

# **ANALYTICAL DEPENDENCY BETWEEN DATA AND ORGANISATIONAL GOALS: MEASUREMENT APPROACH**

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## **ABSTRACT**

*This paper proposes an approach to utilise information from operational data to support the organization goal. The challenge in this issue is how to convert this vast of data into useful information. This is critical for all enterprises to remain competitive. In this paper, we emphasized the dependency relationship involve between the variables such as organization goal, sub-goals, actions, data input and data output. This relationship is important to assist the development of data measurement, data analysis and data modelling. Simple algorithm is developed to support the relationship between the variables.*

Keywords: Data, dependency, goals, organisation, measurement

## **INTRODUCTION**

Data is very important in every organization as a backbone for organization process and performance. Therefore, the success of an organization depends on the effective usage and management of internal and external data. The behaviour of organization is relies on the activities and

strategies of the organization goals. In order to ensure the transformation of data, entire process of the organization needs to be understood. Organization has to make sure that every data created is alignment with their organization goals. So organization needs to ensure the quality transformation in order to achieve the goals. Organization must have the ability to identify, create, store and measure the data. This data is stored in a data storage such database. However, this data is very large and not all data is valuable even the development of technology is improved. This issue become recent research focus among business, management or information system researcher. Many studies and approaches has been done toward the management of data within business areas (Aalst et al., 2005; Dijkman et al., 2011; Kock et al., 2009; Liu & Lai, 2011; Rozinat et al., 2009; Song & Aalst, 2008; Turetken & Schuff, 2007).

As an attempt to utilize the quality of data in vast amount of data, this paper developed a measurement approach based on the dependency between the possible variables such organization goal, sub-goals, action, data input and data output. In order to develop basic structure for the approach, every stage of organization process is defined. This is important in order identify the possible relationship between data and organization goals. Goal is the higher achievement target in one organization. It is an outcome that need to be achieve based on the organization environment. However, several sub-goals are created in order to achieve the main goal and these sub-goals rely on the actions activities. Assume the actions are training, planning or strategy and these actions rely on the organization data. The idea behind this is to look at the measurement process of data aligning with the organization main goals.

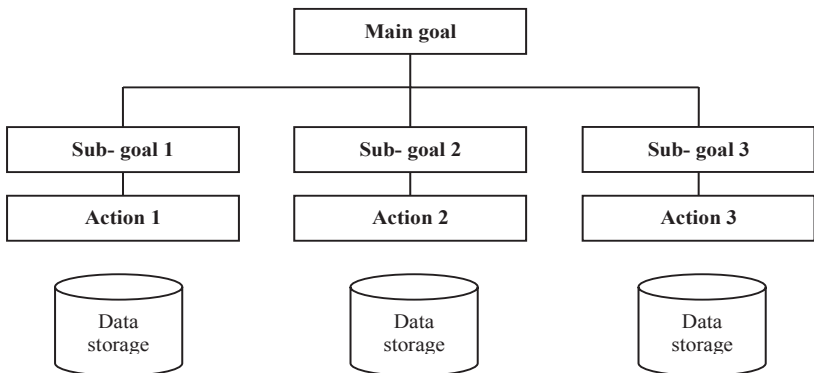


Fig 1: Goals relationship

Fig. 1 above shows simple relationship between goals, sub-goals and action. In order to achieve the main goal, several sub-goals are create to assist the process of achieving the goal. Some organization may have many sub-goals and it depends on their organization environment. These sub-goals support by action such as training, strategies or other activity. However, these actions rely on the data and it is important to understand and identify the type of data exist within their organization.

## **Organization data**

Everyday organization created new data and this has been kept in data storage. Simple example of data storage is database. However, this data is too large and some of this data may have the value and some of them may not. The available data within the organization is very important in order to assist the performance of the organization. So organization needs to identify the valuable of data toward their goals. Organization goals is an outcome developed base on the existing data and it support the overall usage of data toward the organization.

## **ORGANIZATION CONCEPT**

The concepts discuss here is the organization goals. Organization concept in this paper discusses on the goals stages within the organization. In one organization, organization has a top goals or main goals. As discussed above, these main goals supported by sub-goals in order to achieve the main goals. Thus, to achieve the sub-goals, several actions developed. Actions here define as the strategy, planning or activity to support the sub-goals. However, actions rely on the data so organization needs to understand what types of data exist within their organization.

## **PROCESS DEVELOPMENT**

This paper attempts to develop an approach to measure the quality of data as knowledge extraction toward decision making. In this paper, we attempt to look at the relationship between data and organization goal in order to develop a measurement approach. The approach is important in this

case as a tool to identify the value of data to support the organization goal. Here, decision maker needs to make sure that all the decision is parallel with the organization goal. In every organization goals and objectives, several sub-objectives is develop to support and to assist the organization to achieve the main goals and objectives. Every goal supported by organization actions such as planning and training. Thus, specific approach to achieve this goal is needed. On the other hand, the approach must support three basic functions. The basic functions are;

- *Control*: Ability to evaluate and control the resource.
- *Communication*: Well designed toward internal and external performance.
- *Improvement*: Ability to improve and identify the gaps.

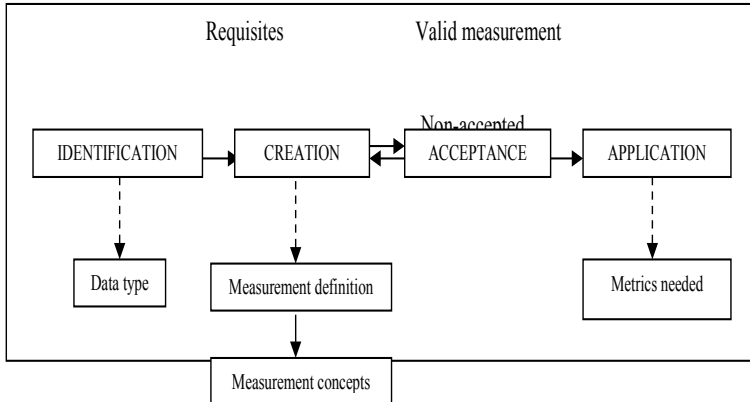
In order to attempt this approach, we try to focus on the early stage of data usage in an organization until the usage of data to support and assist the plan or action toward achieving the organization goal. Thus, three simple steps need to be investigated. The process involves;

Step 1- *Identification*; identify the data type.

Step 2- *Selection*; select type of data.

Step 3- *Quantification*; quantify the data selected toward achieving the goal. Involve the measurement approach toward organization goal.

Simple measurement development process is developed to support the process. This process helped our approach to be specified and selection of the data become more systematic. In order to assist our model development process, we adopted the process applied by Serrano et al., (Serrano et al., 2007). However, compare to them, our application focus on every steps of data step rather than software measurement. Below show the process steps.



**Fig 2: Measurement development process**

*Identification:* Identify the data to measure. Future measurement rely on the data exist within the organization. In this context, data needed is to support the organization goals.

*Creation:* Crucial phase of measurement development. The phase included two important sub-processes which are measurement definition and measurement concepts.

*Definition:* Understand the characteristic of measurement by defining several variable

to show the overall relationship.

*Concepts:* To test the relationship among the variables.

*Acceptance:* The concept is valid and can be tested.

*Application:* The measurement tested to support the metrics needed.

The process helped assist the relationship involve between data selection and this process or flow is very important to make sure the relationship development of data can be apply.

## RELATIONSHIP DEVELOPMENT

Relationship develops in this paper attempt to measure data to achieve the organization goals. The relationship runs as follows. Organization relies on data in order to run the entire organization so organization concepts, organization process and data process are defined. This data need to be measure in order to identify the quality of data. The process involved metrics approach so metrics concepts and data concepts are defined.

### Organization aspects

Understanding the concept assist the overall process in term of achieving the organization main objective. Organization need to be clarified.

#### *Definition 1: Organization*

Social group of people work in one scope of activity to achieve some develop objective. This group of people will distribute task toward implementing the develop activity.

#### *Definition 1.1: Organization entrepreneur*

Group of people or a single person that directly associated with profit-making business undertaking.

Entrepreneurs in organization is recognized as the uncertainty and tight resource constraint by individual initiative and effort (Low, 2001). This mean large organization need to develop an internal culture that allows their staff to be more initiative even though it tends to be more on experience initiative (Williams & Lee, 2009).

#### *Definition 1.2: Organization objective*

An outcome that organization developed to achieves in some particular period of time. The successful of organization plan and activity need to be parallel to the organization objective. The objective state precisely what the organization should be. Therefore, organization objective must be,

Precise: To achieve the objective, the process statement must be

exactly as state in the objective.

Timeliness: Have a time frame toward achieving the objective.

Attainment: The objective can be achieved.

**Definition 1.3: Organization action**

An outcome plan and activity that organization developed to supports and achieves the organization objective. The successful organization objectives rely on the successful implementation of organization action. Therefore, organization action must be,

Flexible: Action can adopt when the environment changes

Consistent: Always referring to the objective

Timeliness: Have time frame to perform

**Definition 1.4: Organization requirement**

Design of what must be accomplish in order to achieve some target. In organization, organization objective and organization action are important in order to accomplish the organization requirement. Here, the requirement to accomplish the target is organization main goal.

Let denote that precise, timeliness and attainment as  $P_{recise}$ ,  $T_{imeliness}$  and  $A_{ttainment}$  and flexible, consistent and timeliness as  $F_{lexible}$ ,  $C_{onsistent}$  and  $T_{imeliness}$ .

Thus, the above may be written as

$$OrgReq: (OrgObj)(OrgAct) \tag{1}$$

so,

$$OrgReq: (P_{recise}, T_{imeliness}, A_{ttainment}) (F_{lexible}, C_{onsistent}, T_{imeliness}) \tag{2}$$

where  $OrgObj$  and  $OrgAct$  is a variable for  $OrgReq$  which  $P_{recise}$ ,  $T_{imeliness}$  and  $A_{ttainment}$  are the characteristics of  $OrgObj$  and  $F_{lexible}$ ,  $C_{onsistent}$  and  $T_{imeliness}$  are the characteristics of  $OrgAct$ .

**Example 1:** In one organization, goal is an achievement target. It is an out-come that based on the organization environment. Main goals are supported with several sub-goals. For instance, in an organization, they have

several sub departments and these sub departments has their goals in order to achieve the organization main goals. However, these sub-goals depend on action such strategy, planning or training. In this case, action relies on data. So it is important for organization to identify and analyse the data.

**Metrics concepts**

Metrics models are designed to address organization process which include organization objective and to assist the decision making process. Metric must be clarified.

**Definition 1.5: Metrics**

A verifiable used to measure both quantitative and qualitative. As a volume of data increase, metric provide data refinement.

**Definition 1.6: Metrics requirement**

Metric design of what need to be accomplished during the metrics process. Specific team attempts to identify the needs toward organization objective.

Verifiable: Set of data that been agreed for converting process into measure.

Measure: Characteristics in a numerical or nominal form.

**Definition 1.7: Metrics analysis**

Requirement must be fulfilled.

Control: Metrics enable to evaluate and control the source they are measures.

Communication: Communicate externally and internally for the purpose of control.

Improvement: Identify gaps for improvement.

Let denote that metrics requirement clarify as verifiable and measure as  $V_{erifiable}$  and  $M_{easure}$ ,

$$MetReq: (V_{erifiable}, M_{easure}) \tag{3}$$



and denote control, communication and improvement as  $C_{ontrol}$ ,  $C_{ommunication}$  and  $I_{mprovement}$

$$MetAna: (C_{ontrol}, C_{ommunication}, I_{mprovement}) \quad (4)$$

Thus, above may also be written as

$$Met: (MetReq)(MetAna) \quad (5)$$

so,

$$Met: (V_{erifiable}, M_{easure}) (C_{ontrol}, C_{ommunication}, I_{mprovement}) \quad (6)$$

where  $MetReq$  and  $MetAna$  are the variables of  $Met$  which  $V_{erifiable}$  and  $M_{easure}$  are the characteristics for  $MetReq$  and  $C_{ontrol}$ ,  $C_{ommunication}$  and  $I_{mprovement}$  are the characteristics for  $MetAna$ .

**Example 2:** Organization data needs to be measure and analyse in order to support the future usage of the data. One example of good metrics approach to support the data usage is Goal Question Metrics (GQM) by Basili and Weiss, (Basili & Weiss, 1984), however this approach focus on software development rather than data measurement itself. But the concepts of GQM shows the systematic approach as it supports qualitative and quantitative analysis and the basic concepts of this approach can generalized to set up an organization measurement program even the development of this metric approach was focused more on software development

## Data concepts

Collective of raw resources and converting this data into useful information. Organization relies on data in every aspect of their actions. It is important for organization to identify, create, store and analyse this data. Data must be clarified.

### **Definition 1.8:** Data

Raw material such number or image. Organization relies on this data toward organization objective and action. Specific team use data and convert it into valuable information.

**Definition 1.9: Quality data**

Data must parallel with organization need. Data in organization need to be subject-oriented such component of subject matter and improve the effective in responding to queries. Thus, data must be,

Complete: Complete present of the corresponding data records.  
Data completeness

refer to the lack of needed fields.

Accurate: Data is correct and set a context for further analysis.

Current: Data is up to date to organization need.

Let denote that complete, accurate and current as  $C_{complete}$ ,  $A_{accurate}$  and  $C_{current}$ . Thus

$$Data: (QD) \tag{7}$$

so,

$$Data: (C_{complete}, A_{accurate}, C_{current}) \tag{8}$$

where data must be quality to support future need and performance. Data must be  $C_{complete}$ ,  $A_{accurate}$  and  $C_{current}$  in order to become quality.

**Example 3:** To improve organization performance, organization or top management rely on data from previous activity. For instance, sales manager require data on sales from last six months in order to come out with the plan toward future sales. Here, data present in form of reports or statistics and this data can assist manager to set a new goal.

**Organization process**

Organization process ( $Org_{process}$ ) can be partitioned into several process. However, organization process can be very large so in this paper, the focus of organization process is on their data existed. The algorithms are defined based on the organization goals and to shows the entire relationship of the organization goals rather than looking at the relationship between business side and data side (Seng & Chen, 2010). Our approach is to look at the organization data flow and the impact of data toward organization

goals. Our approach also intended to look at the relationship between the organization goals.

**Definition 1.10: Process input**

During processing, data involve called process input ( $P_i$ ), where  $\rightarrow$  is an involvement process. So decide

$$\text{Org}_{\text{process}} \rightarrow P_i \quad (9)$$

**Definition 1.11: Process output**

Every process generate output, so decide organization process involve process output ( $P_o$ ) where  $\rightarrow$  also is an involvement process.

$$\text{Org}_{\text{process}} \rightarrow P_o \quad (10)$$

## Data process

Data process ( $D_{\text{process}}$ ) can also be partitioned into several process. Here, process shows the flow of data within the organization.

**Definition 1.12: Data input**

Every stage of process involved data input. Every organization created data almost everyday and this data is store in data storage such as database. So data process involve data input (IN).

$$D_{\text{process}} \rightarrow \text{IN} \quad (11)$$

**Definition 1.13: Data output**

Process generated output. Data store in data storage need to be evaluated to make sure that the data is valuable for certain action. So decide data process involve data output (OT)

$$D_{\text{process}} \rightarrow \text{OT} \quad (12)$$

Let,  $Org_{process} = P_i, P_o$ , where  $\epsilon$  is a characteristic  $x$  can find in  $P_i$ . For example  $y$  is an output of  $x$

$$Org_{process} = \{Org_{process}(x, y) | x \in P_i, y \in P_o\}. \tag{13}$$

Then organization process can summarize as

$$Org_{process} = \{Org_{process}(IN, OT) | IN \in P_i, OT \in P_o\}. \tag{14}$$

It shows the entire  $Org_{process}$  rely on  $IN$  and  $OT$ . Here,  $P_i$  rely on  $IN$  and  $P_o$  rely on  $OT$ . The process define as  $y$  depend on  $x$  and it concludes as  $OT$  rely on  $IN$ .

As defined in *Definition 1.4*, objective and action are the main requirement to achieve the develop target within the organization. Develop target is organization main goals. Objective here can be assumed as sub-goals in order to assist the achievement of main goals.

Here we already defined organization requirement as

$$Org_{requirement} : (Org_{objective})(Org_{actions}) \tag{15}$$

and organization process as Eq. (14) and assuming organization requirement as goal and objective as sub-goals

$$Org_{goal} = (Sub_{goals}, A_{ctions}) \tag{16}$$

so full relationship can be develop here as

$$Org_{goal} = (Sub_{goals}, A_{ctions}), Org_{process} = \{Org_{process}(IN, OT) | IN \in P_i, OT \in P_o\}. \tag{17}$$

Summarize as

$$Org_{goal} = \{Org_{goal}(x, y) | x \in A_{ctions}, y \in Sub_{goals}\} \tag{18}$$

SO

$$Org_{goal} = \{Org_{goal} (IN, OT) | IN \in A_{ctions}, OT \in Sub_{goals}\}. \quad (19)$$

It summarizes the entire relationship as  $Org_{goal}$  rely on  $Sub_{goals}$  and  $A_{ctions}$ . But as we understand, organization relies on data to support achieving the goals. So, full relationship is defines as  $Sub_{goals}$  is an  $OT$  of  $Act$  where  $Sub_{goals}$  and  $A_{ctions}$  are the requirement for  $Org_{goal}$ .

**Example 4:** In organization, the concept required the organization to achieve the target goal (main goal). Main goals supported with several sub-goals ( $Sub_{goals}$ ) in order to achieve the main goal. However, the sub-goals need to be well plan so that it can be achieve and action ( $A_{ctions}$ ) is required toward achieving the sub-goals toward the main goals.  $A_{ctions}$  such as training, planning and strategy rely on the data. Top management must know the type of data exist within the organization. Vast amount of data is created almost every day and this data has been stored in data storage (database). This is data input ( $IN$ ) and  $A_{ctions}$  are important to support the sub-goals. Data need to be identifies it value if it is useful or valuable enough toward the sub-goals and this is the output ( $OT$ ) of the data.

## Measurement process

Previous section discussed on the relationship between the variable which are  $Org_{goal}$ ,  $Sub_{goals}$ ,  $A_{ctions}$ , data input ( $IN$ ) and data output ( $OT$ ). However, in order to support the data measurement and this relationship, the following approaches are applies. First we already defined  $Org_{process}$  as Eq. (14) and overall relationship of  $Org_{goal}$  summarized as Eq. (19).

In order to support the data over the measurement process, several aspects are discussed. The main variables here are data input and data output where  $n$  is a number of variables. So

$$Data\ input\ (IN) = x_1, x_2, \dots, x_n \quad (20)$$

$$\text{Data output (OT)} = y_1, y_2, \dots, y_n \tag{21}$$

and  $\rightarrow$  is involvement aspect

$$\text{Data input (IN)} \rightarrow \text{Process Input (P}_i\text{)} \tag{22}$$

$$\text{Data output (OT)} \rightarrow \text{Process output (P}_o\text{)} \tag{23}$$

where IN is  $X$  and OT is  $Y$ . Here we show the relationship as

$$\text{Org}_{\text{process}} = \{\text{Org}_{\text{process}}(x_1, \dots, x_n \in P_i) | x(y_1, \dots, y_n \in P_o)\} \tag{24}$$

$$\text{Org}_{\text{process}} = \{\text{Org}_{\text{process}}(\text{IN} \in P_i) | \text{OT} \in P_o\} \tag{25}$$

where  $\text{Org}_{\text{process}}$  rely on IN toward  $P_o$ . Then, the entire measurement process toward organization goal is

$$\text{Org}_{\text{goal}} = \{\text{Org}_{\text{goal}}(\text{IN} \in A_{\text{ctions}}) | x(\text{OT} \in \text{Sub}_{\text{goals}})\}. \tag{26}$$

The explanation shows the relationship than involve the variable aspect toward organization goal. It is important for organization to identify the data that involve toward the goal and the approach applied the process of data input and data output. Summarized the overall relationship as  $\text{Org}_{\text{goal}}$  is the process involving data input and data output toward  $A_{\text{ction}}$  and  $\text{Sub}_{\text{goals}}$  where  $\text{OT}$  rely on  $\text{IN}$ . Here,  $\text{IN}$ ,  $A_{\text{ctions}}$ ,  $\text{OT}$  and  $\text{Sub}_{\text{goals}}$  are independent variables where  $\text{Org}_{\text{goal}}$  is dependent variable.

## CONCLUSION

This paper discussed the overall concept development of data measurement. Several variable such goals, sub-goals, action, data input and data output are defined. This paper also discussed the entire relationship of organization process toward data usage. Definitions are provided in order to assist reader to deeply understand the concept.

The intent of this paper is to discuss the important of data measurement in order to support organization goals toward their performance. We have defined some variables as a basic structure for the measurement model. This paper limit to organization goals and data usage and we hope future action can focus on other aspects of the organization. The paper also intent to present some guidelines for goal structure development and in the next stage of our study, we intend to apply this approach and see the gap of this approach. It is our hope that this paper and approach can contribute for this very important issue.

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