly impact the critical competitiveness, or viability, of monodukuri companies, or hard manufacturing and built environment building companies?
- Does the viable system model originally developed by Stafford Beer in 1972 make sense in chaotic complexity, and can the lifecycle model (bifurcation on chaos model) of a growing enterprise explain a trajectory of survival of monodukuri companies in the current (year 2012) global marketplace?
- What are scientific methodologies to provide means to translate viability challenges to real world actions?
- What are the missing links to explain a viable enterprise system in the monodukuri industry in the space of uncertainty and in the era of an increasing share of projects and projectized business in GDPs, and what is, then, a conceptual model for such a contemporary viable enterprise system?
- Are there corporation cases that can initially support the conceptual model?

The type of research is conceptual studies in applied project management, and the research uses a qualitative, descriptive and exploratory approach. The unit of analysis is companies in the monodukuri industry.

2. Interpreting the current market and ecosystem complexity

As of the middle of 2012, the monodukuri companies face a variety of complexity of the marketplace and even deeper, the total ecosystem that can be largely categorized by the “PESTLE” (political, economic, social, technological, legal and environmental) analysis that is an analysis of the external macro environment (big picture) in which a business operates. Table 1 tabulates the current ecosystem factors that are analyzed to exert significant impacts on the monodukuri companies; the table provides the typical recent events symbolizing complexity, type of complexity from among the key words of complexity explained below, and its implication to the monodukuri industry.

The key words explaining the type(s) of complexity have been borrowed from the research on complexity achieved by the project management researchers embracing constructivist epistemopraxeology paradigm (Project Management Association of Japan, 2001, 2007; Bredillet, 2004; Remington & Polack, 2007; ICCPM, 2008; Saynisch, 2010; Cavanaugh, 2012), including:

- A degree of disorder: referred to as complexity code a., in Table 1.
- Uncertainty: code b.
- Non-linearity, irregularity: code c.
- Instability: code d.
- (Requirement for) innovative and highly creative thoughts: code e.
- Multiplicity: code f.
- Scalability: code g.
- Recursiveness: code h.
- (Requirement for) management by praxis (and not by process): code i.
- (Requirement for) heuristic logic: code j.
- Directional complexity such as unshared goals and paths (of government, society), unclear meanings, hidden agenda: code k.
- Temporal complexity such as results from unanticipated environmental impact: code l.

Table 1. PESTLE analysis of the ecosystem facing the monodukuri industry

	Typical recent events	Complexity type	Implication to “monodukuri” industry
Political	New state leaders in France, Russia, China	b., c., d., f., k.	Economy behaving not only to new policies but also to changing social moods
	Iranian sanction	a. (exterior), d.	Serious impact to oil and gas supply in Asia, incl. Japan A market reduction to global oil and gas traders and contractors
	Arab Spring	c., d., j.	Interim halt of foreign project investment
	Myanmar “early” spring	d., f., i.	Infrastructure and industry development project opportunities
	Japanese political instability	d., j., k.	Weakening the Japanese brand
Economic	Persistent worldwide economic recession	b., d., g. (- side)	Vast loss of economic opportunities Sustainability solutions, including bottom-of-the pyramid business, evoked
	EURO crisis	d., g. (- side), k.	Vast loss of economic opportunities for everyone May change world economic systems
	Remarkable shortage of infrastructure in fast growing countries	e., f.	Great opportunities for infrastructure investment funds and developers/contractors equipped with innovative scheming capabilities
	Escalating presence of BRICS, ASEAN +	d., g. (+ side)	Increasing commoditization of once high-technology products having price premium
	Aggressive resources hunt by emerging economies	d.	Escalating resources costs affecting industry competitiveness
Social	3-11-2011 triple disaster in Japan	c., d., g. (+ or - side), h., j., l.	Resilient supply chain models; turning the pinch to opportunity
	Concern for the future in developed economies	b., d.	Shrinking consumption of goods and services
Technological	Commercialization of shale natural gas production	e., i.	Tens % increase of LNG and other natural gas projects in North America, offering ample opportunity to LNG plant contractors and traders
	Smart phone evolution	e.	Smart project execution in agile projects
	Nano technology, biotechnology advances	e, g (+) side	Chances open for real technology innovator
Legal	Deregulation and incentives for economic boosting	d., e., g. (+ side), h.	Highest impact for the better in new energy and other sustainability business
Environmental (Ecological)	Global sustainability commandment	e., g. (- or +side), i.	Great opportunities for program management entities with complexity and ideation capabilities as well as start-ups with great ideas
	Radiation impacts from Fukushima	d., e.,	Accelerated development of decontamination technology, food safety

3. Viable enterprise system models

While the main theme of this research is to position applied project management as a meaningful enabler to support companies’ viability and growth overcoming complexity of the marketplace, the viable system model (VSM) has been visited as the base model for discussing enterprise viability since it has survived for 40 years as a robust reference model of viewing an enterprise, typically a business

corporation, as a going-concern and it can serve as an adequate framework to bridge applied project management with strategic management of monodukuri companies.

The review started with C. Bredillet’s entrepreneurial ecosystem adaptation model for manufacturing companies as a pioneering theory to connect in-enterprise activities with the ecosystem via project management; visited R. Espejo’s applied viable system model (VSM) as a foundation of discussing a viable enterprise system model; and examined how this VSM is challenged in chaotic complexity by applying S. Bushuyev’s anti-crisis enterprise lifecycle model.

3.1. Entrepreneurial ecosystem adaptation mode

Bredillet (Bredillet, 2004) classified the management of manufacturing companies into operational management; strategic management concerned with corporate vision and strategy formulation; entrepreneurial management that deals with plans and framework setting of innovation required under the corporate vision and as dictated by the ecosystem, e.g., the company’s market and its politic-socio-economic environment factors impacting the market and the company’s operations; and project management as a subset of strategic management which guides the company to adapt to new environment on a required timeline. Bredillet depicts a universal model of adapting to changing markets and greater ecosystem to enable the company to be a going-concern. This theory is a critical application development of the viable system model discussed in paragraph 3.2.

3.2. The viable system model

Figure 1 is the viable system model, adapted to Stafford Beer’s original model in 1972 by Raul Espejo (Espejo & Harden, 1989), with simplification and addition of PESTLE factors in between the “market” and the “future”, made by the author.

The viable system model (VSM) has been used extensively as a conceptual model for understanding an organization as a viable going-concern, redesigning them, where warranted by PESTLE factors, and supporting the management of change. Hence, the VSM is a framework for dynamic enterprise management. The VSM provides a framework for designing flexible, adaptable organizations that balance external and internal perspectives, and short and long term thinking.

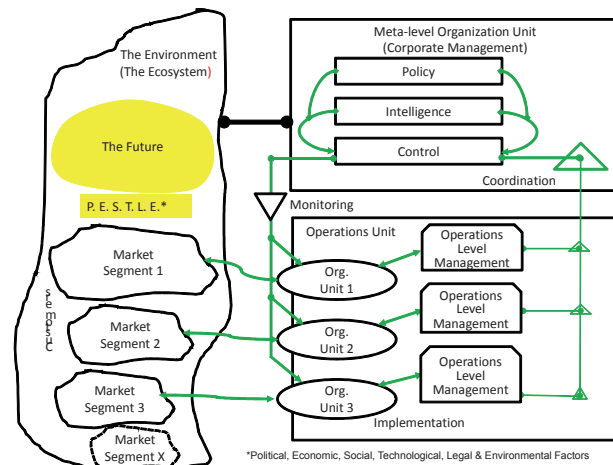


Fig. 1. Viable System Model (Adapted to Espejo’s Model by Tanaka)

In the VSM, an enterprise (pictured on the right) interacts with and adapts to the ecosystem (pictured on the left) which consists primarily of the enterprise's market and the surrounding PESTLE environment.

Being underpinned by fundamental cybernetic principles of communication and control in complex organizations, the VSM offers a way of gaining both functional decentralization (autonomy and empowerment) and cohesion of the whole, or the necessary supporting links between individual parts.

According to Espejo, the VSM has the five essential functions for viability: implementation representing a corporation's primary activities of production with the value chain of the organization as a whole implementing its overall purpose; coordination of the interfaces of its value adding functions and the operation of its primary implementation units; control supervising the primary activities to ensure the functioning of the policy deriving from the intelligence; intelligence, the two-way link between the primary activities and its external environment; and policy to provide clarity about the overall direction, values and purpose of the organizational units, and to design, at the highest level, the conditions for organizational effectiveness.

The intelligence is functional to adaptation to the market and, further, the ecosystem, by providing the primary activity with continuous feedback on marketplace conditions, technology changes and all external factors that are likely to be relevant to it in the future; secondly, it projects the identity and message of the organization into its environment.

Given these primary functions of the VSM and in view of Bredillet's ecosystem adaptation model via project management, the areas where project and program management can contribute to the dynamic functioning of the VSM in the face of the changing ecosystem have been sought: largely the following two elements are identified as high contributors:

- The coordination function of project management, referred to as project coordination that enhances the coordination attribute of the VSM as the project coordination harmonizes a variety of conflicting interests, intelligence and information and to cope with changes for dynamic optimization.
- Meta program management (Tanaka, 2010; Tanaka *et al.*, 2011) that facilitates translating the intelligence to the policy. The meta program management model stands on the constructivist epistemopraxeology paradigm (Bredillet, 2004) and emphasizes translation of organizational strategy into a program by way of conceptualization, mission and value profiling, designing and structuring a program in a complexity environment and could be one of powerful enabler vehicles of the VSM.

3.3. *The anti-crisis lifecycle model of growing enterprises*

Although enterprises are designed to be, or are intuitively a viable system, they encounter crisis from time to time in their lifecycle to a varying degree depending on the industry affiliation, country of residence and operations, global or local economic cycle, excessive internal bureaucracy, or violence of nature.

S. Bushuyev and N. Bushuyeva have developed the lifecycle model of fast-growing organizations (Bushuyev & Bushuyeva, 2008), by mirroring the highly complex society of Ukraine, a lifecycle evolution model of an organization, from government to business companies, that overcomes a series of chaos; the model depicts organizations which either survive and grow by way of proactive and innovative mechanism building, or lose their viability and fall to distinction. By adapting this model, and based on assorted literature (in Japanese) on the growth of Japanese export market oriented companies, a lifecycle model of Japanese electronics companies, now facing a survival-and-death crossroad, has been profiled (Tanaka, 2012).

The companies' published business performances in business years 2009 to 2011 are transmitting a sign of governance crisis or loss of control in the intelligence and policy functions of the VSM. Although the affected companies have initiated austerity measures and invested in R&D at a level well over the all

industry average in business year 2011, what past applications of chaos bifurcation models indicate is that unless the Japanese electronics companies are prepared to look over a basic yet holistic viability model of their own, it is likely that the companies will next enter a crisis of confidence and trust of their stakeholders.

4. Review on dynamic enabler means to support enterprise viability

There are a dozens of theories and practices of general management or business administration, ranging from organizational theories and human resources management, through framework approaches, to managerial innovation theories. However, these theories generally flourish on themselves as snapshot enablers to raise corporate competitiveness on a short to middle term basis and do not address foundation ability of a corporation to be a going-concern. Discussing these general management theories and practices is not within the scope of this paper.

As candidates for approaches to dynamically supporting the VSM model, four enablers have been identified: systems approach; the creative routines of knowledge-creating companies defined by Nonaka (Nonaka & Katsumi, 2004); process-based project management; and meta program management based on the constructivist paradigm (Tanaka, 2010).

4.1. Systems approach

The systems approach is a problem-solving approach based on systems thinking where an overall structure to solve a problem is first identified, then the subject is captured as a system, or a collection of various elements that relate to each other and function as an organic structure, and reveal relationships among the elements that constitute the system, followed by further specific review on its details (Project Management Association of Japan, 2001, 2007).

Tanaka (Tanaka, *et al.*, 2011) defines a project as a system of conversion, operating on a fixed timeline and embracing knowledge, means, finance and management, of input resources to output resources with targeted outcome to meet the objectives and constraints mandated by a specific mission, that is, an overall objective embodying the project owner's value notion and specific strategy set, by coping with disturbance, be politic-socio-economic, or natural. Incorporating this model in corporate activities, hence, would empower the total viability activity cycle.

4.2. The creative routine theory

Nonaka, in his pioneering book establishing knowledge management by way of the model of knowledge creating Japanese companies continuously producing corporate value, defines a SECI model - a model of knowledge creation and spiral through "socialization, externalization, combination and internalization" by deciphering companies that have a robust knowledge management foundation.

As a concrete extension of the SECI model, Nonaka proposes the concept of creative routines of excellent Japanese companies (Nonaka & Katsumi, 2004) by identifying the essence of innovation from the standpoints of innovators vis-à-vis their organizations and proves that excellent companies have creative routines that enable continuous delivery of innovative products to the market and emphasizes synthesizing dialectical thinking for innovation.

In the bottom-line, he has identified the concept of the "creative routines" as live knowledge management practiced on "ba" or shared contexts in motion - having time, place and human relationship connotations whereby fermenting abductive product concepts and dialectic, double looped development to produce excellent products.

In summary, the concept of creative routines provides an essential organizational behavioral model to support excellent Japanese monodukuri companies, and is profoundly aligned to the intelligence, policy, and coordination functions of the VSM.

4.3. *Process-based project management*

Process-based project management bodies of knowledge (PM BoKs) have contributed tremendously to the popularization of project management processes and accordingly general increase of productivity in project oriented business activities. However, as the primary purpose of the PM BoKs is to coach how to most efficiently manage project work, they are weak in guiding what to make, or more concretely, how to translate business commandment of the day into a program, and how to frame a program, then projects from strategy.

In short, process-based project management methodologies are effective tools in carrying out the control function of the VSM but do limited contribution to intelligence and policy functions of the VSM.

4.4. *Meta program management based on constructivist paradigm*

The meta program management is a program management framework beyond the traditional program management and is for organizations' strategy implementation to apply their organizational resources and capabilities for attaining major capital investments or carrying out major innovation initiatives for enhanced added organizational value and/or any form of transformation while responding flexibly to changes in the ecosystem. It embraces program visioning; conceptualization; planning and modeling; structuring; implementation and the exploitation of program products, as against the traditional program management which means managing a collection of projects that are organically combined with each other and hence could better be managed in a combined form (Tanaka, 2010; Tanaka *et al.*, 2011).

The meta program management is, for instance, practiced according to "P2M- A Guide of Project and Program Management for Enterprise Innovation" (Project Management Association of Japan 2001, 2007). It is based on the constructivist philosophy and is designed to satisfy a function of an enterprise's business strategy vis-à-vis its ecosystem.

All in all, the meta program management serves the intelligence, policy and coordination functions of the VSM.

5. A conceptual balanced enterprise innovation model as a foundation framework for a viable enterprise system

A review has been conducted on the basic viable system model (VSM) applicable to monodukuri companies and its enabling methodologies. All of the components of the expanded VSM are valid on their own. The missing link, however, is a holistic framework to effectively and efficiently apply the VSM in the contemporary business environment by gluing the relevant models and methodologies together.

One of the candidate holistic management frameworks is the balanced enterprise innovation model which is an extended model of the balanced innovation model originally proposed by Tanaka in 2004 during his key note presentation at AIPM (Australia) Annual Conference 2004 and updated periodically up to January 2011 (Tanaka *et al.*, 2011). This model is based on the author's descriptive research conducted in 2002 to 2004 (intermittent) on the relationship between Japanese corporations' innovation delivery efficiency and their utilization of non-technological business systems, including management.

The research has found that specific Japanese companies in the monodukuri industry are performing well over the rest of the industry who have unique strength in systems engineering capabilities and time-

bound adaptation management, in addition to superior technology in their respective core technology platforms; such management capabilities show different attributes in branches of the monodukuri industry; and that Japanese corporations, especially those in the manufacturing industry, are in the process of filling the gap, generally referred to as the valley of death or Darwin’s sea, existing between excellent technology base and commercialization of next products supporting the growth of corporations by way of new business models or mechanisms.

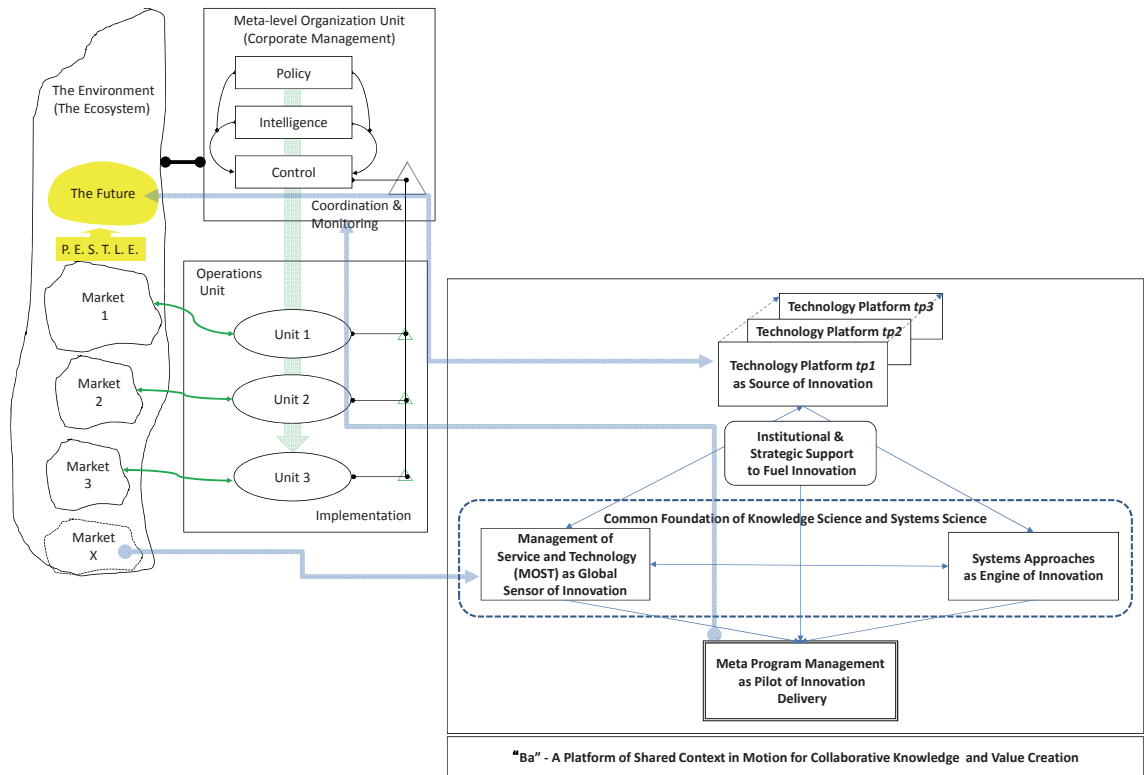


Fig. 2. Balanced enterprise innovation model

The balanced enterprise innovation model, depicted in Figure 2, is a six-domain model of innovation acceleration by identifying dominant enablers and management factors to enhance the effectiveness and efficiency of innovation, and comprises the module of technology platform; the module of management of service and technology (MOST); module of systems engineering; module of meta program management; module of institutional and strategic support to innovation; and the module of “ba”, or a mental space of shared context in motion for collaborative value creation.

The model combines the VSM and the modified balanced innovation model, and connects the corresponding elements of the two models to indicate the relationship by which the conceptual model reinforces the VSM.

6. Conclusion and Further Research Requirement

This paper has captured warning signals for survival of the leading Japanese electronics companies in

the complex marketplace and related the problems to the suffering companies' systems of lowering resilience or lack of flexibility to tide over market waves and proactively develop a future, and configured a resilient enterprise system model that would enable companies to consistently cope with changing environment and produce corporate value out of systemic ecosystem adaptation and systems integration capabilities.

This theoretical model proposed is referred to as the balanced enterprise innovation model that is a six-domain innovation acceleration model with the meta program management methodology serving as a guiding vehicle.

This conceptual model is being supported by limited initial case reviews but should be substantiated and verified for its general applicability through further field research.

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