

A Study of the Effective Elements of Digital Business Transformation

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Abstract: Our business and social environments have been changing because of new digital technologies such as Big Data, IOT, and AI, which have driven the digital transformation in recent years. New business models driven by new technology are expected to improve the efficiency and competitiveness of enterprises. Here, we report on the key elements necessary to succeed in a business transformation by using digital technology.

Keywords: Big Data, digital, transformation

1. Introduction

The rapid evolution, spread, and influence of information and communication technology (ICT) has changed business and management in recent years. This field of changes has passed through four stages of so-called industrial innovation: the invention of the steam-powered engine, electric power, Internet, and the evolution of ICT technology such as IOT (Internet of things) and Big Data.

An inevitable change has also occurred to daily business activities following the technological progress of ICT. Social change is taking place concurrently. For the business models and processes of companies' management highly driven by digital technology, certain drastic changes have already occurred. For example, General Electric (GE) used to earn a large part of its revenue from manufacturing

home electronics or utility and so on, and this was its core competency. However, GE has redefined itself as a service enterprise by delivering software and services based on its in-house data stored and analyzed from its electrical products. This is a kind of symbol for Digital transformation.

The introduction of computers aimed to improve efficiency and productivity and the utilization of ICT by an enterprise rapidly spread in the 1990s; in other words, a company's IT strategy received enormous investment. Management information systems and strategic information systems (SISs) were introduced to improve operational efficiency, as were a focus on competition and a market differentiation strategy. Global transaction and global marketing increased. Thereafter, ERP, a standardization of global processing, was introduced into core business

processes including billing, transaction management, procurement, manufacturing, and human resources.

This study shows how information systems change not only core business processes but also the business model, considering the organization and relation with strategic theory and against the background of this sudden technological progress (e.g., IOT) and vast amount of data (Big Data).

2. Method

The business applications of KAIZEN and KANBAN originally developed by a Japanese automotive company have lead people to study management approaches as well as redeveloped business processes and strengthened corporate culture. However, Digital transformation of Japanese enterprises driven by Big Data, IOT, and AI is not progressed well compared with the cases of Europe and America. [Ministry of Internal Affairs and Communication, 2017] On the contrary, few advanced cases are provided by Japanese companies. This success is not easy, especially for Japanese companies.

This study proposes an approach that can ensure the effectiveness of the elements that cause Japanese companies to transform by using new digital technology. We then draw a new framework to guide the starting activities for digital business transformation with those elements or parameters. Moreover, the differences between this study and preceding studies are reviewed based on the situation of current Japanese companies.

2.1 Traditional elements

One of technology change is shown big data. Volume, Variety, and Velocity are the 3Vs according to the definition of Big Data. The emergence of this new feature of data is an evidence of technology

change in business field. For example, Customer contact center's data, many machine sensors' data and so on can be analyze to get a new insight for business activities and transformation. Then when it possible to create new value in business area, digital transformation could happened. This transformation progress differs from traditional system's one. Those are shown in user, role, and development style. When progressing this digital reformation, the following change is judged from a system building approach as Knowledge integration in action in Table1. [Fukui, 2016]

Table 1: Knowledge integration in action

	Traditional System	Digital Transformation
User	Employees, business partners	Customers, general consumers, things
Role	Rationalization and streaming of management and business, improvement of competitiveness	Customer experience improvement, creation of business value and new business
Development	<ul style="list-style-type: none"> • This clearly defines the requirement before development (waterfall type) • Scratch development, package application • System that gives priority to ensuring quality (specializing in development and production) 	<ul style="list-style-type: none"> • Finding out functional requirements by trial and error (agile type) • External service and parts mash-up • System that gives priority to rapid release (integration of development and operation DevOps)

Table 1 shows that the keywords related to the development of the present system differ. The usual types of keywords are related to management and system development.

As a general review, the main difference at the basis between Traditional system and Digital transformation is that the digital transformation involves LOB(line of business) sections, that means they own and analyze customers' data or sensors' data directly in their business activities. Besides the traditional system is entirely handled by the information system division which manages their internal business system such as finance, human resources and so on.

This difference results from that data, business model, ideas of innovation are stored at LOB sections. Therefore, distinctive new viewpoint whether the digital technology can change to transform ongoing business process or not. That point of view is happened in the development style which involved users' section deeply.

This process shows the importance of the activities in each layer as a new SIS project to be successful. Despite this approach, some elements of the traditional system are still effective for digital business transformation because of the purpose or goal of SISs, which should be to enhance competitiveness.

Wiseman (1989) also documents the success of one company, GTE: "It was difficult for GTE to move the inside of the company well to challenge to immediate SIS for most enterprises." This approach also works for SISs, however, it seems to have been contentious. An information system is a matter for top management, who must approve the zone of management and understand the existing issues as the first step. The function of the top management team should be effective at the project's starting point.

Activities consist of the following five phases:

- Phase A: Introduce the SIS concept to executives.
- Phase B: Discuss the SIS idea with middle management.
- Phase C: Discuss the SIS idea with executives.
- Phase D: Introduce the SIS concept to the top management team.
- Phase E: Discuss the SIS idea with business planners.

Also three elements are raised by Yamanouchi (1992).

- First, you must be Strategic

This includes each level of top management, senior management, middle management, and line management. The purposes of a strategy are to pursue operational efficiency such as automation, labor-saving, and rationalization and management innovation such as business creation, market creation, and technological creation.

- Secondly, you must aim to classify information data (whether you use meaningful data such like explicit knowledge and tacit knowledge) because of the exceptional quality of the information from SIS. In fact, this is the foremost tendency of the digital business transformation in an organization.

- Thirdly, a relationship is necessary between an SIS and the division in charge, who are expected to have a strategic understanding of the information from the SIS.

The try with the strategic middle manager level, show of will, behavior and high true intelligence of an individual of human resources, specialist awareness of an information system department staff, lack of a management mind and the posture to SIS in a top management bed. 4th, for, a relation between SIS and organization side.

By putting an SIS into a pyramid organization, it

bridges the information gap. Yamanouchi (1992) states that the information system department has to escape from technical and practical sectionalism consciousness and place the SIS in the top management layer. The directly connected management strategy and staff department is a drill down of the phenomenon that does not work in an SIS.

As for the methodology, a step-loaded theory about ICT is a conventional efficiency tool (e.g., the ASAP of a SAP). Because a business process exists in SDEM in FJ, a strategy is dropped in an SIS. This is crowded, however, and the framework and methodology lack the usual type.

2.2 New elements

The new framework is taken from IMD's preceding study of digital business transformation (International Management and Development, 2015). The sequence of the reformation strategy can be applied to enterprises as specified in this research. The following shows the eight steps in its execution stage. Those were presented in IMD's related course lecture in 2015

Step 1 : Bold Vision and Leader

Step2 : Project Leaders with cross-functional expertise

Step3: Rapid test and teaming

Step4: Chords on the Digitalization piano

Step5: New patterns of Collaboration

Step6: From front line to core

Step7: Challenge legacy IT

Step8: Re-invent to succeed

This is concluded from the survey to the worldwide enterprises about the innovation fields. And, it should be notable that different elements from the case of an introduction of traditional system and SIS are abstracted.

The research question of this study is targeted at

Japanese enterprises. Also Digital transformation of Japanese enterprises driven by Big Data, IOT, and AI is not progressed well compared with the case of Europe and America as stated before.

Indeed most of Japanese enterprises that are trying to progress digital transformation take time to step transfer to next one.

Hence, combining some elements deprived from prior studies, a supposition for the initial steps of Japanese enterprises is established.

Firstly, Step 1 is viewpoint of leaders' vision and perspective. In this case, leaders mean the management top or executive officers of enterprises.

The means of applying the strategies proposed by Wiseman and Yamanouchi depend on the vision and commitment of top management. Successful implementation in the organization also needs middle management and staff as well as the understanding of which division is in charge

Step 2 is regarded as that which divisions teamed up and who took the leadership, also is regarded as such elements that who was in charge and what kind of motivation drove them.

Step 3 is about features of the digital transformation. And an assessment about whether the implementing of the new technology makes real value is indispensable, by means of POC; Proof Of Concept. Also, it is essential to consider whether the assessment is appropriately carried out or not, when POC is applied.

From the above foregoing studies, elements those were effective to the initial steps of the digital transformation were extracted. The initial steps mean doing into the phase of the Proof of Concept.

Thinking about the steps of IMD, it is likely considered that clearing evaluation to the three steps is the key to the system development that implemented the new technology. As it is mentioned

in the introduction, there are frequently seen that the reason why Japanese enterprises are struggle to adopt the digital transformation is because they tend to stop at the evaluation phase of STEP 3. Therefore, the elements those are influential to initial action up to STEP 3, are combined with elements from prior studies as following.

- Top commitment: How the executive officers or those layers' leaders are involved.
- Purpose and Goal: What goal is targeted or fixed.
- Evaluate: Whether assessment criteria towards appraisal is established. Especially what is targeted for POC activities?
- Teaming: What about the actual state of the structure of team members as well as their collaboration
- Motivation: Who is actually motivated to do.

3. Case Analysis

Based upon preceding studies, the elements that effect initial steps were extracted.

In this section, based on each extracted element, it is to be analyzed that how an experimental project progressed.

Analyzing method was formed from several interviews and interviewees' empirical accumulateness, and then the result was arranged.

These interviews were carried out with system engineers who worked at information system enterprises, and who had consulted with more than two enterprises.

We establish the content, examine the differences, and identify the elements of two businesses : SCM (Supply chain Management) and Marketing area. These two companies are compared by using two kinds of digital business transformations, one is

successful and one is not. The matrix is filled with interview data based on the extracted elements in digital transformation.

Firstly, the focus was placed on how the transformation was advanced by leaders' participation. The purposes of the target, evaluation, teaming, and motivation of each level were also picked out as elements.

3.1 SCM case

Company A and Company B are both manufacturing companies in Japan. They belong to the largest group of their area and perform well. However, they would like to be more competitive by using new digital technology defined business transformation to enhance their SCM business processes. They start to transform, as shown in Table 3.

The manner of tops' commitment and its difference: Company A started with an order that was asking for actions something to reduce inventory as an issue of SCM, Supply Chain Management, by means of new information technologies like BigData and IoT. On the other hand, Company B started with a top's approval for actions of the middle management as LOB, Line of Business. In this comparison, there is some difference between top-down instruction and bottom-up requests for approval of action.

The difference in Purpose and Goal:

Besides Company A was put an order from the top to reduce inventory, the purpose of LOB is a matter whether the rolling forecast handled by workforces is replaceable to the information system with the new technology. Company B is distinguishing the jobs between manpower's and information system's

The difference in Evaluation:

Company a values the digital technologies as all or

nothing, aiming to make the digital technology and analogue manpower fully matching. On the other hand, Company B assess the digital technologies as supplemental tools to support existing operation.

The difference in Teaming:

Company A is thought that there is lack of understanding for mutual skill and job itself among each member and function. And Company B is thought that understanding among each member and function for the new technology are no difference.

The difference in Motivation:

Company A is thought that nothing is influenced in the existing operation if POC is not going well. And Company B is thought that all of team members expect to improve their existing operation by digital transformation with POC result.

Thus, by evaluating abstracted elements, the apparent difference between successful case and unsuccessful case could be observed.

Table 3: SCM case

Elements	Company A (not Work)	Company B (Work)
Top's Commitment	• Command to do" something"	• Approval to the proposed solution by a middle management Leader
Purpose Goal	• TOP: ROI of Inventory reduction • LOB: Accuracy enhancement by replacing from people work to machine	• LOB: Better than current accuracy
Evaluate	• Same accuracy equivalent to people's work	• Focus on efficiency comparing to Accuracy
Teaming	• LOB, Analyst, System engineer • Communication gap	• LOB and Analyst understand each situation
Motivation	• LOB IS a leader • Not distress much	• All of company share the mission for transformation

3.2 Marketing case

In the same manner as the SCM case, we find the differences between two medium-sized retail companies: Company C and Company D. [Table 4] Both have used a forecasting application tool; however, neither is satisfied with the outcome on their marketing activities. Therefore, they are eager to upgrade the accuracy of their marketing forecasts by using new technology. Those are recognized the value lead by new technology as digital transformation

The difference in the manner of tops' commitment:

There is no difference between Company C and Company D. As both companies are the mid-sized, approvals from the top were directly obtained.

The difference in the Purpose and Goal:

Company C aims to transform existing operation, yet Company D aims to improve effectiveness of existing operation, somehow.

The difference in Evaluation:

There was no evaluation criterion at Company C, but at Company D there was an assessment for how quickly the transformation was achieved. As Company C had no clear direction about the transformation, it was hard to establish assessment criterion.

The difference in Teaming:

The project leader of Company C was replaced in the middle of action. This means the digital transformation was less prioritized compared with others. As for Company D, a staff exclusively assigned for the digital transformation executed POC, Proof of Concept.

The difference in Motivation:

At Company C, there was a tendency to go ahead anyway. But, at Company D, there was a mighty motivation to start with as quick as possible.

Company C had no strict schedule to do because their current business activities were doing usual without special problem.

On the other hand, Company D eagerly improved with some value by new digital technology.

Those are big difference among them.

Thus, as for the matter of the digital transformation happened into marketing business, it could be observed that there were both successful case and unsuccessful case, depending on the nature of abstracted elements.

Table 4: Marketing case

Elements	Company C (not Work)	Company D (Work)
Top's Commitment	<ul style="list-style-type: none"> • Approval • Direct report to top 	<ul style="list-style-type: none"> • Approval • Direct report to executive
Purpose Goal	<ul style="list-style-type: none"> • Business process transformation 	<ul style="list-style-type: none"> • Speed up of current business process
Evaluate	<ul style="list-style-type: none"> • nothing special 	<ul style="list-style-type: none"> • Digital mesurment for speed
Teaming	<ul style="list-style-type: none"> • LOB Analyst, System engineer • Lob leader changed on the way 	<ul style="list-style-type: none"> • LOB and Analyst, System engineer • Full time leader
Motivation	<ul style="list-style-type: none"> • No limited in duration • Not distress much 	<ul style="list-style-type: none"> • Eager to do start

4. Discussion

To ensure effective elements, the following are considered to infer whether each company is performing well.

- Commitment of top management: Depth of the recognition of top commitment issues. Under the traditional system approach, commitment is strategic and necessary for the information system department in order to recognize the system should bring efficiency for the company management. On the other hand, under digital transformation it was

depended on the cases. This means it could start small scale by LOB section without Top layers's commitment.

- Purpose or goal: This is necessary to factorize each goal into scenarios to have knowledge of the business and data. Digital transformation is expected to add new value that should be a kind of purpose or goal.

As for SIS, purpose or goal is always a matter for top management and have a strategy to pursue operational efficiency.

- Evaluation: The evaluation indicates their goal direction. Then criteria of POC result influenced the progress.

- Teaming: This shows whether both the LOB (line of business) and analyst side can understand and communicate each other. Also it influences whether leaders can factorize the goal into tasks to solve the business transformation. Strong leadership and dedication are necessary here.

- Motivation: This is naturally important to every business scene, however new value by digital transformation often takes times with try and error activities. Then motivation are necessary as sharing a a common understanding among the team

A digital business transformation results from merging management strategies and information systems, based on organizational theory and innovation theory. Christiansen (2001) states that "who pulls it to the way with which a request of a target, organization sentiment and personal sentiment battles each other by the small organization." This shortcoming may be amended with a recovery; however, there is not always a direct way to the goal. Therefore, top management must understand and fully agree, as during the SIS introduction. Middle management can be factorized when proceeding to agile and failed possibilities. The bottleneck is a setup resolution. For example, the problem solution is evident or not. This is also related to whether LOB

have a problem when in trouble.

5. Conclusion

Effective elements of technology are included, such as how to advance a digital transformation when SIS is already functioning. While it is important to define when the process is not completed, how to use the data requested is vital as well. That is the matter of the leader's vision, seriousness of the commitment, skill of middle management, and factors picked up by field project members. When a member who understands technology joins the team with one of the project leaders on a site and both skills are satisfied, the case may not work with that which previously existed. When no members possess digital skills, this is the reason for a transformation failing.

Concerning about the approach of progress of the digital transformation which revolutionize the business model by means of applying new technology to the existing business with some value, the author has discussed about the extracted elements that is different from traditional ones.

-The seriousness of the executive layers' commitment

-The business skills of middle management and data utilization is necessary

- The factorization of problems and establish the assessment criterion for POC

Although the factors different to the preceding document were picked out qualitatively, the author is also planning to increase the number of sample projects, corroborate the elements, and inspect these as part of the data analysis. When using ICT and building a management strategy, Japanese companies with global competitive power should be the reference as a new framework for competitive advantage.

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