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A Formal Model for the Business Innovation Case Description

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Abstract[1]

The purpose of this paper is to formalize the plural business innovation cases to compare each other. In case method learning, class discussions are based on cases that summarize actual business processes. This paper presents a model to re-description formally business innovation cases written in natural language. The model we named Managerial Decision-making Description Model (MDDM). MDDM consists of less than ten kinds of symbolic components and a simple syntax, for ease of writing and reading. In MDDM we define the structure of a business as layered relationship between objectives and resources. Then MDDM illustrates business innovation as a transition in the objectives-resources relationship and expresses the role of decision making in that transition. By formally describing business innovation cases in this way, it is possible to visually compare the characteristics of individual innovation processes. The model also allows us to compare the understandings between a facilitator and learners for the same case in a case study classroom. This formal description can be applied to the outcomes of organizational simulations and business games as well as to actual business innovations. In this paper, we introduce MDDM and its examples of cases descriptions derived from an actual business case and an organizational simulation.

Keywords: *Formal Description, Decision Diagram, Business Case, Business Structure*

1. Introduction

This paper proposes a formal, descriptive model to describe managerial decision-making processes that transform business organizations. This heuristic tool, named the Managerial Decision-Making Description Model (MDDM) (Kunigami et al.

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2019) provides a common method to compare decision-making processes for business innovation cases as well as a methodology to visualize these processes. Here we introduce MDDM and demonstrate how MDDM works on actual business innovation cases.

'A "case" is a short narrative document – a story – that presents a particular challenge facing an individual or organization.' (Harvard Business School n.d.) The case is use for the case method teaching as "a philosophy applying to both education and research that is built upon the creation and analysis of complex real world examples." (Gill 2011 p1) Figure 1 shows an outlook of case method.

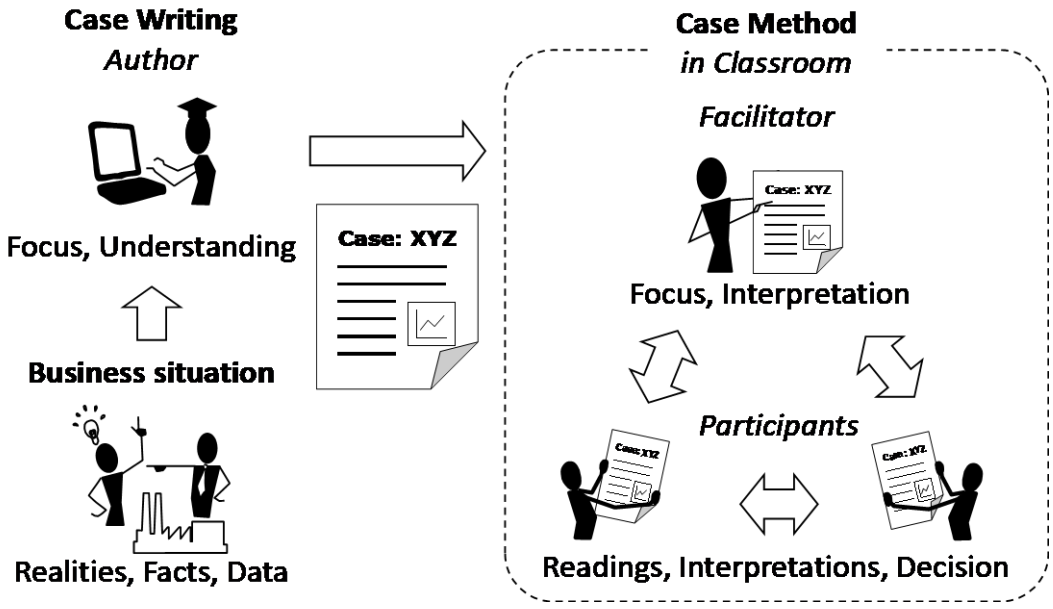


Figure 1: Outline of Case Method. Case method is a discussion-based education in which participants experience management decision-making in a case.

Not only for the case method teaching, there exist various types of case for practitioner-oriented textbooks and business journals. (Gill 2011 chapter 3) Here, we define the business innovation case as a short narrative document that presents a particular change of the business structure with decision-making in an organization. We use the word "innovation" as a change of the business structure, which means

both successful and unsuccessful. Also we think the business innovation case is applicable for the case method teaching and a textbook for practitioner.

Accordingly, we also define key terminologies for the MDDM. First, the business structure of an organization is defined as a multi-layered structure of business objectives and their related resources or means. Here the resources mean both tangible and intangible asset (e.g., finance, equipment, employee, technology, information etc.) mobilized to achieve the objective. Next, managerial decision-making is understood as the way an agent (i.e., a member of an organization) defines or redefines business objectives and their related resources in a business structure.

The formalization of business innovation cases allows case method participants to explicitly compare their understanding, interpretation, and decision making with the facilitator and other participants. A comparison is easier with classmates in a classroom and with participants in other classrooms. Figure 2 outlines these situation.

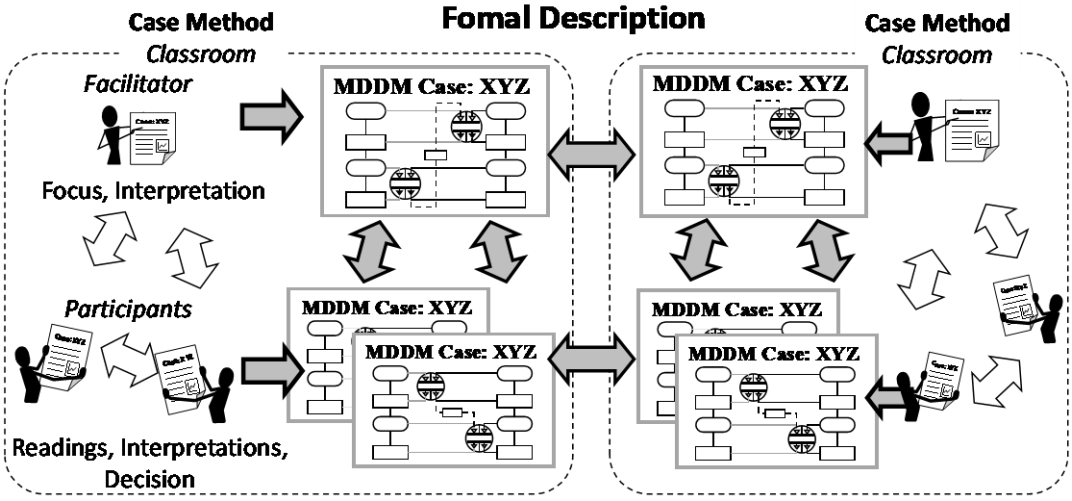


Figure 2: Formal Description in Case Method. Formal description allows for the sharing of ideas about management decisions in and out of the classroom.

To formally describe managerial decision-making that changes the business structure of an organization, the MDDM must be able to represent following items.

a) the multi-layered structure of a business, and its transition,
b) the focus (or bounded scope) of agents' observations and actions,
c) the agent's position corresponding to each layer in the business structure,
d) the chronological order and the causality of agents' decisions.

By satisfying these requirements, the MDDM enables us to describe "who" decides "what", "when," and "where the decision affects on the business structure," along with how the decisions change.

2. Related Work

MDDM is specialized to describe business innovation case. Therefore MDDM focuses on a one-time transition process that organizational decision-making changes the business structure. This feature let MDDM an unique description model.

On the other hand, various models and languages on the business processes exist focusing differently from MDDM. Table 1 shows those models and languages available to describe business processes in various levels.

Table 1 : Description Models and Languages

Foucs of Description	Description Model / Language
Static processes in the business model	UML, Petri Net, BPMN, CMMN, Viable System Model, Business Canvas
Transition processes of the business model	<Function/service oriented> HLBC <Decision making oriented> MDDM

The Object Modeling Group provides formal description language UML(Object Management Group 2017) and models i.e. CMMN: Case Management Model and Notation (Object Management Group 2016a), the BPMN: Business Process Model

and Notation (Object Management Group 2014), and DMN: the Decision Model and Notation (Object Management Group 2016b). These provide detailed representations of inside states of business and actors' behavior as long as the entire business structure is presumed to be static or at least stable. These Object Modeling Group's models and languages, while capable of detailed description, are difficult to read and write for non-specialist software engineers.

Petri-Net (Petri Nets World n.d.) is one of network model focusing of chronological ordered connection and synchronization of actions. Petri-Net is fits in describing a certain business process, but it has no business structure model. The Visible System Model (VSM) (Beer,S. 1972, Part 3) or the Business Canvas (Osterwalder et al. 2010 Chapter 1) represent structures of given business models. These are not oriented to describe transition process between the business models.

Sawatani et al (2016 slide 15) and Sawatani (2018 p347) presented High-Level Business Case (HLBC) to describe such a one-time transition of business process. HLBC is utilized for creating a new business blueprint from the present to the future. While HLBC focuses on an evolution of the functions and services of a business process, the MDDM focuses on the decision-making process driving business structure transitions.

3. Methodologies

To represent a transition of business structures as a "Decision Diagram," the MDDM uses three kinds of components. In placing and connecting those components, the decision diagram describes organizational decision-making as an equivalent circuit. The decision diagram satisfies the condition presented in the previous section.

3.1. Three major components

The MDDM uses three kinds of major components: (i) business structures, (ii) the environment, (iii) agents' decision element, as well as auxiliary elements: (iv) a connector and an event.

(i) Business structures: The Business Structures Component represent a set of multi-layered structures of objectives-resources couplings, tied to the organizational business process, before and after the business innovation. (Figure 3)

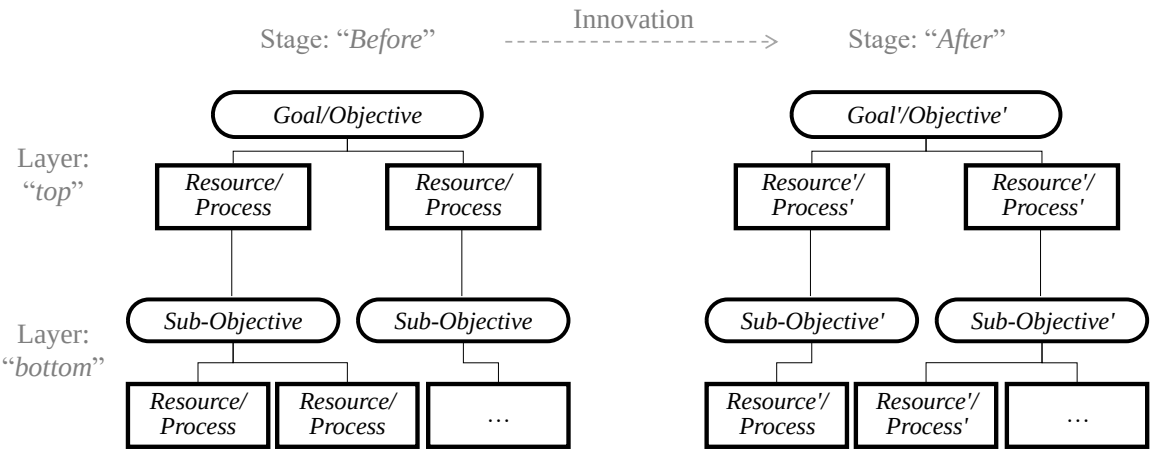


Figure 3: Business Structure Components. Business Structure components represent multi-layered coupling of objectives and resources in an organization.

This component is comprised of the objective symbols, resource symbols and the connections between them. Each objective symbol represents a goal, an objective, or a target a business layer. A resource symbol represents a resource, an operation, a product, or a means required to achieve the objective symbol that couples with the connection. By heaping up the objectives-resources couplings, the Business Structure Component represents a multi-layered structure of business organizations.

(ii) Environment: The Environmental Component describes status transitions, and events outside of the organization (Figure 4). This component consists of status and event symbols. Each status symbol represents a technological situation or condition

in the market or in another organization. The event symbol indicates that something occurred to with the status that triggers an agent's decision, or a result caused by an agent's decision. The status order Figure 4, and the events from left to right, indicate their chronological order.

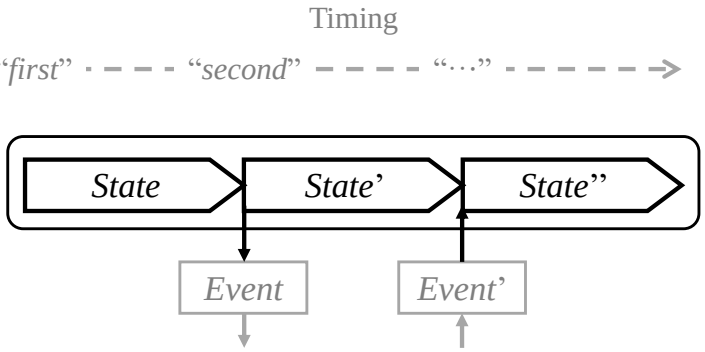


Figure 4: Environment Component. Environment component represents states or conditions surrounding the business. A state can be connected with event elements.

(iii) Agents' Decision: Agent's Decision Elements describe how agents redefine the objectives and resources in an organization's business structure. Each agent's decision is represented as a "Decision Element" with 2×2 terminals (Figure 5).
Each terminal has a specific function. The left hand's dual terminals in the decision element represent an agent's observation-action pair before the decision. The upper left terminal indicates an agent's former objective or the target. The lower left terminal indicates an agent's former action, resources, or means for the former objective. In contrast, the right-hand two terminals represent an agent's observation-action pair as a consequence of an agent's decision. The upper right terminal indicates an agent's new objective or target, and the lower right terminal an agent's new resources or means to facilitate the new objective.

(iv) Connector and event are auxiliary but important elements. Connector represents the relationship between symbols or components. Inside business structure components, connectors indicates subordinate relationships between objectives and resources. Between business structure components and agent's decision, connectors indicates target of observe and action (Figure 6 left). Between environment

components and agent's decision or between agent's decisions connector and event indicates something happen about the decision (Figure 6 right).

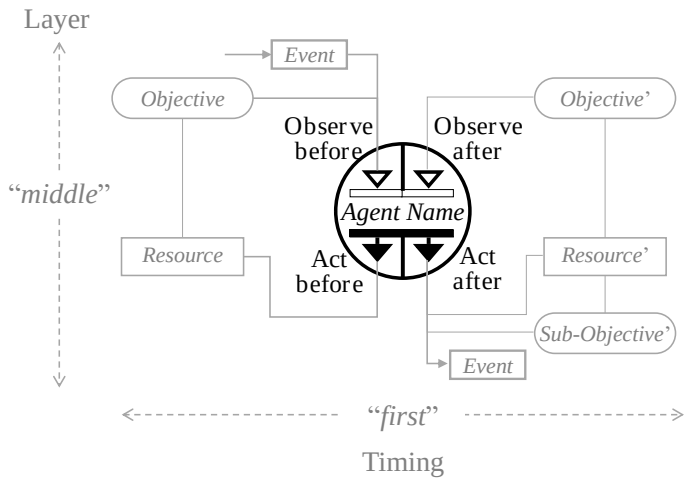


Figure 5: Decision Element. Agent's Decision element represents redefining objectives-resources coupling in business structures by the agent's behavior.

Meanwhile, if the relationship between two symbols that should be related is either missing or negative, the disconnection symbol should be used (Figure 6 center).

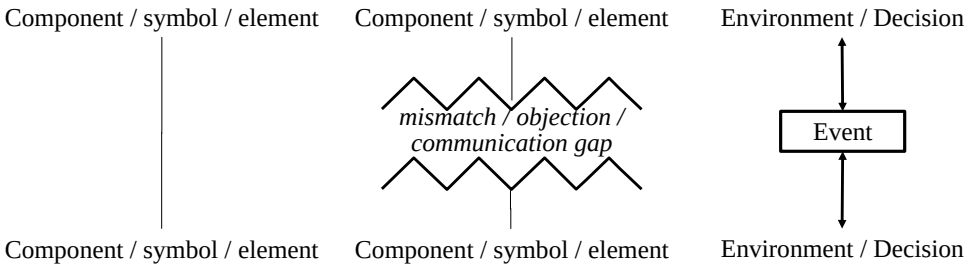


Figure 6: Connector and Event: Connection, disconnection and event

3.2. Composing Decision Diagram

By allocating and connecting those components, the decision diagram describes the organizational decision-making with a transition of business structure (Figure 7).

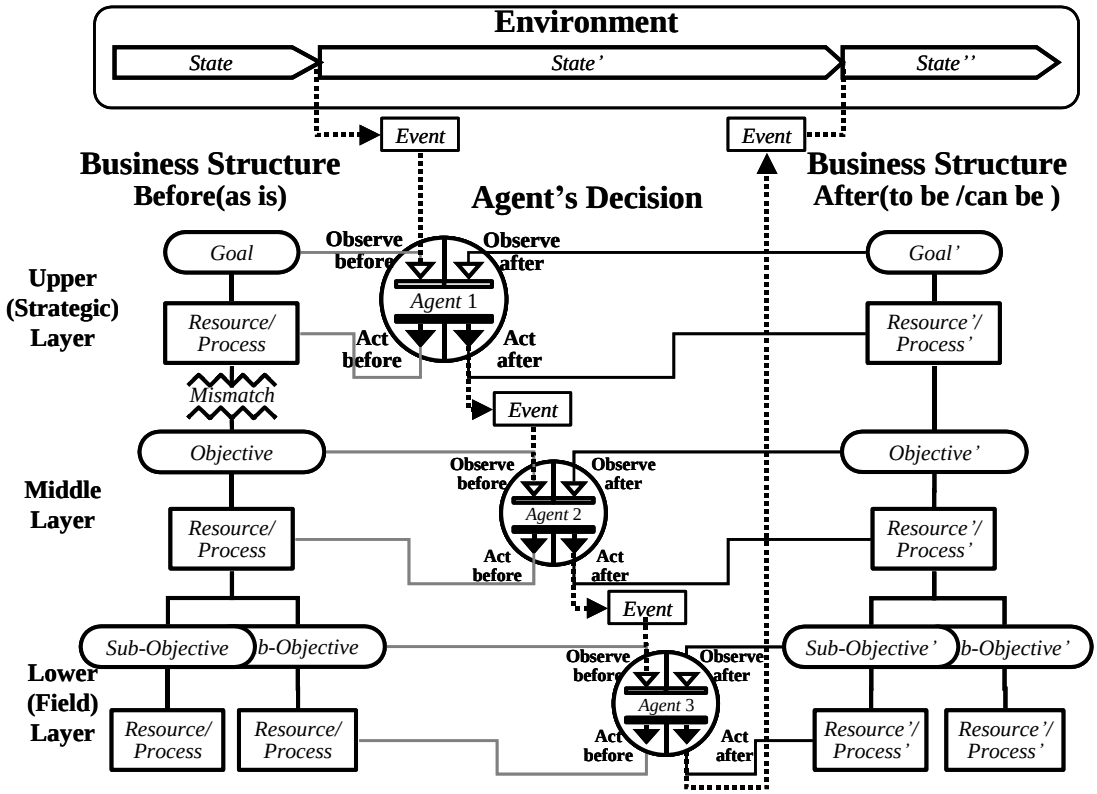


Figure 7: Decision Diagram. Decision Diagram describes how agents' decision-making transforms the business structure by connecting the components.

To begin with, the environmental component is placed at the top or the bottom of the decision diagram. It introduces time (from old to new) in a horizontal direction (from left to right) in the decision diagram.

Next, to describe transitions in the business structure, the two business structure components are placed on the left and right-hand sides of the decision diagram, respectively. The left-side component represents the business structure that existed before agents' decisions and the right-side component represents the business structure that result from agents' decisions. We call the left-side structure "Before" or "As Is", and the right-side one "After," "To Be," or "Outcome." These business structures introduce vertical layers into the decision diagram from strategic management (upper) to field operations (lower).

Third, an agent's decision elements are allocated between business structures. This allocation reflects the organizational position and chronological order of an agents' decisions. The decision's vertical position indicates the structural layer to which an agent belongs. The horizontal order of the decisions, from left to right, indicates their chronological order.

Fourth, agent decisions connect to the other components and decision elements. The upper left terminal of each decision element connects to the symbols that an agent observes as the objective or the target in the left-hand ("before") business structure. The lower left terminal connects to symbols that an agent acted upon regarding the resource or the means in the left-hand ("before") business structure. In the upper right terminal of each decision element connects to symbols that an agent observes as the new objective or target in the right-hand ("after") business structure. The lower right terminal connects to symbols that an agent uses to take action regarding the resources or the means in the right-hand ("after") business structure.

Finally, either an environment-agent interaction or an agent-agent interaction is represented by connecting an agent's terminal and related event symbol. For example, when an event related to the environment triggers an agent's decision, the event symbol is connected to the agent's upper left terminal. Similarly, if an agent's decision triggers another agent's decision, the agent's lower right terminal and the other agent's upper right terminal are connected through the trigger event's symbol. Again, if the relationship between two symbols that should be related is either missing or negative, the disconnection symbol should be used. The disconnection symbol represents a mismatch in objectives-resources coupling, an incoherence between upper- and lower-layer business structures, an objection to an event or a decision, or a communications gap between agents.

3.3. Various Types of Decision Diagram

The MDDM decision diagram represents various forms of decision making. The decision diagram shows the order in which the decisions were made and by whom. Also the diagram indicates the organizational positions of the agents. Combining these orders and positions, the diagrams allows illustrating various organizational decision making patterns. Typical patters of those are shown in Figure.8.

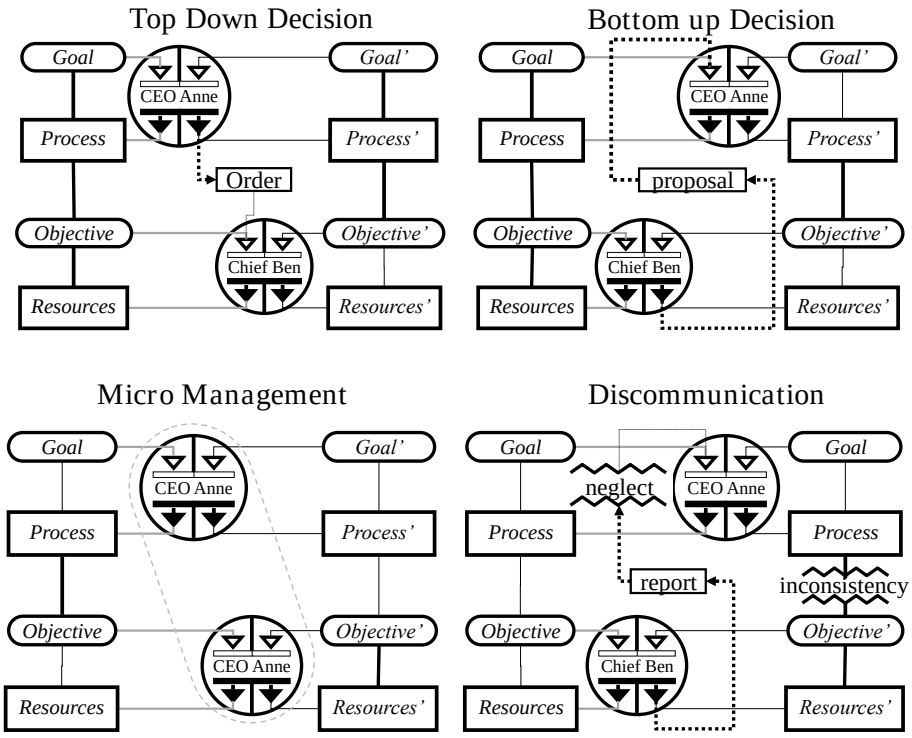


Figure 8: Typical Types of Organizational Decision Making.

3.4. Decision Diagram Extension

As an extension of MDDM, not only one way interaction, The decision diagram allow describing two sided interaction with feedback. Simple decision making with feedback are shown in Figure 9 by inserting a virtual objective-resources coupling.

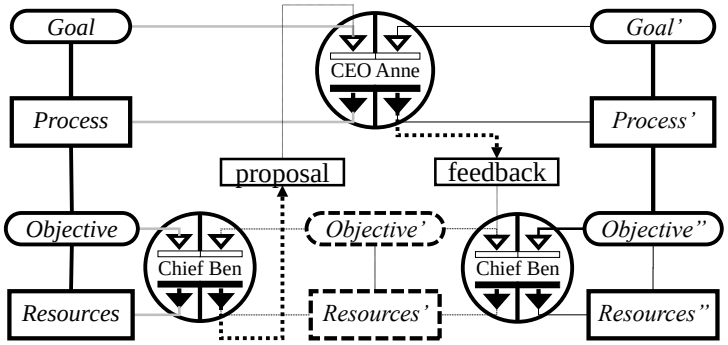


Figure 9: An Example of Decision Making with Feedback Process. A virtual /transitional objective-resources coupling is shown by broken line

Furthermore the decision diagram can be extended to describe consecutive decision-making cases interacting each other. The common environment component makes available such extension by which connects business decision-making cases that affect each other. An Extended Decision Diagram consists of related decision-making cases and the common environment component that connects these cases (Figure 10). The common environment component describes the common statuses observed or affected by the decision diagrams. An event symbol between a common environment and a decision diagram indicates such observation or effect.

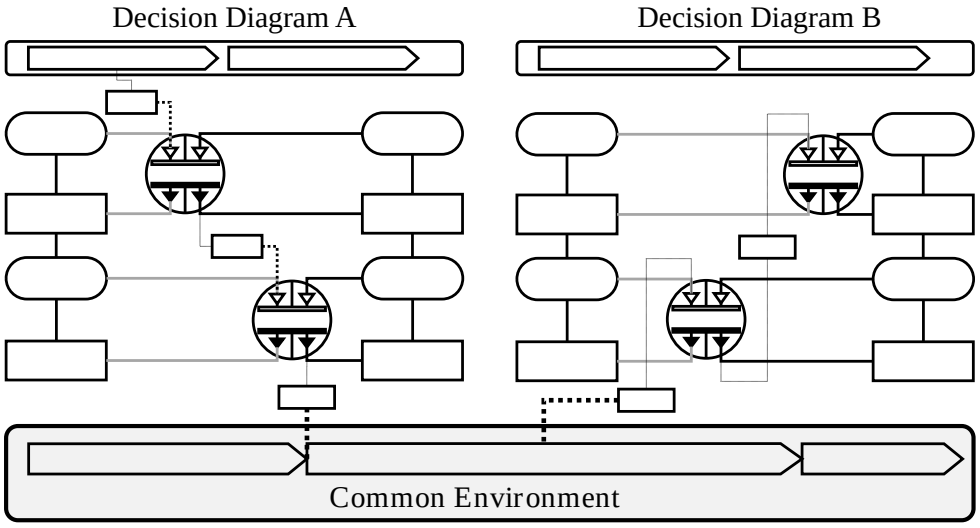


Figure 10: Extended Decision Diagram. Two decision diagrams' interaction are represented by connection with common environment.

3.5. An Example of Decision Diagram: Cases of Dr. Faust

Here is a decision-making diagram for the case of Dr. Faust as a simple example. In "Faust" part one (Goethe 1808), Dr. Faust was bored with his pursuit of knowledge about the world in order to reach scholarly satisfaction. One day, Faust made a deal with Mephistopheles to live his life with the goal of having a supreme experience of life. The first thing he did was to have a romance with Gretchen.

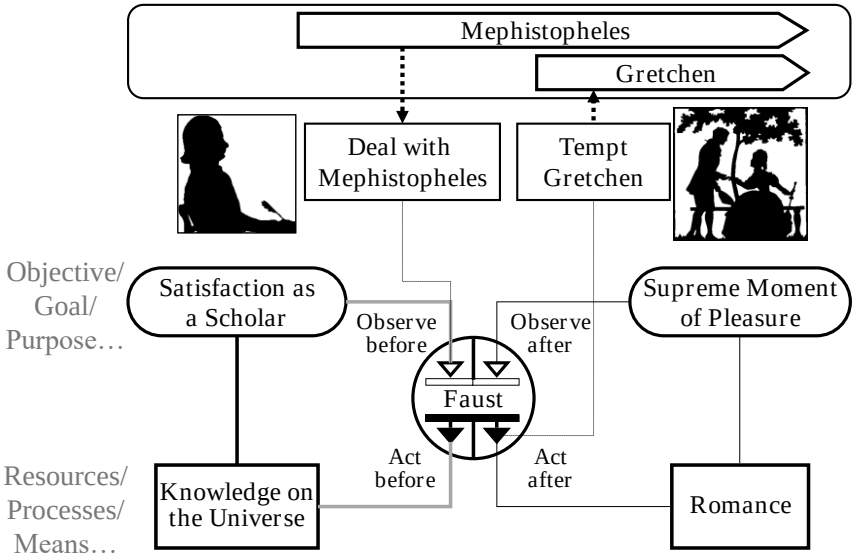


Figure 11: An simple decision diagram from the case of Dr. Faust.

The Decision Diagram for this case is shown in Figure 11. The deal with Mephistopheles led to a transition of the combination of the goals and the measures of Dr. Faust's life.

4. Application to Describing Business innovation Cases

In this section, we exemplify some description of business innovation using MDDM. First, we describe an actual business case of the Sony Walkman. Next, we compare

HLBC and MDDM by illustrating this Walkman case also in HLBC referred in section 2. Furthermore, we describe the case derived from agent simulation, not the actual case, in MDDM. Such a virtual case description leads MDDM to more wide area of application discussed in the next section.

4.1. Application to Actual Business Cases

Here we illustrate how the MDDM describes actual managerial decision-making, using well-known business innovation cases of Sony Walkman. The Sony Walkman case is introduced in the official history of Sony (Sony n.d. a), (Sony n.d. b). It is a typical example of destructive innovation.

According to the case, in 1978, Ibuka (the Honorary Chairman of Sony) privately asked Ohsone (the manager of the tape recorder division) to convert a handy tape-recorder into a stereo playback machine. The good sound from the modified machine pleased Ibuka, who then he personally took the machine to Chairman Morita to let him try it. Morita decided instantly to launch the machine into the market as a product presenting a totally new way to enjoy music. The new product was named the Walkman in 1979. Despite both in-house and retailers' skepticism about a machine without recording function, Morita pushed forward the Walkman sales. Through the "Music in moving" campaign supported by motivated young sales staffs, Walkman became a global success and a new music lifestyle was born.

The decision diagram for this case shows a transition of Sony’s business structure shifting from a high-low mix strategy (for the cassette tape recorder market) to the creation of a playback-only headphone-player market. While the decision diagram for this transition is similar to the bottom-up decision-making process, the decision elements were connected by Ibuka’s personal behavior events. This is a typical example of managerial decision-making promoted by an informal communication via a “trickster” in the organization. (Figure 12)

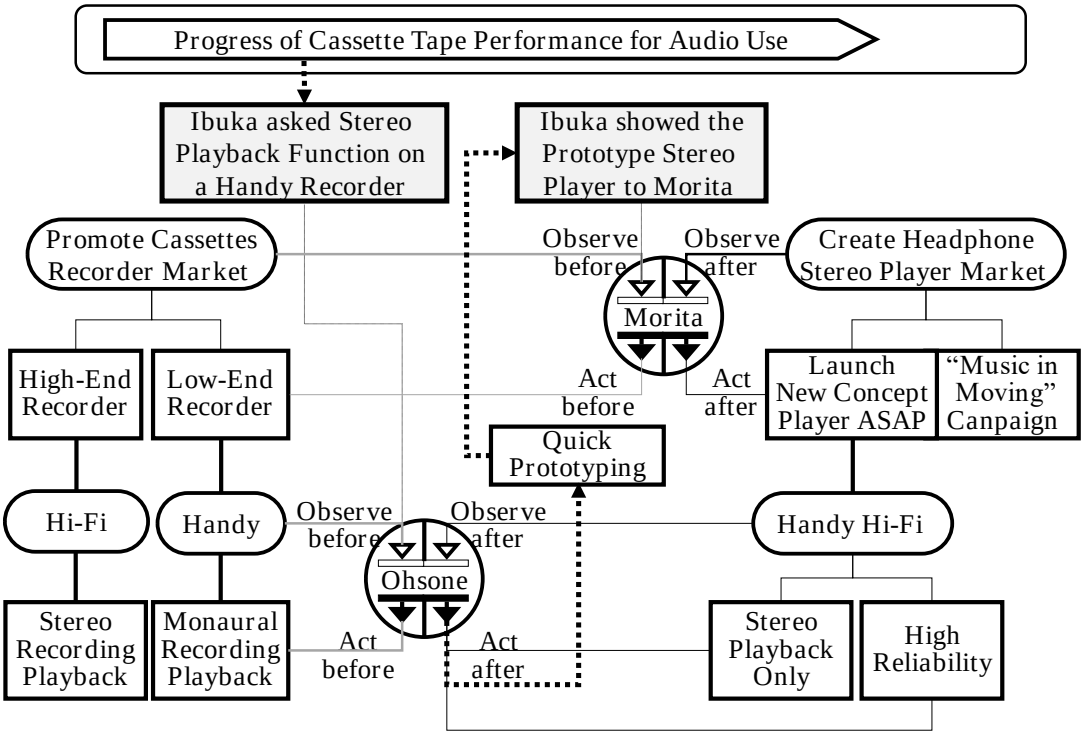


Figure 12: The Decision Diagram for the Sony Walkman Case. Informal communication led the transition from the old structure (left) to the new market creation strategy (right)

4.2. Comparing with High-Level Business Case

Here we compare the MDDM description with the High-Level Business Case (HLBC) referred in section 2. Figure 13 shows the case of Sony's Walkman described by HLBC. HLBC illustrates the innovation of business frameworks in a step-by-step manner under a given opportunity and direction. MDDM, on the other hand, also focuses on the organizational decision-making process in innovation cases.

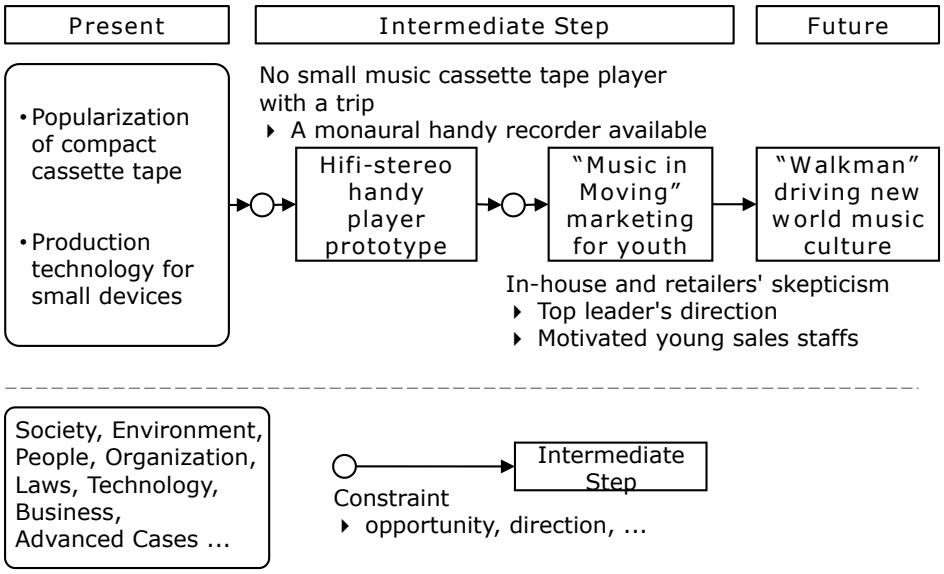


Figure 13: Sony Walkman Case by HLBC. (Legend is under the broken line)

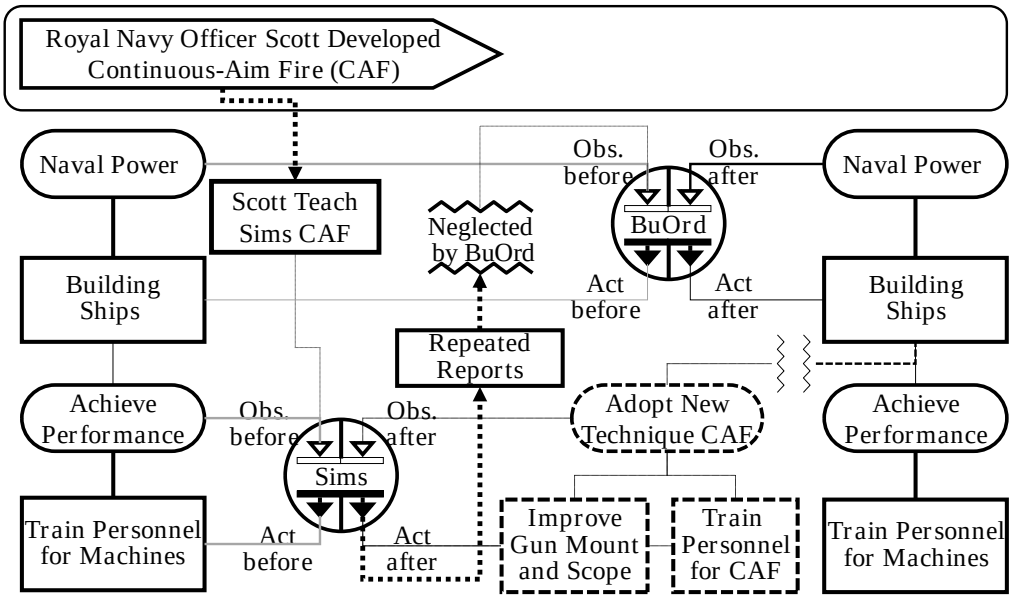
4.3. Application to Actual Business Cases with Extended Form

Next, we illustrate a real case by more complex decision diagrams that described in section3.4.

Gill (2011 chapter3) cited the case of the Naval Gunnery by Morison as an example of showing a specific concept of innovation. According to Morison (1966 p17) and Armstrong (2015 p10), the case can be summarized in two parts.

Part A:

> Lieutenant William Sims, the U.S. Navy, learned a new revolutionary gunnery technique of continuous-aim fire: CAF from Captain Scott, the Royal Navy, while he visit China. Sims tried to adopt CAF on his ship with modifying the gun instruments and retraining his gunner. He dramatically improved his ship's gunnery performance by using CAF. Sims sent a number of reports to the Bureau of Ordnance: BrOrd Navy, which ignored them; BrOrd believed that naval officers should be trained in the guns provided by BrOrd.



BuOrd : Bereau of Ordnance

Figure 14. Decision Diagram of the Part A of the Naval Gunnery Case.

Part B:

> When more commanders favored Sims, BrOrd formally rejected the CAF. Finally, Sims sent a letter of direct appeal to the President Theodore Roosevelt. Roosevelt, interested in reforming naval gunnery, let BuOrd fill "inspector of target practice" by Sims. In his new position, Sims improved gunnery procedures, trained crews, and instituted a system of competitions, awards, and reports. Finally, he revolutionized American Navy's gunnery.

In Figure 14, the part A shows a failure of innovation within an organization in which top rejecting bottom-up innovation based on external ideas. In Figure 15, the part B shows innovation through a shift from the denial of the top to a new top-down process using an external authority. This parts is examples of an extended decision diagram with feedback in Figure 9. These two parts can also be easily connected each other to the extended form a decision diagram, like a Figure 10.

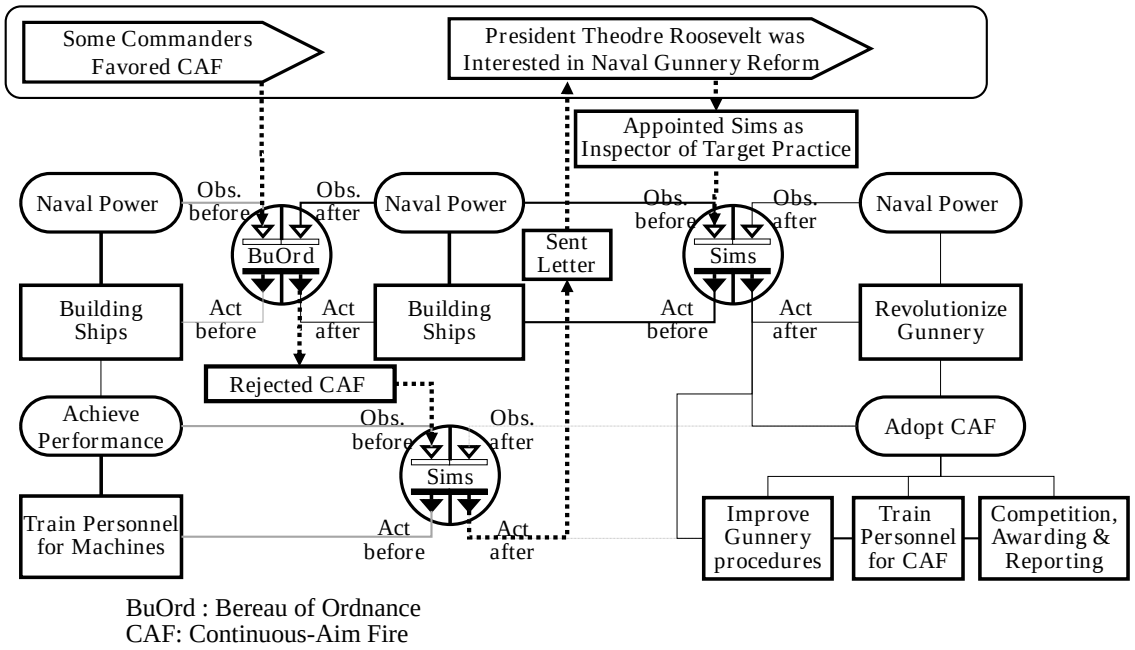


Figure 15. Decision Diagram of the Part B of the Naval Gunnery Case.

4.4. Application to Virtual Business Cases from Agent based Simulation

Next, we are going to mention that MDDM is also applicable to agent based simulation analysis.

Kobayashi (2013) shows Kaizen (spontaneous and progressive innovation) and organizational deviation are explained an unified agent based model. He used case based analysis to illustrate that his agent based model was well ground on the real business process. He wrote down several cases based on his agent simulation logs. Then he showed equivalence of the simulation driven cases and the real business case.

Kobayashi wrote down his simulation driven cases with natural language, now MDDM allow us to describe formally such virtual cases. In Figure 16, the decision diagram describes one of simulation driven cases from Kobayashi's work. In this

decision diagram the deviation from the safety-regulations (as a negative innovation) happened and propagated after the company's ambiguous incentive.

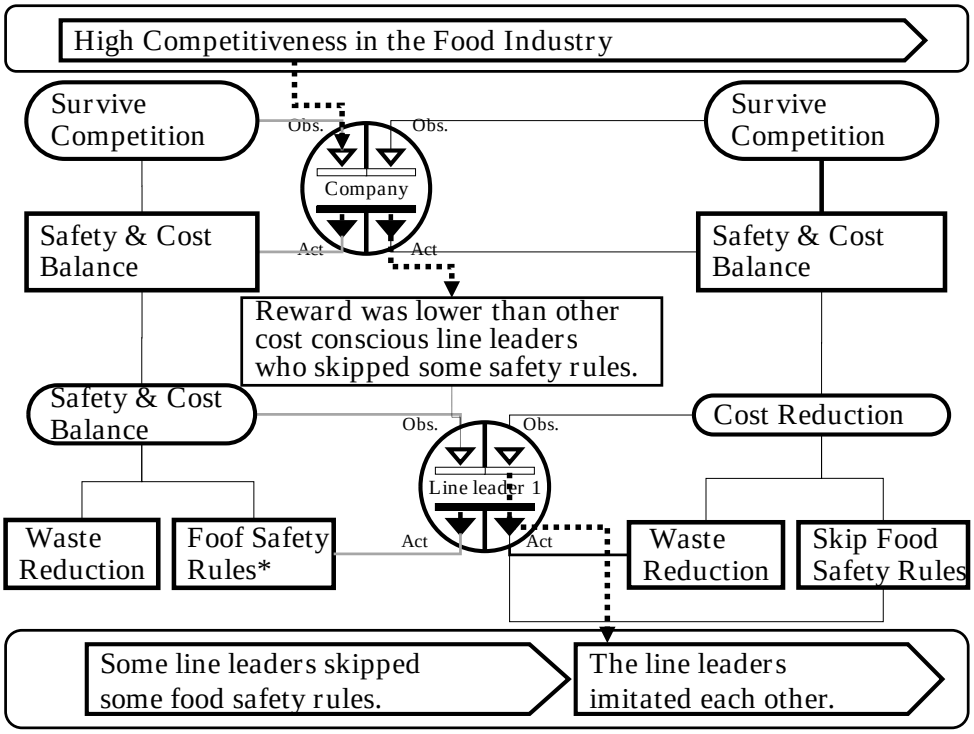


Figure 16. Formal Description of Case from Agent Simulation: This decision diagram illustrates the organizational deviation case from Kobayashi (2013).

When comparing the results of a simulation with a real business case, it is easier to discuss the equivalence and differences if both are described in a formal model rather than writing the simulation results as a case in natural language. In this way, MDDM decision diagram could be an effective tool to describe organizational simulation outcomes.

5. Consideration: Formal Description for Case Method

By using decision diagrams to formally describe a business case, we can not only objectively represent the structure of the case, but also visually grasp the differences in understanding among the users of the case.
When describing a real business process as a case, the author of the case selects and summarizes facts and data based on his or her own perspective and understanding. In a case-study classroom, the facilitator leads the class discussion based on his or her own understanding of the case. In addition, the participants in the case study express their opinions about the decisions in the case based on their own understanding of the case. Such class discussion is an emergent activity that takes place orally, but it is not easy to objectively compare and understand the differences in perceptions of the case structure between the participants and the facilitator.

The MDDM decision-making diagram is designed to facilitate this kind of discussion in case studies. The decision-making diagram of MDDM is effective in clarifying such differences in understanding of the case structure between facilitators and participants, and between participants and each other.

Furthermore, by formally describing the participants' understanding of the given case, we will not only be able to visualize and compare the differences in perceptions to the case within a class, but also the differences between the perceptions of participants in different classes.

Figure 2 illustrates that formally describing of a case allows us to share of ideas about the interpretation of such a case within and across classrooms. In this way, by formalizing our own understanding of the case, we can share visually those ideas with others across time and space. Such sharing idea could bring us deeper and wider understanding on the case.

Formal models provide business case learners with the means and opportunity to express their understanding and insights in a more objective manner. It also facilitates case learners to develop the attitude of comparing their own understanding and insights with those of others. As a formal model, MDDM also focuses on decision making and resource mobilization within an organization, so MDDM will help business innovation students to develop an attitude of objectively sharing their ideas with stakeholders when they become involved in innovation as managers in the future.

Finally, we remark on the uniqueness of the formal description of a case. MDDM does not attempt to uniquely describe the contents of all cases written in real business or natural language. It is impossible to uniquely describe a real business written in natural language, even with the OMG's specification languages. Rather, a specification language is an attempt to uniquely determine the contents of a process in natural language, which can be interpreted in various ways, by re-describing it formally, while clearly indicating which interpretation is followed. MDDM formally describes the contents of a case according to a specific interpretation with in various possibilities to understand the case. Then the decision diagram allows for a unique representation of the interpreted contents and making clear differences in the interpretations.

6. Summary and Remarks

To formally describe business cases, MDDM provides a decision diagram that illustrates the transition of business structures caused by related agents' decisions. The MDDM also helps clarify differences in case learning perceptions among participants and facilitators in a class or with other classes. The MDDM discriminates between the decision style in a business case. An extended decision diagram describes interacting decision diagrams.

As an application example, we illustrated a decision diagram for a real business case of Sony Walkman. For comparison, we also gave a formal description of this case in HLBC. As another application, we presented a decision diagram from a organizational agent-based simulation (ABS) log. We exemplify a business simulation analysis using MDDM in another paper. (Kunigami et al.2020)

A paper on business gaming (Nakano et al. 2007) presented the simulated business gaming environment, integrated with case learning, and based on actual business cases. The MDDM will provide an effective way to describe gaming players' decisions and compare them formally to original business cases.

7. Acknowledgments

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References

Armstrong, B.F. (2015). *Continuous-Aim Fire: Learning How to Shoot*, Naval History Magazine Vol.29, No.2, p 10.

Beer,S. (1972). *Brain of the Firm: Managerial Cybernetics of Organization*, Allen Lane. Part 3

Harvard Business School (n.d.). *About Case Method Teaching*, https://www.hbs.edu/case-method-project/about/Pages/case-method-teaching.aspx

Gill,G.T. (2011). *Informing with the Case Method: A Guide to Case Method Research, Writing,& Facilitation*, Informing Science Press, Santa Rosa CA, p 1 & chapter3.

Goethe,J.W.(1808) *Faust*, part I.

Kobayashi,T., Takahashi,S., Kunigami,M., Yoshikawa, A. & Terano,T. (2013). *Is There Innovation or Deviation? Analyzing Emergent Organizational Behaviors through an Agent Based Model and a Case Design*, The 5th International Conference on Information, Process, and Knowledge Management (eKNOW 2013), pp.166-171.

Kunigami,M., Kikuchi,T. & Terano,T.(2019). *A Formal Model of Managerial Decision Making for Business Case Description*, F. Koch et al. (eds) Evolutionary Computing and Artificial Intelligence. GEAR

2018. Communications in Computer and Information Science, vol 999, pp 21-26, Springer, Singapore.

Kunigami M., Kikuchi T., Takahashi H., Terano T. (2020). *A Formal, Descriptive Model for the Business Case of Managerial Decision-Making*, In: Jezic G. (et al.) (eds) Agents and Multi-Agent Systems: Technologies and Applications 2020. Smart Innovation, Systems and Technologies, vol 186, pp.355-365, Springer, Singapore.

Morison, E.E. (1966). *Gunfire at Sea: A Case Study of Innovation, Men, Machines, and Modern Time*s, The MIT Press, Cambridge, MA, pp.17-44.

Nakano, K., Matsuyama, S. & Terano, T. (2007). *Research on a Learning System toward Integration of Case Method and Business Gaming*, The 4th International Workshop on Agent-based Approach in Economic and Social Complex Systems (AESCS 2007),pp.21-32.

Object Management Group (2014). *The Business Process Model and Notation Specification*, ver.2.0.2, https://www.omg.org/spec/BPMN/

Object Management Group (2016 a). *The Case Management Model and Notation Specification (CMMN)*, Ver.1.1, https://www.omg.org/spec/CMMN/

Object Management Group,(2016 b). *The Decision Model and Notation Specification*, Ver.1.2, https://www.omg.org/spec/DMN

Object Management Group (2017). *UML 2.5.1*, https://www.omg.org/spec/UML/

Osterwalder,A.,& Pigneur,Y. (2010). *Business Model Generation: A Handbook for Visionaries*, Game Changers, and Challengers, 1st edition, Wiley. Chapter 1

Petri Nets World (n.d.). http://www.informatik.uni-hamburg.de/TGI/PetriNets/index.php

Sawatani, Y., Kashino, T. & Goto, M. (2016). *Analysis and Findings on Innovation Creation Methodologies*, https://www.slideshare.net/YurikoSawatani/analysis-and-findings- oninnovation-creation-methodologies, slide 15.

Sawatani, Y. (2018). *High-level Business Cases Creation Method by Interpolating Constraints Between Present and Future*, Xu,F.(eds.) Proceedings of the International Conference on Creativity and Innovation 2018,Japan Creativity Society, pp.347-360.

Sony History (n.d. a). Chapter 5 *Prompting Compact Cassettes Worldwide*, https://www.sony.net/SonyInfo/CorporateInfo/History/SonyHistory/2-05.html

Sony History (n.d. b). Chapter 6 *Just Try It*, https://www.sony.net/SonyInfo/CorporateInfo/History/SonyHistory/2-06.html