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Accommodating Decision Maker's Needs & Preferences in An Oil and Gas State-Owned Enterprise by SSM Based Action Research

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Abstract. The Covid-19 Pandemic has shifted the behaviour of decision-makers in all business processes. This situation has accelerated the process of digitizing all information, information technology, and business processes. As a subsidiary of an Oil and Gas State-Owned Enterprise in Indonesia, The SHU also has a similar SOE's bureaucracy for the approval process in business development. What factors were considered, and how did the interaction and interrelation within those factors influence the decision-making is the main question in this research. This research aims at developing the decision-making system by accommodating the decision-maker's needs and preferences. Action research based on soft systems methodology (SSM) is used to model the new decision-making system and compare results. The long decision-making stages of business development investment have delayed several important business development projects, leading to missed early production opportunities and increased capital investment. Financial decision documents have to be wet-signed by all stakeholders involved in the decision-making process. It is practically difficult to follow existing business processes for business development approval during the Pandemic. The Covid-19 Pandemic is an entry point for redefining existing decision-making systems. The results showed that the principle of prudence and compliance are the main factors influencing decision-making. The development of digital review and approval based on a decision-making system conceptual model accommodated the interests of all stakeholders, and business processes continued during the Pandemic.

Keywords: Decision-making Model, Action Research, Soft-System Methodology, Bureaucracy

INTRODUCTION

A recent study states that state-owned enterprises (SOEs) are complex organisations that generate new developments. The study was exploring multiple patterns of state enterprise reform that have enabled governments to generate competitive domestic firms (Nem Singh & Chen, 2018: page 1). State companies are perceived as staid, hierarchical, and bureaucratic (Budiman et al., 2009: page 4). The characteristics of oil and gas state-owned enterprises are similar to those of SOEs, which are hierarchical and bureaucratic. Late to act and slow to make decisions also contribute to the unfavourable condition of SOE (Utoyo et al., 2019: page 686).

A typical Exploration & Production (E&P) decision-making problem faced by national and international oil companies involves the prioritization of projects in an investment portfolio in the face of limited financial resources. The prioritization is often complicated by the need to consider multiple competing and non-commensurable criteria, such as subsurface complexity, size of the reservoir, plateau production, and needed infrastructure, in addition to other issues of strategic concern, such as socio-economic, environmental, and fiscal policies, particularly in the case of governments or national oil companies (Qaradaghi & Deason, 2018: page 617). The decision-making method is complicated. Each method

will bear positive results or incur large losses for the Corporation. This cycle of investigation and judgment happens in business on an everyday premise and is a significant part of administrative work on different progressive levels in the professional workplace (Da Silva Neves & Camanho, 2015: page 1097).

As one of the sub-holding in upstream business units of a state-owned enterprise in Indonesia, The SHU manages a portfolio and operations of 55 subsidiaries and eight joint ventures that manage oil and gas fields. The long decision-making stages of business development investment have delayed several important business development projects leading to missed early production opportunities as well as increased capital investment. A digital application decision-making approval system has been implemented in the organization since 2018 as part of Corporate programs to implement Digital Transformation. After two years of operation, the system still has not been fully applied for digital approval of decision-making systems. The hard copy approvals are still being used, and the wet-signature is still required by all stakeholders involved in the decision-making process.

Conflicting multi-criteria in decision-making also happens as some functions of the organization have different criteria in decision-making. The problem may not be the criteria set for decision-making, but apparently, the nature of people in the decision-making process who have different interests and perceptions.

Community (Stakeholders) participation is considered as one of the most important things in the process of Development Planning (Muluk et al., 2020: page 105). The stakeholder perceives superiority to be the most determining factor in the final decision-making process (Susanti et al., 2020: page 139).

On January 30, 2020, the WHO proclaimed the Chinese outbreak of COVID-19 to be a Public Health Emergency of International Concern, representing a high risk to nations with weak wellbeing frameworks. The emergency committee has stated that the spread of COVID-19 may be interrupted by early detection, isolation, prompt treatment, and the implementation of a robust system to trace contacts (Sohrabi et al., 2020: page 71). The WHO declared Indonesia as one of the newly reported cases of COVID-19 on March 2, 2020. On March 12, 2020, the WHO Director-General reiterated that countries should not give up on stopping the outbreak now that WHO has characterized it as a Pandemic. The cases in Indonesia are then increasing rapidly. Therefore the governor of Jakarta has announced Work-From-Home (WFH) policy starting March 16, 2020. This policy is followed by all SOE offices, including SHU.

It is difficult to follow the existing business process for reviewing and approval during the WFH period, where the wet-signature is mandatory. This study aims at developing a decision-making system by accommodating the decision-maker's needs and preferences with the Covid-19 Pandemic issue as the entry point. Their need and preference influence organizational perception in creating a judgment and decision for business development investment. A qualitative approach was used to accommodate those requirements.

Conceptual Problems

Problems in business development decision-making at SHU escalated, starting from the bureaucracy and hierarchy of state-owned enterprises in fulfilling compliance, accommodating stakeholders, unclear business processes, differences in the level of individual understanding in the decision-making system, differences in perceptions, shared responsibility in decision-making, excessive caution, wet signatures related to legal matters, the use of paper documents to review business development proposals and work from the home policy during the Pandemic.

Apart from the problems described above, each individual in the decision-making system plays an important role in raising other issues. The long decision-making stages of business development investment with its problematic situation have delayed several important business development projects, leading to missed early production opportunities as well as increased capital investment.

The digital system for review and decision-making of business development proposals has been introduced since 2018. However, it did not reduce the existing business process flow, instead of adding the workload for the approval process through a digital

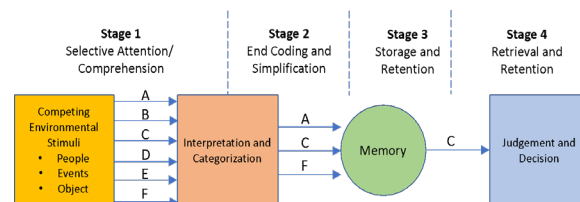
system and also the approval process through hard-copy documents.

Theoretical Framework

This research aims at developing the decision-making system by accommodating the decision-maker's needs and preferences. A new digital approval system will then be developed based on the proposed model. The research scope was limited to business development decision-making in SHU. The project data sampling was carried out for the period 2018-2020 with the organization and business processes applied at that time. The selection of correspondents from SHU management was based on the availability of officials.

The theoretical framework was deduced from Kinicki & Fugate (2012) that proposed a social information processing model that consists of a four-stage information sequence (figure-1). Kinicki stated that perception is a cognitive process that enables people to interpret and understand surroundings. Stage 1, 2, and 3 describe how specific social information is observed and stored in the memory. The last stage involves turning mental representation into real-world judgements and decisions.

Figure 1. Social Perception: A Social Information Processing Model

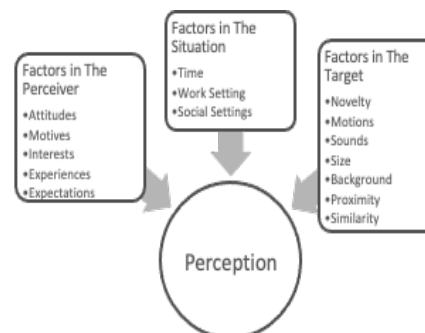


Source: Kinicki & Fugate, 2012: page 85

The factors that influence perception in stage 1 are clearly described by Robbin & Judge (2019: page 209); factors in the perceiver representing people, factors in the situation representing events, and factors in the target representing the object.

This research focused on the independent variables that influence behaviour in decision making wherein Robbin's model are factors in the perceiver.

Figure 2. Factors that influence perception



Source: Robbins & Judge, 2019: page 209

Perception is the cycle we use to sort and decipher tactile impressions to give meaning to our condition. People's behaviour is based on their perception of what reality is, not on the reality itself. A number of factors form and distort perception. Factors that influence perception can reside in the perceiver, the object or target being perceived, or the situation in which the perception is made (Robbins & Judge, 2017: page 209).

Factors in the perceiver are influenced by personal characteristics such as attitudes, personality, motives, interests, past experiences, and expectations. People hear what they want to hear and see what they want to see, not because it is true but because it confirms their thinking.

The characteristics of the Target, which are novelty, motion, sounds, size, background, proximity, similarity, and also people perceive because they do not look at the target in isolation. The relationship of a target to its background influences perception, as does the tendency to group close things or a similar thing together.

The time at which an object or event can influence attention, as can location, light, heat, or situational factors. People are usually not aware of the factors that influence their view of reality.

In an organization where a lot of people from multi-discipline joint together as decision-makers create a decision on the same object, factors in the situation and factors in the target are inherently similar to the perceiver. But the factors in the perceiver itself will vary from one to another. The needs and preferences of people or decision-makers involved in the decision-making influence their perception of the objective of the project.

Group decisions are affected by the preference structures of individual members and the influence they have in the group. The human preference that is represented by stakeholder's behaviour is believed formed by organizational culture (Ertosun & Adiguzel, 2018: page 66). The cultural system of stakeholders is referred to as exogenous or independent variables.

The representation of the conceptual framework model of the decision-making system for business development in Indonesia's oil&gas state-owned enterprise is referred to as a causal or structural model. In regard to the structural model, Economic, Technology, Environment, Organization, Business-risk, Politic, and Market (Dahooie et al., 2018: page 3; De Almeida et al., 2017: page 154; Siksnelyte et al., 2018: page 12) are referred to as endogenous or dependent variables.

Estimation of model accuracy depends on the comparison of model projections with existing business models. Each management representative was considered to be selected in this study, projecting the potential distribution of organizational behaviour without considering factors such as individual preferences, interests, and knowledge that would explain the phenomenon. In addition, it should be noted that individual preference distribution databases show

huge differences even for common and widespread novelties such as digital transformation. Therefore, the estimation of model projection accuracy is very dependent on the reference database.

Although this research was only conducted at SHU, the results could be extended to holding or subsidiary companies and applied to similar organizations such as state-owned companies and oil companies, which have similar problems.

RESEARCH METHOD

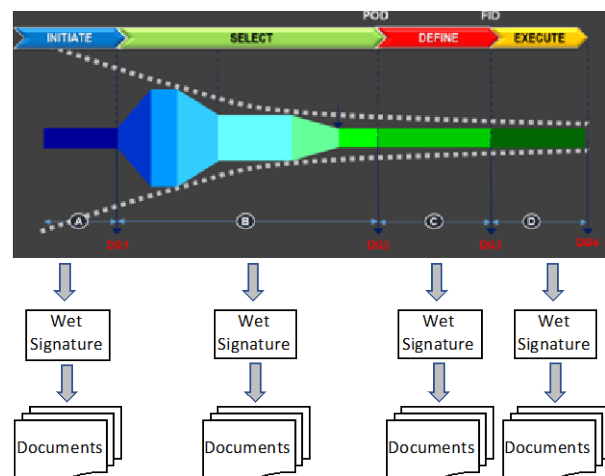
Research Context

As an oil and gas sub-holding company of Indonesia's SOE, SHU has a very well-defined decision-making system modified from the common Capital Value Process (CVP) within the same industries. However, the implementation of the decision-making system combined with traditional bureaucracy made all the administrative works take much effort than the project itself. The contextual model includes decision gates in every cycle phase that comprises three companies (four business units) and ten functions in every business unit. The author is the researcher but also takes action on the implementation of the conceptual model.

The long and complex decision-making chain may not be good for the business goal. The wet signature that is still required for any financial review and approval just makes the approval process more complex. Starting from March 16, 2020, SHU also implemented the Work From Home policy due to the COVID-19 Pandemic for all office activities. As mention in the previous section, the main problem for the approval process is wet signatures that are still required for approving all documents in this case; Review forms, Approval forms, and decision gate documents that need to be signed by more than 30 people from ten functions in each stage.

A digital application decision-making approval system has been implemented in SHU since 2018 as part of Corporate programs to implement Digital Transformation. After two years of operation, the

Figure 3. Contextual Business Process Flow



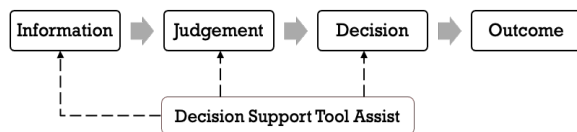
system still has not been fully applied for digital approval of decision-making systems. In the real world, hard copy approvals are still being used. A final decision would be obtained with many stakeholders involved on average 1.5 years after proposal submission. Conflicting multi-criteria in decision-making also happens as some organizations' functions have different criteria in decision-making.

The decision-making system of business development in SHU consists of many stakeholders from ten functions, hence the interest and perception of each stakeholder will be different. Therefore, the criteria of decision-making are also different on each function. This difference will lead to difficulties in finding equilibrium in the decision of business development. The long and complex review and approval process expressed this situation.

Conceptual Framework

The conceptual framework was deduced from a conceptual theory of the decision-making process with decision-support tool assists (Closs et al., 2016: Page 3).

Figure 4. Concept of Theoretical Framework for Decision Making



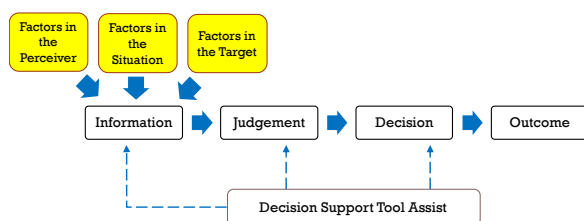
Source: Closs et al. (2016)

Stakeholders influence decision-making at every gate of the capital investment proposal. Important criteria are taken from the literature review (De Almeida et al., 2017: page 154). The judgment is the system that is currently applied, such as CVP, procedures, or guideline. The decision is the final decision in every gate based on supporting information and data.

The outcome is the result of a decision made by management. Decision support tools assist derived from commonly used tools from the previous study (Siksnylyte et al., 2018: page 10).

Organisations are complex systems that include many different groups within them and affect many different groups and elements of their environment. These groups are generally referred to as the stakeholders of the organisation. Some of these stakeholders are important for the successful operation of the organisation, and some are important because of the effects

Figure 5. Concept of Theoretical Framework for Decision Making



that the organisation has on them. In both cases, the organisation needs to be aware of these stakeholders and manage them successfully, the former for reasons of effectiveness, the latter for reasons of legitimacy and ethicality (Wang et al., 2015: page 562).

The hypotheses are that an individual's needs and preferences influence organizational perception in creating a judgement and decision for business development investment. This argument refers to Hardjosoekarto (2012: page 2) that culture form patterns of behaviour and attitudes of members of society, Wang (2015: page 562) that stakeholders are important for the successful operation of the organisation, Robbin & Judge (2019: page 209) that people's behaviour is based on their perception of what reality is and not on the reality itself, and Kinicki & Fugate (2012: page 84) that turning mental representation into real-world judgement and decision requires social information processing as mentioned above. The nature of people as stakeholders in the decision-making process have different interests and perceptions, which are formed by organizational culture.

Between structural model and cultural system, although the variables may be related, their relationship is not to be explained by this particular structural model.

Research Methodology

Facing the complexity of managerial problems, where different stakeholders have different points of view, is increasingly leading to the use of soft systems methodology (SSM) (Hanafizadeh & Vali Zadeh, 2015: page 355). SSM will also be used in this research to accommodate the need and interests of each stakeholder. In developing the Conceptual model, the deductive approach will be applied. The previous theory and model were then modified to fit the current condition and generalized as a new model proposed (inductive). In terms of philosophy, this research is pragmatism as the main goal is to accommodate all stakeholders' needs and interests.

The proposed research model (figure 6) is the combination of the common decision criteria with stakeholder's intention to be integrated into the current business model (figure 3). At the center of the research, the model is the existing business model for Business Development Proposal. It comprises three cycles of stages for business development approval. Multicriteria decision approach to accommodate factors influencing decision-making adopted on each cycle as shown on the left side of the model.

Figure 6. Research Model

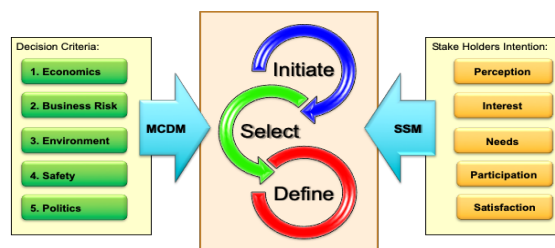
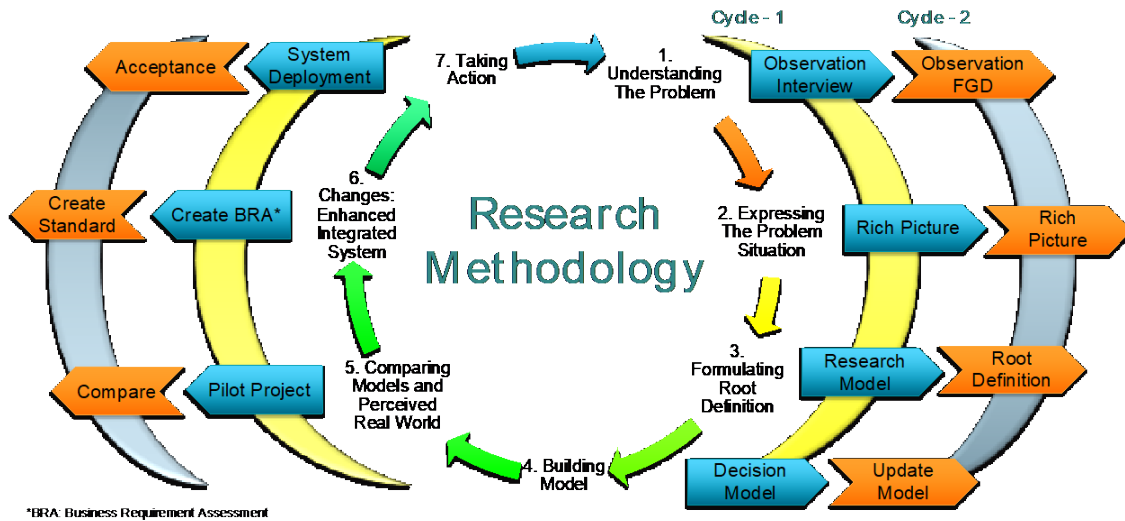


Figure 7. Research Methodology



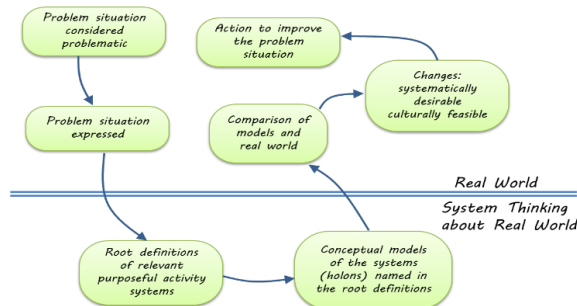
The sorting criteria are; 1-economics, 2-business risk, 3-Environment, 4-safety, 5-business risk. Then stakeholder's intention in decision-making to be accommodated by soft system methodology-based action research. The stakeholder's intentions to be explored are perception, interest, need, participation, and satisfaction.

The Soft Systems Methodology (SSM) is a qualitative technique that applies systems thinking to non-systemic situations (figure 8). First developed as a modelling tool by Peter Checkland in the late '60s at the University of Lancaster UK, it has since then grown into a problem-solving tool. It is particularly utilized for issues that have an elevated level of mental, social, and social components that lay weight on discovering arrangements through learning and energy about the issue.

There are two cycles of action research, as shown in figure 7. However, this paper only describes the first cycle that has been done. The first cycle is the creation and application of a business development decision-making model based on preposition and data collection. The second cycle is a system improvement after the first cycle.

Stage-1 – Understanding the Problem. Data collection includes observation, discussion with the team, and interviews with stakeholders performed

Figure 8. Seven-stage model of SSM



Source: Checkland & Scholes, 1998: page 27

representing all decision-making chains in the system.

The aim of observation research is to see through the eyes by viewing events, actions, norms, and values from the perspective of the people being studied. By attending to mundane details help us understand what is going on and provide clues to other layers of reality (Silverman & Marvasti, 2008: page 8).

The observations were made in a meeting at SHU, which was attended by SHU's management and subsidiary management. The data analysis was carried out in the form of coding, observation notes, field notes, thematic analysis.

Stakeholders, in this case, are the management involved in decision-making, namely the vice president of 10 functions in SHU, the related directors, and general managers of the subsidiary.

Stage-2 – Expressing the Problem situation. The problem situation was explored and explained, whose output was presented as a rich picture. For the initial identification and exploring of the worldviews, the researcher used documents and open interviews with experts. Most qualitative researchers rely quite extensively on in-depth interviewing or, in other words, can be said as a conversation with a purpose.

Making drawings to demonstrate the numerous components in any human circumstance is something that has described SSM from the beginning. Its justification lies in the way that the multifaceted nature of human issues is consistently an unpredictability of various cooperating connections, and pictures are a superior medium than direct exposition for communicating connections (P. Checkland & Scholes, 1999: page 22).

Rich pictures are used to depict complicated

situations. They are an attempt to encapsulate the real situation through a no-holds-barred cartoon representation of all the ideas covered already in layout, connections, relationships, influences, cause-and-effect, and so on. Just as these goal ideas, rich pictures should delineate abstract components, for example, characters and qualities, perspectives and biases, soul and human instinct

Stage-3 – Formulating Root Definition. Root definition and CATWOE are the sources of the purposeful holons known as human activity systems. The modelling language is based upon verbs, and the modelling process consists of assembling and structuring the minimum necessary activities to carry out the transformation process in the light definition of the CATWOE elements.

CATWOE stands for:

Customer: recipient of the results of the business framework,

Actor: a role that plays a measure of the business framework,

Transformation: the core of the cycle that delivers results to clients,

Weltanschauung: basic world view for a change

Owner: a stakeholder with overall authority for the business framework,

Environment: principles and boundaries that encompass the business framework.

SHU has its own approval system, which is based on information on supply, available resources, development in oil and gas technology, ad hoc issues, can determine what business development will be proposed from its subsidiaries. This system manages, integrates, and controls the approval process at all stages.

Stage-4 – Building Conceptual Model. The proposed research approach will be using an action research approach to solve a complex problematic multi-criteria decision-making. The proposed research model is shown in figure 5.

Collecting the activities needed to make a contribution to T, transforming it, and disposing of the output, ensuring the activities required of other CATWOE components are included; then face to face whether they rely on different activities or not.

Model building expertise using original baseline information without including the overwhelming setup features that are not authenticated by root definition and CATWOE. After a model is created, the golden rule for consistently 'reading' the model begins with an action that does not depend on another action but has another motion that depends on it.

This is useful when we increase our understanding of what it means to treat deliberate action intensely as a framework idea. The best remedy for this dangerous expression is indeed the endorsement of Arthur Koestler's use of neologism for the whole conceptual idea, particularly the 'holon' (P. Checkland & Scholes, 1999: page 30). That is the SSM model: the holon to

use in managing banter.

The stakeholder groups involved and interested in the decision-making process are broadly outlined below:

(a) Government officials and associated experts: this group consists of municipal managers, sector heads (which could include managers from other spheres of government as well), treasury officials, and all those responsible for managing the execution of municipal functions. (b) Top management of subsidiaries: this group consists of general managers, senior managers of SHU's subsidiaries who operate the field operation directly. (c) Top management and BOD of SHU: this group consists of senior managers, vice presidents, and the board of directors of SHU. (d) Upstream Directorate: this group consists of the senior vice presidents and Upstream director. (e) Holding: This group consists of the senior vice presidents and the board of directors of Corporate (Holding).

The proposed decision-making method consists of the following steps:

Step-1: Gather information: collate (and share) input from the various role players in the form of interviews, surveys, technical studies, etc.

Step-2: Specify group and prioritise needs: (a) Draw up value trees for each group: each constituent group defines a hierarchy of criteria/issues/needs for their area or domain of interest. (b) Define group development measurement scales. Draw upscales for each dimension of the value tree for each group. These scales may be linked to outcome measures (indicators) and specific means of collecting data to inform them. (c) Use weighting techniques to reach an agreement on priorities for the issues making up the value trees.

Step-3. Strategies, evaluate and plan: (a) Formulate objectives and strategies. Specific alternative solutions to the identified needs or issues are generated. These may be in the form of broader strategies (ultimately groups of projects) or specific projects. (b) Evaluate the alternatives by scoring on a number of criteria. The criteria used to score the identified alternatives should include the impact, cost, and sustainability of the solutions. Explore the set of alternatives to find the highest value (collection of alternative projects or strategies).

Stage-5 – Comparing Model & Perceived Real World. This stage consists of the comparison of the problem-oriented conceptual model with the rich picture built up at Stage-2.

Checkland & Scholes (1998: page 43) describe four things in making comparisons: (a) informal discussions. (b) formal questions. (c) scenario writing based on the 'operate' model. (d) to model the real world in the same structure as the conceptual model.

Formal questions are by far the most commonly used. The model is used as a source of questions to be asked about the real world; answering that question sparks debate, which can be done in any way

that seems appropriate for the particular situation. It may be a group of people gathered in one place at a time for discussion, or it may be conducted in one interview or dialogue that is spread over a period. It is impossible to generalize. (Checkland & Scholes, 1998: page 43).

Stage-6 – Changes: Enhanced Integrated System. In choosing some significant frameworks to show, on a basic level, consistently various levels accessible, and it is important to choose for each root definition which level will be that of system, the level at which will sit the T of CATWOE. This makes the next lower level the sub-system level: that of the individual activities which, linked together, meet the requirements of the definition.

Stage-7 – Taking Action. Once a systems thinker has taken on board the idea of conceptualizing the world and its structure in terms of a series of layers, with any layer being justified by definable emergent properties at that level, it is always appropriate to think at more than one level. The SSM agent ensures that whatever levels are considered a system, the levels above (broader system) and those below (sub-system) will always be taken into account. However, systems thinkers also accept that not only will it choose the level to be the 'system' level but will also interpret the nature of the 'system' according to Weltanschauung or his own world view. These notions of 'layers' and 'world views' mean that SSM developers cannot avoid taking a position on the perceived nature of the methodology and high-level assumptions.

Reliability and Validity Test

The data collection method used interviews. The interview is designed to collect information such as criteria of decision-making in business development at SHU to selected correspondents who are responsible for making decisions and coordinating business development plans.

The qualitative data can assume the forms such as interviews, observations, documents, and records. The quantitative data can be instrument data, observational checklist, or numeric data such as survey results (Creswell, 2014: page 59).

Coghlan & Brannick (2005: page 100) mentioned that secondary data are data, both numeric and textual, that were developed for some purpose other than helping to solve the action research question at hand. It is required to evaluate these data on the basis of their relevance to the research question, their availability, and their accuracy. In order to have confidence in the worth, validity, and reliability of the data, it is necessary to consider the following questions for each archival source:

- Who collected the data?
- When was it collected?
- What was collected?
- Why was it collected?

There are two cycles of action research proposed in this study (figure 8). In the first cycle, all data, either numeric or text, will be collected by the researcher,

who also a member of the organization. Data numeric and text will be retrieved from the Corporate report, database, and other formal deliverables taken in the last three years. Other data related to the decision-making process will be collected by interviewing stakeholders either directly or indirectly involved in the decision-making process. The interview will also validate the data collected from the system.

The second cycle will be validating the proposed model by doing another interview, Delphi, or Focus Group Discussion to the same stakeholders after implementation. This two-cycle action research is expected to be completed in 1 year.

The reliability test for this research will be conducted by; (1) Subject Matter Experts checking for validation. (2) Pilot interview with at least three stakeholders of the samples;

Noble and Smith (2015: page 35) suggested strategies for a qualitative researcher to ensure credibility of the study; (1) Accounting for personal biases. (2) Acknowledging predispositions in testing and progressing basic impression of strategies to guarantee adequate profundity and significance of information assortment and investigation. (3) Meticulous record continuing, demonstrating an unmistakable choice path, and guaranteeing understandings of information are predictable and straightforward. (4) Establishing a comparison case/seeking out similarities and differences across accounts to ensure different perspectives are represented. (5) Including detailed and thick verbatim descriptions of participants accounts to support the finding. (6) Demonstrating clarity in terms of thought processes during data analysis and subsequent interpretations. (7) Engaging with other researchers to reduce research bias. (8) Respondent validation, and. (9) Data triangulation.

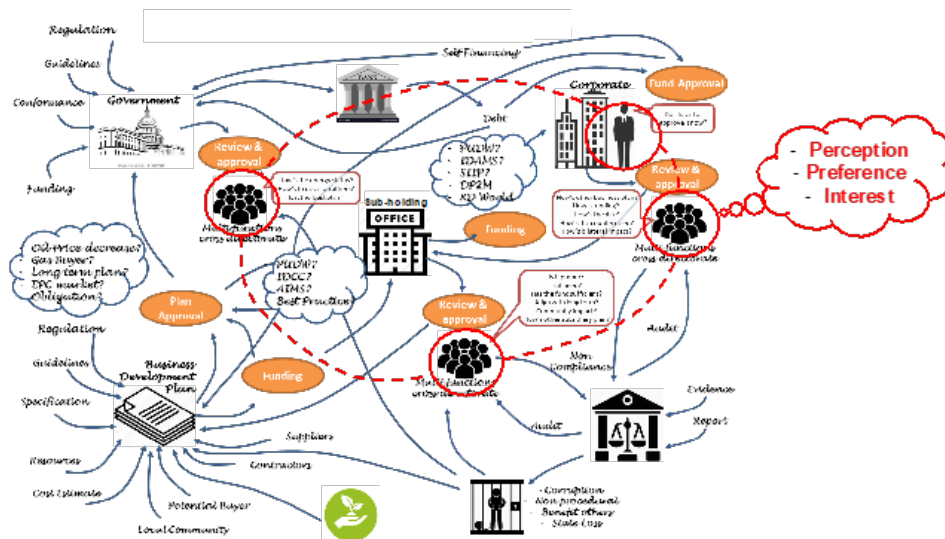
RESULT AND DISCUSSION

There are two cycles of action research proposed in this study. In the first cycle, all data, both numerical and text, were collected by researchers who are also members of the organization. Numeric and text data are taken from Company reports, databases, and other formal submissions taken within the last three years. Other data related to the decision-making process were collected by interviewing stakeholders, both directly and indirectly involved in the decision-making process. The interview validates the data collected

Table 1. Summary of the survey on the existing system

No.	Question	Answer					Normalized
		A	B	C	D	E	
1	Satisfaction	3	4	8	1	1	C. Satisfy
		18%	24%	47%	6%	6%	
2	Usage	3	4	2	6	2	D. Un-practical
		18%	24%	12%	35%	12%	
3	Process review	2	2	5	6	2	D. Un-helpful
		12%	12%	29%	35%	12%	
4	Control	2	4	3	5	3	D. Difficult
		12%	24%	18%	29%	18%	
5	Management Approval	1	6	2	4	4	D. Difficult
		6%	35%	12%	24%	24%	
6	Comment	1. Need online review and approval					
		2. Long approval duration using hardcopy					
		3. Approval at home during pandemic					

Figure 9. Rich Picture of Approval system SHU



from the system. The second cycle will validate the proposed model by conducting interviews, Delphi, or focus group discussions with the same stakeholders after implementation.

The reliability test for this research was conducted by; 1- Subject Matter Experts checking for validation, and 2- Pilot interview with at least three stakeholders of the samples (Noble & Smith, 2015: page 35).

Understanding the problem

Observations, discussions, and interviews were conducted. A satisfaction survey of the existing approval system was also conducted on 17 SHU staff who were directly involved in preparing reviews and recommendations for management.

The interview was conducted with three management representatives from Holding (Corporate), Sub-holding (SHU), and Subsidiary company, a Production Sharing Company (PSC). Coding from three interviews has Investment, Portfolio, Project, economic, business, technology, organization, production, and planning as the most coding word

Table 2: Mind mapping of interviews

Super Category	Category	Sub-Category	Sub-Sub-Category
Decision Making	Leadership	management	business
			decision-making
		Mission People	investment
			government
			engineering
	System	Measurement	onwj
			production
		Method	subsurface
			surface
			team
Plant	Measurement	concept	
		design	
		execution	
			increase
			level
			long-term
			operability
			plan
			project
			stage
			technical
			work
			aspects
			change
			playing
			pu dw
			system
			asset
			facility
			field

appeared during interviews.

The interrelation between constructs taken from coding with three main constructs; Investment, Portfolio, and project. Under those three main constructs are criteria of decision-making that were coded in the interview's transcriptions.

There are 31 selected constructs from the most frequent codes that appear in the interviews. Those codes are sub-sub-categories of decision-making. Then those sub-sub-categories were grouped into sub-categories and then grouped into categories under Decision-Making as the super-category.

The four most frequent categories are business, investment, production, and project. Therefore, as a preliminary finding, the decision-making in SHU is influenced more by the Leadership of SHU's management.

Questions to respondents were divided into five main topics. The perceptions of each topic are summarized in table-3. Referring to Robbins & Judge (2019: page 209), people's behaviour is based on their perception of what reality is, not on the reality itself. The result shows that the perception of SHU as an SOE has an experience that made the prudential and compliance aspects two things that have to be held on by all business development plans

Expressing the Problem Situation

Creating pictures to show the numerous components in any human circumstance is something that has described SSM from the beginning. Its reason lies in the way that the intricacy of human undertakings

Table 3: Summary of preliminary interview

No.	Main Topic	Respondent #1 Asst. Mgr (Subs) MBA, > 20 years	Respondent #2 Asst. Mgr (SHU) MBA, > 20 years	Respondent #3 Manager (Holding) MSC, > 25 years
1	Existing Decision Making Process	The prudential Aspect	Project Economic	Prudent
2	Existing Guidance for Investment	Compliance	Compliance	Compliance
3	Timeline for Investment Approval	Deliver project prudent	Prudent	Not competitive
4	Non Technical Factors Influence Decision Making	Safety Environmental	Organization Culture	Organization Environmental
5	Management Concern on Decision Making	Compliance to regulation Government need	Project Economic	Political Market Market Intelligent Competitiveness

Table 4: Development Approval duration 2019-2020

Project	Stage			Total days
	Initiate	Select	Define	
1			88	88
2			442	442
3			98	98
4			70	70
5	20	28	185	233
6			206	206
7			150	150
8			179	179
9	38	62	174	274
10	31			31
11	41			41
12	22	55	122	199
13	13			13
14	52			52
Average	31	48	171	251
Max	52	62	442	556

is consistently a multifaceted nature of different interfacing connections, and pictures are a superior medium to direct writing for communicating connections (Checkland & Scholes, 1999: page 22). The funding process and approval involve many people in many organizations. The rich pictures will draw attention to the (usually) many people or groups who could be seen as stakeholders in any human situation, and Analysis of One's list of possible, plausible problem owners, selected by the problem solver, is always the main source of ideas for relevant systems which might usefully be modelled.

Data collected from business development approval in SHU during 2019-2020 vary on each stage. It all depends on the complexity of the project. The summary of the duration of days taken for approval is represented in table-4.

Align with a rich picture where so many stakeholders involved in the decision-making and the pre-study survey result, that complaining about the existing review and approval system where hardcopy is mandatory as a proof review sheet, then a model of approval system needs to be developed.

Formulating Root Definition:

- C "customers": System users in SHU
- A "actors": Decision-makers & users
- T "transformation process": Long and complicated decision-making process Short and simple decision-making process
- W "weltanschauung": Technology and Organization Culture
- O "owners": SHU's Management
- E "environmental constraint": Existing structure, modern technology, company resources.

Building Model

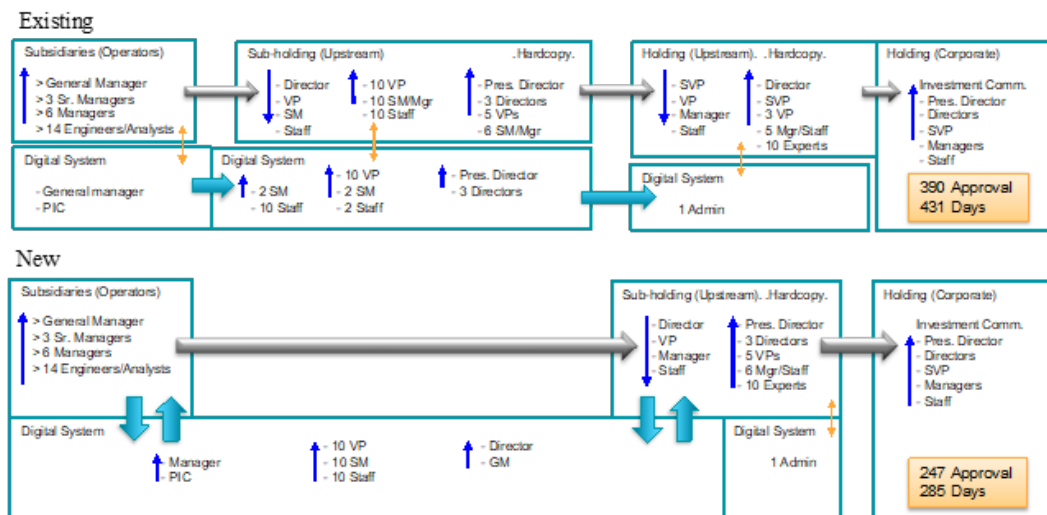
The Decision-Making Process (DMP) model was developed to accommodate all stakeholder's needs based on interviews, observation, and questionnaires, despite criteria required for decision-making. The utilization of one data center in the system and digital approval as a valid approval system will reduce approval duration and fit for purpose during a Pandemic where all stakeholders are working from home. The conceptual model is limited only to the SHU approval system. Approval systems in subsidiary companies and corporations are beyond SHU authority.

The existing digital data storage will be used and enhanced with the capability to replace manual wet-signed review sheets. Every stage comprises review and approval documentation used as a reference for business development proposals. The documentation consists of ten disciplines/functions that have to be reviewed and approved by each staff, manager, vice presidents, and directors. The functions included in the approval cycle are subsurface, drilling, surface facility, economic analysis, risk register, supply chain management, QHSSE, Human resource/ human capital, legal, relation, and commercial. All reviews to be performed in parallel and approved by email.

Comparing Model and Perceived Real World

Although much comparing of models with perceived reality took place during individual discussions

Figure 10. Flow of Proposed Approval Activities compare to Existing System



with managers in SHU, Corporate, and SHU's subsidiaries, a more formal comparison stage can be seen in meetings with all functions in SHU at which the work is discussed. The study was explained to the management team in a focus group discussion where the emerging themes were discussed.

In order to accommodate all stakeholder's needs and preferences, all functions have to review and approve a business development plan. Based on the interview result, prudent is the most important aspect. Therefore all requirements in the existing system remain the same, but redundancy activities are eliminated, and serial physical approval to be revised with parallel online approval. Figure 9 shows the existing flow of approval activities and the proposed flow of approval activities in SHU.

Changes: Enhanced Integrated System

The thrust of the proposal to the investment committee of SHU was that this work should be the directorate's contribution to providing a review and approval system of business development in SHU. It was agreed by management to make changes to the existing system as part of System Enhancement. The Business Requirement Architecture (BRA) was prepared and then to be approved by the Management of SHU as legal documentation to do the enhancement on the existing system. The BRA submitted to the Information Communication Technology (ICT) division as the executor of the system enhancement. This 6-months project consists of; 1) System Development phase, 2) System User Test phase, 3-System Integrated Test phase, 4-Deployment phase, and Go live phase.

Taking Action

The agreement to go ahead with a six-month program made ICT responsible for defining, initiating, and coordinating the activities. There are 31 live projects in the approval system that have to be transferred from the previous system to the new system. Some conversions need to be performed by users to ensure system migration worked properly.

In order to standardize the new workflow of the new online review and approval system, a company guideline for review and approval of business development projects in SHU was prepared and released. This guideline that was approved by SHU management also grants the use of digital approval in the system, replacing existing wet-signature approval.

CONCLUSION

Decision-making problems are less perceived as soft issues. Many human and social problems are not considered in modelling and solving these problems. In this research, using SSM and cognitive maps as aids in the modelling phase, decision-making has been investigated as an unstructured and semi-structured problem. The aim of this research is to reach a consensus among various views on the issues that play a major role in human factors. Building a final

consensus main task model using cognitive mapping in this methodology provides an agreed picture of the subjective perceptions of the various beneficiaries about the problem studied. In addition, in the stage of comparing the conceptual model with the real world using comparison tables, the proposed changes and ultimately the appropriate and desirable suggestions to be made are achieved, and in accordance with the objectives considered, a sensible guideline is presented. This guidance includes interacting with the university to draw on academic knowledge and the oil industry experiences of senior management and advisors within the organization.

It is clear that the main basis of the presented solutions is to consider the human factor in the problem. Individual needs and preferences influence organizational perceptions in making judgments and decisions for business development investments.

There is no doubt that using a soft thinking approach in decision-making has several problems. Due to the nature of decision-making problems, interviews should be conducted with managers and experts from a high level of the organization. Therefore there are some limitations to finding and gathering information from them.

Hierarchy and bureaucracy in State-Owned Enterprise cannot be avoided to fulfil compliance. However, accommodating stakeholders with clear business processes can minimize or even eliminate differences in individual perceptions and levels of understanding in the decision-making system. The modified digital system based on the presented model accommodates shared responsibility in making decisions with prudent principles. This digital system also solves the problem of reviewing and approving business development proposals while working from home during a Pandemic.

The research limitation is the inability to observe the impact of policies within the company for a long period of time because the process of proposing business development in the oil and gas industry, which is an inherently high risk, does take a long time. The researcher has experienced that social science can explain the implementation of organizational policies from an inward-looking perspective. A theory from political science and psychology is needed to explain the phenomenon that occurs to officials in state-owned enterprises in the decision-making process. Future research is needed to understand better the background of individual behaviour in making decisions and why digital technology fails to accommodate this problem. The full cycle of action research must be completed to find out how this model is applied in the organization, and the second cycle of SSM is also important for the improvement of the gaps identified in the first cycle.

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