Data-Driven Decision Making: Qualitative Study at Digital Startup using Semantic Domain Analysis

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Abstract: Business Intelligence (BI) is commonly applied to large companies, but there are a few evidence of BI practice in startups. Although startup founder understand that data and information are very important, but how this used for decision making needs to be further explored. Through interviews with four startup's founders, the transcript result were analyzed using domain semantics and taxonomy analysis. Several findings are outlined which are followed by suggestions for future research.

Keywords: Information, Knowledge, DIKW, Decision Making, Taxonomy Analysis.

1. INTRODUCTION
Business Intelligence (BI) is considered as the art of gaining profit through a “data”, where BI includes business analyses, enterprise reporting and performance management [1]. In a survey of the state of business analysis conducted by Bloomberg Business Week (2011), 97% of companies with revenues exceeding $100,000,000 were founded using some form of business analys [2]. This indicates that enterprise companies need an analysis of the business they are running based on the data they informed. The results of the analysis then produce a knowledge and reported to support in determining a decision for corporate strategy.

BI mostly refers to systems, applications and technology used to collect data from various sources, processed and displayed in the form of information which usually an easy-to-read. BI is used to measure and analyze as well as to monitor operations within an organization with the aim of helping decision makers to make decision more effectively. The succeed of BI analysis lies in the processed data and information. Structured data analysis and BI are common among large companies or enterprises. However, whatabout a start-up company that is known for its minimal operating history and limited resources. Startups should strive to achieve their space in dynamic market to survive and grow. Comparing to larger companies, startups have differences in terms of their structures, resources available, environmental response and the way they compete in the market [2, 3]. It should come a little surprise that eventhough unicorn startups in Indonesia are on the rise, the development of new startups have decline over the past years [4]. Starting and closing a business is an ongoing process, and for startups, the failure rate can also reach 90% [5]. While there are many issues that can create or brake the success of startups, BI become increasingly important for company all size.

A startup has seen its potential to become a market leader through its ability to develop the market for the next 4-5 years. Thus, marketing strategy is the one of the main thing that startups must pay attention to. Many startup founders understand that there is important information contained within their company data. But how to collect the information, convert into knowledge and using that for the purpose of decision making, it is still not clear. How far has BI been done at startups or is it limited to
provide business analytics (BA) only. Through exploring the use of data and information for the needs of marketing strategies for digital startups, this article aims to answer how data and information quality have an impact on decision making of digital startup marketing strategies for business analysis and how decision making at digital startups has an influence on the choice of marketing channels that lead to disruptive marketing.

2. THEORETICAL BASIS

2.1 DATA, INFORMATION AND KNOWLEDGE

Starting from TS Elio’s poem, DIKW was mapped by Milan Zeleny into four elements [6]. They are “know-nothing; know-what; know-how and know-why which have a connection from context increasingly to understanding [7]. Information is related to the understanding relations; knowledge related to the understanding pattern and the last understanding principles which leads to wisdom [9].

Knowledge comes from information that is processed from available data in various sources. Data has no meaning. Data is a collection of facts, concepts or instructions on storage that are used for communication and processing automatically which presents information that can be understood by humans [8]. It can be as objects, events, activities and transactions that are recorded, grouped and stored but have not been organized to convey a certain meaning [9]. Data becomes meaningful after it becomes information. Information is much easier to identify, organize and distribute while knowledge is more difficult to manage because it is generally attached to individual mind [10] It is called as tacit knowledge. Knowledge is identified as a combination of information and experience. Therefore, the knowledge possessed by each individual is unique, depending on the environment, culture and other factors that formed it up [11].

2.2 BUSINESS ANALYTICS VS BUSINESS INTELLIGENCE

Business analysis (BA) can be defined as a process that begins with the collection of business-related data and consists of the sequential application of the main descriptive, predictive and prescriptive analytical components, whose results support and demonstrate business decision making and organizational performance [12]. According [2], BA was introduced to represent the key analytical component in BI.

BA includes simple analytical procedures but requires that the results of the analysis have a measurable impact on business performance. Some of the differences between BA and BI lie in the role of business performance planning. When information on what is happening now and in the future is provided, BA will show what is the best strategy for dealing with them, while BI provides information on what has been done to deal with it. For this reason, BI did not carry out predictive and prescriptive analyzes, only limited to historical data.

2.3 DECISION MAKING

Quality decision-making depends on asking the right questions to the analytical tools or human. In term of strategic management studies, decision making is defined as a decision that is used to achieve the goals set by management. Meanwhile, in the Information Systems study, decision making is used to measure the performance of the IS itself [12]. Decision making style is closely related to cognitive style which often refers to individual thinking practice [13]. Therefore, this style is related to how their perception about data and information gathering.

3. RESEARCH METHOD

The social situation in this study focuses on how decision making will affect marketing activities in the era of disruption. For this reason, chosen organization was closely related to the term of innovation and disruption with characteristic as digital startups. The
triangulation method is used which combines the methods of observation, interviews and documentation at each step of data collection, processing and analyzing. Passive observations were made at the beginning before conducting semi-structured interviews with four digital startups chosen. The selection of startups was based on funding and types of services. Because this study used a purposive sampling type where data collection was carried out on some one who was considered to know the most, only the CEO, founder or co-founder who was interviewd related to this topic.

3.1 INTERVIEW INFORMANT
Through mobile application services, startup GRS aims to help the entertainment industry to develop its business by utilizing digital platforms to market their events. Startup A is also a market channel for venue owners, event organizers, communities and advertisers to inform their activities. By downloading this apps, everyone can immediately find out what current and in the near future activities. This digital startup is also equipped with a ticket sales and purchase platform. Currently, more than 20,000 people have downloaded this apps with 40% of active users.

Startup KAT is a B2B service that creates a chatbot platform for commercial. The engineering team analyzed consumer behaviour data through millions of text messages they previously received from previous startup. This data is used for the development of artificial intelligence technology in order to interpret complex sentences structures. Startup KAT adopts natural language processing technology in translating the context of the the conversation, therefore it can provide relevant answer to any questions asked. This technology allows brands to interact and transact with consumers more quickly and efficiently.

Startup SON was founded firstly in 2014, is an analytical platform for social and digital media that focuses on analyzing public sentiment. This startup helps companies understand what their target market by monitoring more than 80 online media or social media, 5 major forums and blog at all times. Startup SON claims that currently the platform has been trusted by several large companies such as XL Axiata, Pertamina, Air Asia and others.

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<th>Table 1. Interview Informant</th>
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Startup KOF is a marketing automation platform provider, offers four fundamental modules, campaign builder; optimizer; monitoring and analytics. The four ofthem are integrated with digital channels which include search, display, remarketing and social media. KOF is the first startup from Indonesia which provide a Software as Service (SaaS) marketing automation platform based on artificial intelligence and machine learning. By digital marketing campaign, KOF plays the role of integrating and automating the marketing process to be more effective with the resources currently owned by the company.

3.2 DATA COLLECTION
As far as data collection is concerned, we gathered data through deep interviews to 4 (four) reputable founder or CEO. Interviews lasted 48 min on average and were tape-recorded before transcription. As our work progressed, we regularly went back to our interviewees to ask them for clarifications and further details. There are 4 groups of questions related to (1) data and information quality; (2) Business Analysis; (3) Decision Making and (4). Marketing strategy. Each group has 3 question using “How”, “What” and “Why”, which are open questions. Tabel 2 shown the question we provided.

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<th>Tabel 2 Interview Questionaire</th>
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<td>Variabel</td>
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What are the characteristics of good data and information quality and how can this be obtained?
What should be done to maintain the quality of the data and information?

**DM**
What are the considerations when making a decision?
How big is the role of data and information in decision making?

**BA**
How is business analytics done?

**QT = Quality Data; DM = Decision Making; BA = Business Analytics.**

### 3.3 DATA ANALYSIS

We analyzed data using semantic domain analysis (Gliozzo, 2006; Gardenfors, 2017). In domain analysis, there are 3 interconnected elements, namely the domain name, semantic relationship that connects the categories and domain details. We used three semantic relationships: function, means-end and inclusion. Semantic relationships are the associations that exist between the meanings of phrases or between the meanings of sentences (Storey, 1991).

The semantic function relationship has the form “X used for the Y function”, which in this case is done to analyze the importance of the data according to the informant’s perception. From the question of how important is the data from the perceptions of informants, there are four important points from the interview were formulated: (1). forecasting; (2). fault prevention; (3). strategy approach customer supporting and (4). decision making base.

The semantic means-end relationship has the form “X is a means of achieving the goal Y”. Interview questions about how to know about the quality of data, with this analysis, there are two dependencies in obtaining data, (1) Identification of information and knowledge to acquire good quality data and (2) whether the generated data comes from real users or data sources that have proper credibility. Some informants admitted that relying on third parties made their work more efficient, while others admitted that they were doing their work by continuous research, transparency and processing quality. All informants gave their opinion that business analytics obtained from data processing is very helpful in supporting the business in terms of making decisions to meet the goals of stakeholders. At certain times, informants said that in making decisions, they do not use data when the data has been transformed into knowledge. However, this is very rarely done when the decision is closely related to the company’s strategy, including the marketing strategy.

The semantic inclusion relationship has the form “X is type Y”. Using this analysis, we conclude the interview result that information at digital startups can come from various sources, internal (knowledge embedded within the startup) and external (media, customer, competitor and others).

### 4. RESULT AND DISCUSSION

In what follows, we present in greater detail each important variable that impact to the decision making in digital startups and how this decision making has an influence on the choice of marketing channels that lead to disruptive marketing. Based on analysis of informant’s transcript, the strategic decision making are mostly related to the marketing and finance. It needs to consider two important things, data-information-knowledge and opportunity cost. The strategic of marketing looks at two things, the marketing channel and the business model is applied. For B2C startups, the strategic focus lies on social media, where as B2B business model focuses on traditional marketing strategies.

#### 4.1 DATA-INFORMATION-KNOWLEDGE

Data and Information are important considerations used by informants in making decisions, but only few are able to transform into knowledge. As has been explained that knowledge is a combination of information and
experience. When data and information comes to quality, it needs to be seen from how to collect the data and maintain the information. Information does not become innovation if the converting into knowledge fail. But this conversion requires several processess. By interviews, we understand that knowledge in decision making obtained mostly based on the experience and prior knowledge of the founders attached to the startups digital. This knowledge serves as forecasting, fault prevention, strategy approach customer supporting and decision making base. Data and information utilization consider two things: data functionally and data quality. Functionally, data is used to support forecasting, fault prevention, strategic approach to customers and the basis for decision making. Meanwhile, in terms of quality, the informan said that quality data was seen from how the data and information was collected (data collection) and data maintenance.

4.2 OPPORTUNITY COST
When it refers as a resource, opportunity cost means the value of the next-highest-valued alternative use of that resource. Opportunity cost here is defined as the price of the next best thing we could have done had we not made we first choice (Kennon, 2020). It includes both implicit and explicit costs. Opportunity costs that must be incurred when choosing a particular business activity. There are 4 factors that drive successful decision making (Yeager & Sommer, 2019), executive knows the business situation that is being carried out; knows the role and act effectively, has clear ambitions and goals; the last, executive has thoughts of being cost-effective in making decisions.

In startups, marketing strategy looks at two things, the marketing channel and the business model being applied. If the business model uses B2C then the strategic focus lies on social media, vice versa, if it is B2B the strategic focus is on traditional marketing.

5. CONCLUSION AND FUTURE RESEARCH
In terms of data-information-knowledge, the consideration in decision making at digital startups commonly focus on marketing efficiency and effectiveness of the marketing channels used. There is difference approached of strategy for B2B startups and B2C startups. Although data and information have important role for decision making, but in term of knowledge, it still depends on the prior knowledge of founder and co-founder which is difficult to be codification. Therefore, some cases indicate that the decision was made still based on the founder’s instinct.
For future research, it is necessary to explore the decision making in specific startups field such as e-commerce, transportation, culinary and other services. The quantitative study also should be considered to explore the relation between BI/BA, knowledge absorption and decision making in startup digital.

REFERENCES


