Multi-Sided Networks of Digital Platform Ecosystem: The Case of Ride-Hailing in Indonesia

Mohammad Nabil Almunawar[a,*], Muhammad Anshari[b]

[a] Associate Professor, School of Business and Economics, Universiti of Brunei Darussalam, Brunei.
[b] Researcher, School of Business and Economics, Universiti of Brunei Darussalam, Brunei

A B S T R A C T

The business world has been undergoing a digital transformation. The adoption of multi-sided digital platform across the world has sped up this transformation. Multi-sided digital platforms create value by mediating inter-actions and transactions of distinct groups of users. A platform and its stakeholders need to be considered as a business ecosystem. Elements or components in the ecosystem exchange values and together form a network of exchange values. The objective of this paper is to construct a framework for crafting and observing digital business ecosystems. The foundation theories used to construct the framework are transaction cost econo-my (TCE), multi-sided markets, and value network. This paper uses Go-Jek, a growing ride-hailing platform from Indonesia, as a case to discuss how the framework works in mapping Go-Jek's digital business ecosystem, and then explain its expansion strategy. This paper has both theoretical and managerial contributions. It provides a formal definition of digital business ecosystems as a network of exchange values. The framework does not only help studies the existing business ecosystems but also can be used to craft a new business ecosystem. It can also be used to study value exchanges within the ecosystem, assessing or crafting ecosystem expansion strategies.

Keywords: Digital Business Ecosystem, Go-Jek, Multi-sided Markets, Value Exchange Network

Ⅰ. Introduction

Digitalization of business, whether internal or transaction-related processes, has contributed to the significant improvement in the efficiency of business processes and at the same time offers businesses to reach their customers directly by selling prod-ucts/services or to have a closer relationship with them. In addition, if products/services can be digi-tized, a full dimension of digitalization can be ach-ieved through digital delivery.

The birth of many new business models, including digital platform (platform for short) businesses, is an interesting development since the introduction

*Corresponding Author. E-mail: nabil.almunawar@gmail.com

of the Web. While earlier platform firms like e-Bay and Craigslist continue to grow, enjoying the advantage of their multi-sided platforms, expanding their business globally, the popularity of platform-oriented business models continues to rise. Steve Job led the transformation of Apple, which was on the brink of collapse, from a close innovation of a product-oriented company, to open innovation of a platform-oriented company (Cusumano, 2012). This created a very large ecosystem, where a myriad of independent software developers contributes to co-create value centering on iOS through iPod, iPhone, and iPad.

The main focus of platform-oriented business models is different from traditional business models. Most traditional business models focus on the selling of products or services, so the value is created and delivered to customers, and then captured through the customers' payments. In contrast, platform-oriented business models focus on matching or connecting two or more different groups of customers and the value is created by facilitating them to transact, and more values are generated through the expansion of networks centered in the platform (network effect).

This can be illustrated by comparing the traditional taxi with ride-hailing taxi firms. The traditional taxi firms sell taxi service to passengers. To create the service, a taxi firm needs to own and maintain taxicabs as well as hire drivers. Drivers deliver the taxi service to passengers and capture the value of service through payments from passengers. In contrast, a ride-hailing platform, such as Uber or Go-Jek, does not need to own taxicabs or hire drivers. The platform's main function is to connect drivers who own cars with passengers. A passenger uses his/her smartphone to find and order a taxi through the platform. Once the order is confirmed, the driver will find the location of the passenger, pick up, and transport him/her to the requested destination.

The platform firm' concern is to expand the networks, which are essentially a two-sided network, that of the drivers and passengers. The more passengers join the network, the more valuable the platform becomes, and hence more drivers will be attracted to join the network of drivers. Similarly, the more drivers join the network, the more valuable the platform is to the passengers. This is called the network effect; in this case, the cross-network effect, which can make a platform grows very fast if the platform firm has the right expansion strategy. Further, unlike the traditional taxi business model, the platform-oriented business model of a ride-hailing taxi can be expanded easily to support a multi-sided network beyond the taxi service, such as providing courier and food delivery services.

Many pieces of evidence show that platform-oriented business models outperform traditional business models. For example, the previous king of cell phone firm, Nokia, and the previous dominant player of messenger services, BlackBerry, whose business models are selling products or services to customers, dearly lost to platform-oriented players, Apples and Google's Android as admitted by Nokia's former CEO (Thornhill, 2016). According to Moazed and Johnson (2016), platform-oriented businesses will dominate the business world in the 21st century. A survey conducted by Accenture confirmed this as the survey found that "81% of executives say platform-based business models will be core to their growth strategy within three years." (Accenture, 2016).

Two-sided, in general, multi-sided markets theory explains the economics of platforms with two or more user groups (Eisenmann et al., 2006; King, 2013; Parker and Van Alstyne, 2005; Rochet and Tirole, 2003; Rochet and Tirole, 2006). Platforms create value by mediating interactions and trans-

actions of distinct groups of users. A network effect is expected if the main group of users reach a critical mass, and this leads to the quick expansion of the platform ecosystem. Deciding which group of users to be the main one is known as the "chicken and egg problem" which needs to be carefully solved.

A platform and its stakeholders that affect or are affected by the platform need to be considered as a business ecosystem. Each element or component in the ecosystem has a role(s), and their interactions create values. Components of an ecosystem and their interactions and network, hence a business ecosystem can be observed through the lens of value network (Allee, 2008; Stabell and Fjeldstad, 1998). In a value network, values are co-created by each node in the network through interactions (de Oliveira and Cortimiglia, 2017).

The main objective of this paper is to propose a framework for observing digital business ecosystems and use it as a tool to observe or develop a strategy for expansion by offering more values through a value co-creation strategy. We use Go-Jek, a leading and fast-growing ride-hailing in Indonesia, to apply the framework in mapping Go-Jek Ecosystem and observing its expansion strategy. The main contribution of this paper is a framework to map and analyze business ecosystems. Application of the framework to Go-Jek allows the following questions to be further explored: 1) What is Go-Jek's core business ecosystem? 2) How does Go-Jek initiate, develop, and maintain its ecosystem?

The rest of the paper is structured as follows: Section 2 is the literature review on some concepts and related issues; Section 3 discusses the methodology; Section 4 discusses the framework; Section 5 explores Go-Jek's business ecosystem, and Section 6 discusses Go-Jek's network expansion and competitive strategies. Finally, Section 7 is the conclusion.

Ⅱ. Literature Review

This section discusses the literature review that leads to the construction of the framework for mapping digital business ecosystems, especially that of multi-sided platforms. As the topic is multi-disciplinary, the literature comes from different areas such as information systems, economics, management, and social sciences such as social exchange theory in sociology and psychology. It starts with the technical construct of digital platform, and then moves to the economics foundations of digital platform business models, which are the transaction cost economy (TCE) and multi-sided market theory. The last part discusses business ecosystem system theories, especially on value exchange value network theories to construct a value exchange network, the foundation of our framework. Value co-creation and its roles in an ecosystem will also be discussed.

2.1. Digital Platform

There are many views on digital platform, ranging from viewing it as a physical entity, transactional intermediary, multi-sided networks, to value creation entity in an ecosystem. There is vagueness or ambiguity in conceptualizing what digital platform is (Asadullah et al., 2018).

A digital platform is considered as a system construct for developing products, services, and technologies (Spagnoletti et al., 2015; Yoo et al., 2012). For example, a digital platform like Soureforge.net is a platform for developing open-source software. Cloud computing platforms are information technology service platforms, offering three types of services, software as a service, platform as a service, and infrastructure as a service (Almunawar and Almunawar, 2018). Of course, social networks such

as Facebook, Instagram, and online communities like Wikipedia and LiquidFeedback are also digital platforms (Spagnoletti et al., 2015) that facilitate people to communicate and interact regardless of space and time.

Recently, especially during the Covid-19 outbreak, there is a growing number of transactional platforms. They facilitate transactions or exchanges between sellers and buyers, for business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C) transactions. Many buyers practice multihoming (Koh and Fichman, 2014), using competing platforms to extend their options. Transactional platforms are very different from service or product platforms in their structures and business models. Transaction platforms are multi-sided platforms (Hagiu and Wright, 2015; Tan et al., 2015). However, it is not the other way around. For example, an operating system such as Android, Windows, and Linux are multi-sided platforms, linking software developers, users, and hardware manufacturers, but they are clearly not transactional platforms.

The majority of digital platforms are two-sided or multi-sided (Chakravorti and Roson, 2006; Eisenmann et al., 2006; Parker and Van Alstyne, 2005). However, a digital platform can also be one-sided such as a digital platform for telephone or internet service providers. The root of a two-sided or multi-sided platform is the two-sided market theory in which the platform manages two or more different but interacted markets (Armstrong, 2006; King, 2013; Rochet and Tirole, 2004). A platform needs to develop strategies to grow and to compete with similar platforms (Armstrong, 2006; Eisenmann et al., 2006; Feng et al., 2019; Parker and Van Alstyne, 2005).

2.2. Transaction Cost Economy, Two-sided and Multi-sided Markets

The main function of a multi-sided platform is to mediate two or more groups of customers to transact. Transaction cost economy (TCE) theory (Coase, 1937; Williamson, 1979; Williamson, 1981; Williamson, 1989) provides a good reason for the recent popularity of platform-based business models. In general, a transaction cost is a cost incurred during the exchange of goods or services, which may include searching cost, communication cost, legal fees, and commission fees.

Suppose S is a supplier, C is a customer, and I is an intermediary. Intermediation is likely to happen if $T_{SC} > T_{SI} + T_{CI}$, where T_{SC} is the transaction cost between S and C, and T_{SI} is the transaction cost between S and I, and T_{CI} is the transaction cost between C and I (Klein and Selz, 2000; Sarkar et al., 1995). For transaction-based platforms such as ride-hailing, platforms greatly reduce the transaction cost between groups of customers by cutting down prices to nearly zero of searching and communication costs. In some cases, such as ride-hailing, platforms create new markets by digitally linking S and C, which was previously difficult or impossible to do.

Three important factors govern transactions, which are the frequency of the transactions, uncertainty, or disturbance of transactions, and asset specificity (Williamson, 1981; Williamson, 1989). Asset specificity is any form of an asset owned by a firm that can create a dependency on customers. In the case of a platform, the main asset specificity is the multi-sided market of its customers, or in general its business ecosystem.

In a two-sided market, the intermediary controls transactions between two distinct groups of customers. Two-sided markets or in general multi-sided markets

are highly related to the theory of network externality (Katz and Shapiro, 1986; Katz and Shapiro, 1992; Katz and Shapiro, 1994). Network externality is the effect of additional customers or users of a particular product or service on the utility of existing customers or users to the same product or service. Positive externality means additional customers or users that join the network will increase the utility of the product or service, and negative externality is the opposite. A classic example of a product that exhibits network externalities is the telephone. The utility or value of a telephone increases if the total number of telephones in the network increases.

Katz and Shapiro (1985) also highlight indirect network externalities, which was discussed further by Clements (2004). Complementary products or services create indirect network externalities. For example, the utility of a smartphone increases along with the increase of social media applications available for the smartphone and the number of social media applications increases along with the increase of the total number of smartphone users. Indirect network externalities can take place in more than one related networks linked by an intermediary. For example, the utility of a credit card platform to its customers increases alongside the increase of total number merchants that accept the credit card issued by the platform. Similarly, the utility of a credit card platform to merchants increases along with the increase of the total number of customers of the platform. Intermediated indirect externalities are two-sided markets or networks where the network externality of one side is dependent on the size of the other side (Rochet and Tirole, 2004; Roson, 2005).

A two-sided market has two or more different types of customers or users who transact through an intermediary or a platform, in which the volume of transactions is sensitive to the allocation of price between the two sides. Rochet and Tirole (2004) provide a formal definition of two-sided markets by comparing it to a one-sided market in two connected markets. The literature on two-sided markets also discusses how an intermediary creates a price structure that attracts both sides to join the platform (Armstrong, 2006; Chakravorti and Roson, 2006; King, 2013; Rochet and Tirole, 2003; Roson, 2005; Rysman, 2009).

Price allocation between two-sided networks is key in internalizing value for the platform to make a profit and growth. In general, a platform can design two prices, fixed and variable prices (such as subscription and usage fees) for consumers from both sides to attract and retain them. (Parker and Van Alstyne, 2005) develop an interesting model of two-sided networks that explains how a platform creates a price structure to internalize the externalities. A good price allocation will help grow both side networks. However, price allocation should be accompanied by a proper strategy for the expansion of the networks by developing and maintaining the business ecosystem centering on the platform.

2.3. Business Ecosystem, Value Exchange, and Value Network

Like an ecosystem in Ecology, a business ecosystem is composed of diverse interdependent entities or actors, where each entity contributes to the existence of the ecosystem. The concept of business ecosystem was introduced by (Moore, 1993; Moore, 1997) to describe that a firm is interconnected and interacts with other firms or business actors in producing value to satisfy customers' needs. This concept was taken by many researchers (Cennamo and Santalo, 2013; Clarysse et al., 2014; Corallo et al., 2007; Gueguen and Isckia, 2011; Iansiti and Levien, 2004b; Jacobides

et al., 2018; Jansen et al., 2013; Kamargianni and Matyas, 2017; Karhiniemi, 2009; Kim et al., 2010; Koenig, 2012; Weber and Hine, 2015; Zahra and Nambisan, 2012). In the business ecosystem view, a company exists within its ecosystem; it influences and is influenced by other components or actors in the ecosystem. Although researchers in business ecosystems agree that a business ecosystem is a network of its actors, there is a lack of study on how this network is constructed and the detail on how the participants interact. This gap will be addressed in the next section.

In every business ecosystem, there must be a leader or keystone that controls the communication and transactions within the ecosystem (Iansiti and Levien, 2004b). In a business ecosystem, the value creation of the keystone is crafted based on value created by other entities. Hence, the keystone needs to care about the value, well-being, and the growth of other entities within the ecosystem. In other words, the keystone needs to make sure symbiotic relationships with other entities and among entities so that together they co-create values and maintain a healthy business ecosystem (Anggraeni et al., 2007; Iansiti and Levien, 2004b; Moore, 1997).

In a multi-sided market ecosystem, the platform is the keystone of the ecosystem. According to (Iansiti and Levien, 2004a; Iansiti and Levien, 2004b), the platform needs to have an effective strategy to keep its business ecosystem healthy and productive. The strategy must focus on efficient value creation and then share the value with other entities or participants in the ecosystem.

The main value of the keystone is as an enabler that governs interaction and exchanges values among other entities in the ecosystem. Besides, the keystone co-create value with other entities (Ceccagnoli et al., 2012; de Oliveira and Cortimiglia, 2017; Prahalad

and Ramaswamy, 2004). Consequently, the value of an entity is amplified by the keystone. This can be explained with the following example. Suppose a digital marketplace platform P is the keystone of a simple business ecosystem that contains buyers (B) and sellers (S). Individually, the value of P, B, and S are V_p, V_b, and V_s, respectively. The value of S seen by B is $V_s + V_p$, and the value of B seen by S is $V_b + V_p$.

To see this value co-creation clearly, we need the concepts of value exchange and value network. The value exchange theory has a strong root in social exchange theory (Blau, 1964; Emerson, 1976; Homans, 1958). In social exchange theory, a social relationship between people always involve giving and taking. In other words, the cost and benefit of a social relationship must hold. A social relationship will sustain if there is a balance between cost and benefit in the relationship. Blau (1964) limits social exchange as contingent and rewarding actions from others, which is a mutually contingent and rewarding process between two actors involving transactions (Emerson, 1976). However, social relationships are complex; more than two actors are involved in the relationships. Therefore, a complex social relationship is a composite relationship constructed by a network of social exchanges.

In businesses, the social exchange can be reduced to value exchange when one party gives value and expects to receive a comparable or better value from the other party. However, most business activities involve many parties; hence a network of exchange value is formed. There are several value networks theories in the literature (Allee, 2008; Christensen and Raynor, 2013; Peppard and Rylander, 2006; Stabell and Fjeldstad, 1998). However, only Allee (Allee, 2000; Allee, 2008) explicitly discusses the structure of the network. The key concept of Allee's

value network is value conversion where agents engage in intangible and tangible exchanges to achieve economic or social good. In addition, it is interesting to note that Stabell and Fjeldstad (1998)'s value network as an extension of Porter's value chain concept (Porter, 1985). A business applies a value network if it mediates customers or clients. The business itself is not a network, but it provides a networking service to facilitate exchange between customers. Thus, the network is the interaction among customers, and the value network is the value created by providing services that facilitate the matching among customers.

Ⅲ. Research Methodology

This study proposes a new framework that utilizes quality literature to serve as the foundation for the proposed framework. Quality literature enables validation of the original theory proposed to ensure the validity of the study and reliability of the results (Barnes, 2005). Quality literature is vitally important to ensure that the theory and principles that underpin the research are well established and that they fit with the research methods proposed. The previous section has ascertained the theory and principles that underpin this research and in investigating views of development, the primary research sought to uncover the theories within the digital business ecosystems for multi-sided platforms, transaction cost economy (TCE), multi-sided market theory, and value exchange value network theories.

The research suggests a three-staged literature review process to guide in the development of a sound and effective literature review for proposing a framework. The three stages of the proposed literature review process are 1) Inputs, 2) Processing and 3) Outputs. <Figure 1> provides an overall view of the

process-oriented framework proposed (Levi and Ellis, 2006).

<Figure 1> Three Stages of Proposing Framework (Levy and Ellis, 2006)

The inputs stage in the process will address issues related to find relevant literature. The input in this process is developing a framework of the business ecosystem using Stabell and Fjeldstad's value network, multi-sided markets, and Allee's value network theories to configure the price allocation strategy and value exchange in the core part of the business ecosystem, and Allee's value network theory to configure value exchange in the ecosystem and the co-creation of value for the ecosystem health and expansion. Processing involves qualifying the literature (i.e., validating literature quality – peer-reviewed work vs. non-peer-reviewed work, various quality levels of peer-reviewed work, etc.), as well as how to read research literature (i.e., cognitive/construct-level, literature streams, theories). The outputs stage in the process addresses issues related to writing the actual literature review and describing the impact of the body of knowledge on the proposed framework. It is where the justifications for a case study approach involving the case raid hailing is an emerging issue that would benefit from exposure to potential theoretical foundations (Webster and Watson, 2002).

Following the literature study, a framework of digital business ecosystem is constructed based on the integration of several relevant concepts. To test the framework, a rapidly growing (considerably the larg-

est), relatively new multi-sided platform in Indonesia, Go-Jek, is chosen as a case. The framework is applied in mapping Go-Jek's business ecosystem and exploring its expansion strategies.

Ⅳ. Value Exchange Network – A Business Ecosystem Framework

Value Exchange Network (VEN) is a network of value exchanges between actors in the ecosystem. Formally, VEN is defined as a labeled directed graph (digraph), G (N, V) where G is a VEN, N is a set of actors in VEN and V is a set of directed edges between elements labeled by a set of values.

4.1. Value Exchange

Value exchange is defined as the exchange of set values between two actors. Several types of values can be classified as tangible and intangible (Allee, 2008). The tangible values are *good, service, revenue,* and *fund. Good* is any physical or virtual items transferred from one actor to another. *Service* is any service provided by an actor to another. *Revenue* is any monetary or non-monetary item received by an actor from another actor in exchange for goods or services. *Fund* is monetary or non-monetary invested from an actor to another. The intangible values are *information/ knowledge, benefits,* and *option. Information/ knowl-*
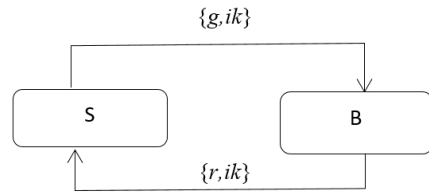
<Figure 2> S Exchanges Values with B

edge is information/knowledge transferred between actors. *Option* is a range of choices provided by an actor to another.

Let *S* be a seller and *B* is a *buyer, S* sells a physical item (good) to *B.* <Figure 2> shows value exchange happens between *S* and *B. S* transfers a good and information {g,ik} to *B* and *S* receives a revenue and information {r,ik} from *B.* Note that the *ik* transferred from *S* to *B* is different from the *ik* transferred from *B* to *S.*

<Figure 3> shows a simple two-sided market scenario. *S* and *B* are a group of sellers and a group of buyers, respectively, and *P* is a two-sided digital platform that provides services for *S* and *B* to transact or exchange values.

<Figure 2> describes *P* manages transactions or exchange values between *S* and *B.* Any buyer in *B* buys items from any seller in *S* through *P.* A buyer from *B* receives a good or goods {g} from a seller in *S,* and the seller receives a revenue {r} from the buyer. *P* receives information or knowledge {ik} from *B* and *B* receives or enjoys {s,ik,o,b}, which are services, information, option and intangible benefits such
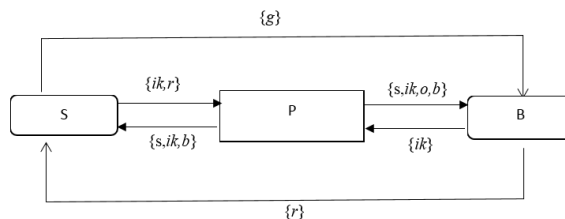
<Figure 3> The VEN of a Two-sided Platform

as convenience, satisfaction, and fun from P. S receives {s,ik,b}, which are service, information or knowledge, and benefits from P and P receives information and revenue from S.

A VEN diagram such as depicted in <Figure 2> becomes larger, complex and difficult to manage if there are many actors involved in the ecosystem. A VEN can be represented as a table that carries few advantages, such as simple and can be processed or analyzed by a computer. <Table 1> represents the VEN in <Figure 2>.
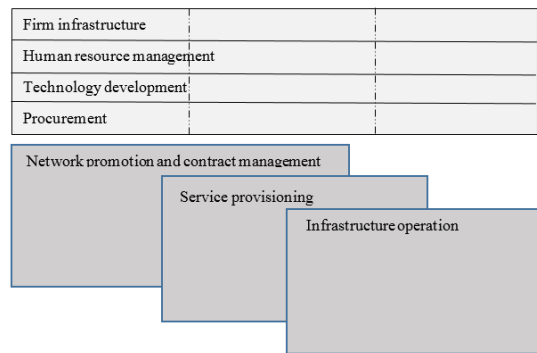
<Table 1> The VEN Table of Figure 2

Actors	S	P	B
S	-	{ik,r}	{g}
P	{s,ik,b}	-	{s,ik,o,b}
B	{r}	{ik}	-

It is interesting to note that with a table representation, we can compute the total value transferred and received by an actor. The total value transferred by S is {ik$_p$,r$_p$} $\cup$ {g$_b$} or the union of sets in the S's row, and the total value received by S is {s$_p$,ik$_p$,b$_p$} $\cup$ {r$_b$} or the union of sets in the S's column.

4.2. Managing the Keystone

The keystone is responsible for the growth and welfare of the business ecosystem under its control. For the multi-sided platform ecosystem, the keystone needs to properly manage the value exchanges within its multi-sided markets by increasing the value of the platform by expanding the market, increasing transactions, expanding services, and collaborations. To do these systematically, the value network configuration proposed by Stabell and Fjeldstad (1998) offers a value network diagram (VND) to model value network configuration (Almunawar and Anshari,

2020). The value network diagram is divided into primary activities and support activities. The primary activities are composed of overlapping activities: network promotion and contract management, service provisioning, and network infrastructure operation. The support activities are composed of separate activities: firm infrastructure, human resource management, technology development, and procurement. <Figure 4> shows the diagram of a general value network.

<Figure 4> Value Network Diagram
(Stabell and Fjeldstad, 1998)

4.2.1. Primary Activities

There are three primary activities for creating the value network configuration: network promotion and contract management, service provisioning, and infrastructure operation. Network promotion and contract management cover all activities that attract customers to join the platform, including setting the requirements to join, initiating, managing, and then if necessary termination of contracts. Service provisioning is a set of activities for creating, managing and maintaining services. Infrastructure operation covers all activities for operating and maintaining physical and information infrastructure.

4.2.2. Support Activities

There are four support activities to support the primary activities of the firm. These are firm infrastructure, human resource management, technology development, and procurement. Firm infrastructure deals with activities for running business functions such as general management, accounting, finance, and information systems. Human resource management covers activities related to managing human resources, such as recruitment, training, and promotion. Technology development covers activities related to network development and service development. Procurement is a set of activities related to purchasing network infrastructure and service development.

Ⅴ. Applying the Framework – The Go-Jek's Business Ecosystem

We use a case study to demonstrate the expressing power of the framework in mapping a business ecosystem and explain its expansion strategies using both VEN and VND. Go-Jek is chosen to demonstrate the power of the framework for the following reasons:

1. Go-Jek is a genuine local company in Indonesia, starting from a very simple platform to a sophisticated, giant multi-sided platform with a growing ecosystem.

2. There is plenty of information available on the Internet on Go-Jek, including many interviews with the CEO and other Go-Jek executives.

3. Go-Jek has a few interesting strategies to grow its ecosystem that can be clearly seen through the lens of VEN and VND.

5.1. Ride-Hailing in Indonesia and Go-Jek

A ride-hailing platform provides services to match the drivers with the passengers digitally through smartphones. To strengthen its business ecosystem, a ride-hailing platform expands its services on top of its main services, such as courier services and food delivery.

In Indonesia, ride-hailing, especially motorcycle-based ride-hailing, offers convenient transportation and delivery services to help customers overcome heavy traffic congestion in many big cities. A good example of a ride-hailing platform in Indonesia is Go-Jek.

Go-Jek started its ride-hailing operation in Jakarta in 2011 with 20 motorcycles (ojek) drivers (Chopra, 2016). Go-Jek mediated ojek drivers and passengers through telephone, just like a call center for three years (until, 2014). When a passenger calls the Go-Jek call center requesting an ojek service, the operator in the call center will find an available ojek closest to the passenger to fulfill the request. The call center will inform the passenger that she/he would be picked up shortly when an available ojek is present. Although the business model is quite impressive (peer-to-peer intermediation through a call center), there was no significant growth of Go-Jek during this period as the technology utilized (call center) did not help the Go-Jek platform to expand.

The situation changed dramatically when Go-Jek upgraded the business model to a mobile-based platform in January 2015. Go-Jek made a breakthrough in 2015 when its app received 4 million downloads in the first six months after launching and 9 million by the end of the year (Go-Jek in Indonesia - Motorbike Taxi Booking App, 2016). The number of downloads keeps rising and the network is expanding at a rapid rate. Go-Jek or its competitor, Grab,

provide motorcycle and car ride-hailing and other related services such as food delivery, cleaning, and shopping, which are conveniently reached by customers through their smartphones (Freischlad, 2017). In addition, consumers in Indonesia prefer ride-hailing like Go-Jek, as they are normally cheaper and easier to reach than conventional services. Besides, ride-hailing offers transparent fare in advance before customers even take the service that makes customers trust the system with a transparent service fee. Furthermore, ride-hailing offers convenience and additional benefits to both drivers and customers.
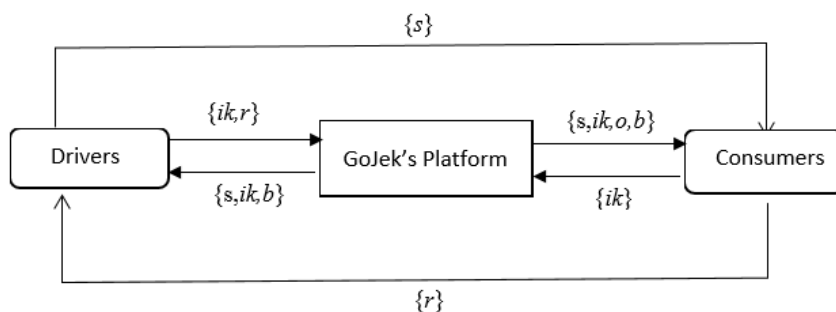
5.2. The Go-Jek's Core Business Ecosystem

Go-Jek's core business ecosystem is a multi-sided market ecosystem, which composes of the keystone or Go-Jek's platform, the consumer markets, the driver markets, and individuals or micro, small and medium enterprises (IMSME) that sell their services or products to consumers, and mobile network operators. Go-Jek's core business ecosystem is a VEN where the nodes are Go-Jek's platform, the consumer market, the driver market, IMSME, and mobile operators. Using <Figure 2> as a template, <Figure 3> is the foundation of Go-Jek's business ecosystem.
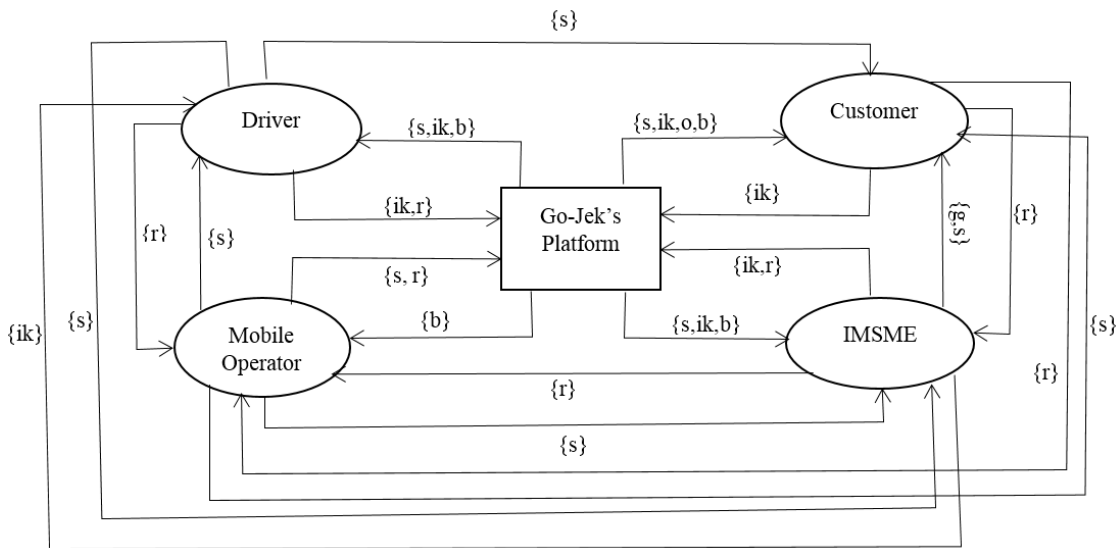
<Figure 5> describes value exchanges between three main players, *driver, Go-Jek's platform,* and *consumers.* This is a scenario of value exchanges if a consumer (passenger) takes an ojek through Go-Jek's platform. A consumer, using their smartphone, connects to Go-Jek's platform, received a set of value {s,ik,o,b}, which are the service from Go-Jek, information about available ojeks, option to which ojek to select, and of course, the convenience and other benefits by ordering an ojek through the platform. Once the consumer decides to order a service from an ojek, their details, including the location through Go-Jek's platform will be sent to the intended *ojek* driver. The *ojek* driver receives the order from the consumer through the platform. The driver also receives service and intangible benefits from the platform, {s,ik,b}. The driver submits his/her detail and location to the platform, which will be passed to the consumer, which is *ik* in {ik,r}. Next, the driver provides a transportation service {s} to the consumer and in return, the consumer pays the service {r}, which is revenue for the driver. The driver shares this revenue to the platform, which is the revenue for the platform or *r* in {ik,r}.

<Figure 6> depicts Go-Jek's core business ecosystem. Mobile operators are necessary actors in the ecosystem that helps other actors connect constantly. Mobile operators deliver value in the form of communication services to other actors and receive revenue from the services. There is an interesting relation

<Figure 5> The Foundation's Go-Jek's Core Ecosystem

<Figure 6> The Go-Jek's Core Business Ecosystem

between mobile operators and the platform. <Figure 3> reveals that mobile operators receive benefits from the platform as they can harvest all communication revenues caused by interactions mediated by the platform. As a result, the platform may get revenues from mobile operators, especially from mobile operators used by drivers as the platform can control through which mobile operators that drivers must use for the interactions with the platform, hence to customers or passengers as well.

Go-Jek's core ecosystem depicted in <Figure 6> is a multi-sided market, composing of the driver market, customer market, and the IMSME market. Note that mobile operators are not part of Go-Jek's

multi-sided markets; they help connect those markets to Go-Jek's platform. Each mobile operator involved in Go-Jek's business ecosystem may consider that it shares many actors with Go-Jek's ecosystem, so it must work harmoniously to achieve a common goal, growing the ecosystem and harvest larger revenues.

Go-Jek harvests its value mainly through *drivers* and *IMSME*; this means *drivers* and *IMSME* are key markets to care for. However, VEN and VND of Go-Jek's business ecosystem, as well as the multi-sided market logic, can help Go-Jek to derive a competitive strategy, and hence expanding its ecosystem with the main objective is to maintain and expand

<Table 2> The Go-Jek Core Business Ecosystem

	Go-Jek's Platform	Customer	Driver	IMSME	Mobile Operator
Go-Jek Platform		{s,ik,o,b}	{s,ik,b}	{s,ik,b}	{b}
Customer	{ik}		{r}	{r}	{r}
Driver	{ik,r}	{s}		{s}	{r}
IMSME	{ik,r}	{g,s}	{ik}		{r}
Mobile Operator	{s,r}	{s}	{s}	{s}	

its *drivers* and *IMSME* markets. We will discuss this strategy in the next section.

<Table 2> is Go-Jek's core business ecosystem depicted in <Figure 6>. Go-Jek's full business ecosystem is complex and difficult and hence can be better represented using a VEN table.

5.3. The Keystone

Since Go-Jek's platform is the keystone of the ecosystem, we should discuss the details of its value configuration using VND.

5.3.1. The Primary Activities

Network promotion and contract management is an extremely important activity as Go-Jek's strategy is the expansion of its external networks in various sectors (such as transportation, logistics, homecare, healthcare, ticketing, shopping, food and beverages, and finance/payment system).

Go-Jek aggressively promotes its network through generous discounts on all its services, advertisements, and memorandum of agreements or contracts with many partners such as banks, insurance, telecommunication providers to support its main stakeholders, drivers, and customers.

Service provisioning is all activities that are aimed towards providing and managing services to retain the existing customers and attract new ones as a follow up of the network promotion and contract management activity. Service provisioning is the key to the primary activity in the value network as value is derived from service (service quality, capacity, and opportunity). According to Stabell and Fjeldstad (1998, p. 428), "the customer may receive a value from the value network without ever actually invoking the mediation services." This definitely relates

to Go-Jek as in many circumstances, a customer may enjoy a service without paying for it. As the Go-Jek main service is matching between customers and suppliers, it is easy to see that finding a supplier (such as finding a driver) in the network is a great service. Not only can a customer (passenger) find a driver through the app, he/she can also identify the driver and his/her vehicle and participate in assessing the quality service provided by the driver by rating the driver through the app. A customer can invoke and pay the service through the Go-Jek's payment system (Go-Pay) for another customer at a different location. In the same way, a customer can send a gift or food to his/her friend and the friend will enjoy the great service without paying for it.

In general, we classify Go-Jek's services into two categories: internally generated services and internalized externally generated services. Examples of internally generated services are the user-friendly app, convenient payment using Go-Pay, price transparency, and security. Examples of internalized externally generated services are the delivery and variety of external services provided by Go-Jek's ecosystem.

Service provisioning and *network promotion* are geared together towards expanding the external networks, whether by adding more nodes (either customers or suppliers) or by incorporating other firms to add new services as well as support or enhance existing services. For example, Go-Mart, an internalized externally generated service, is a great service for families living in a heavily congested city with bad traffic like Jakarta. Go-Mart helps families shop for their daily needs without having to go to a mall or a marketplace, and deliver them to the destination (homes) within 60 minutes at a very affordable cost of delivery (less than $1 per delivery if the payment is conducted via Go-Pay).

Service quality is an important strategy to expand the customers' network. Unlike traditional *ojek*, Go-Jek services in general have standards and quality control to ensure that customers are satisfied using the services offered (such as transparency, security, timeliness, and convenience). Services are monitored and a feedback mechanism is implemented to acquire voices from customers to monitor and enhance services.

Infrastructure operation. The basic Go-Jek information infrastructure is a wireless-based Internet that connects stakeholders, especially customers and suppliers. A good wireless network is required because without it, the wide-range services offered cannot be supported properly and customers will complain, and possibly, they will move to competitors. Go-Jek needs to have a good information infrastructure that can connect customers, swiftly execute all transactions, and at the same time support the network's rapid expansion flexibly. This can be done through a reliable public cloud such as cloud computing offered by Amazon (Almunawar and Almunawar, 2015). However, Indonesian laws related to data do not allow customers' data to be stored outside the country. Besides, a public cloud cannot guarantee information security needed to run Go-Pay. As a result, Go-Jek adopts a private cloud and has its own data center to manage all services and transactions using HPE ProLiant DL560 Gen9 Server, a highly scalable server as the core engine for its private cloud (Sung, 2016).

5.3.2. The Support Activities

Support activities, which are activities related to firm infrastructure, human resource management, technology development, and procurements, are necessary activities needed to run the business daily and to support the primary activities.

Activities in the firm infrastructure such as general management, accounting, and finance indirectly support the primary activities. This may include planning, directing, controlling, monitoring, and evaluating all business activities, including the primary activities. Similarly, activities in human resource management indirectly support the primary activities, such as recruitment and training, including recruitment and training of drivers. Although they are not Go-Jek's employees, they are the front-end of the Go-Jek force.

Go-Jek's business relies on information technology. Hence, technology development is the core activity for Go-Jek's innovation. Go-Jek has seriously invested in technology development; a research and development (RandD) center has been set up in India, and two Indian IT companies namely C42 Engineering and CodeIgnition have been acquired to support further technological development (Chanchani, 2016). Surely, Go-Jek's RandD will have a direct impact on its primary activities, especially on improving service delivery and expanding services, hence expanding network externalities, while strengthening network internalities to keep the expansion of network externalities in control. Procurement activities, especially technology-related procurement, may not be as frequent as other companies since Go-Jek's back-end system (the private cloud) was established and customers access the front-end system through their smartphones. In addition, through its RandD, much of GO-JEK software is developed and maintained internally.

5.4. Go-Jek's Larger Ecosystem

<Table 3> shows a larger Go-Jek business ecosystem. This ecosystem includes many components that influence the ecosystem's survival as well as its expansion.

Some important components in the ecosystems are Investors (IS), Regulators (RG), Insurance Companies (IC), Financial Institutions (FI), Conventional taxicab companies (CTC), and Competitor (CP).

Beyond the Go-Jek core ecosystem, with the number of drivers keeps increasing, about 1 million recently, Go-Jek has successfully attracted billions of dollars from investors. Some main Go-Jek investors are Gamvest PTE Ltd., KKR Go Investments, Sequoia Capital India Investments, WP Investments, Golden Signal Limited, Tascent, JD.com, Meituan-Dianping, Google, Temasek Holding, Astra and Djarum (from Indonesia), KKR, Warburg Pincus, and Farallon Capital (Emerhub, 2018). Of course, these investors expect revenue from their shares. Go-Jek is the first Indonesian company to reach a unicorn status (a valuation of higher than USD 1 million) in 2016, and recently, its valuation has reached USD 9 million (Emerhub, 2018).

Motorcycle-based ride-hailing, which is the main Go-Jek service, is hardly regulated in Indonesia (Subiantoro, 2018), as are not considered public transport (Subiantoro, 2018). Initially, car-based ride-hailing was also not regulated. However, recently the government, through the Ministry of Transportation, proposed rules and regulations (Permenhub 108) to govern the operation of ride-hailing in Indonesia, especially car-based ride-hailing (Choirul, 2018). However, Permenhub 108 was scrutinized by the Supreme Court (Mahkamah Agung) and forced to change some rules and regulations. Therefore, Permenhub 108 has not been implemented yet as currently is in the process of revision. Nevertheless, rules and regulations for car-based ride-hailing will be enacted, and this will influence the operation of car-based ride-hailing in Indonesia.

Go-Jek cooperates with several insurance companies such as Pasar Polis for vehicle insurance, Allianz for health insurance, and BJPS Ketenegakerjaan for social security benefits (Go-Jek, 2017; Purba, 2018). Drivers can easily tap "Go-Proteksi" in the Go-Jek App for drivers to participate in insurance. Go-Jek also collaborates with financial institutions (banks) to provide financial services for their drivers and

<Table 3> The Go-Jek Larger Business Ecosystem

	1	2	3	4	5	6	7	8	9	10	11
Go-Jek Platform (1)		{s,ik,o,b}	{s,ik,b}	{s,ik,b}	{b}	{r}	{ik}	{ik,r}	{ik,r}	{s}	
Customers (2)	{ik}		{r}	{r}	{r}					{ik,r}	{ik,r}
Drivers (3)	{ik,r}	{s}		{s}	{r}			{r}	{ik,r}		
IMSME (4)	{ik,r}	{g,s}	{ik}		{r}						
Mobile Operators (5)	{s,r}	{s}	{s}	{s}		{s}				{s}	{s}
IS (6)	{f}										
RG (7)	{ik}		{ik}	{ik}		{ik}			{ik}	{ik}	
IC (8)	{s}		{s}	{s}					{s}	{s}	
FI (9)	{s}	{s}	{s}	{s}					{s}	{s}	{s}
CTC (10)	{ik,r}	S			{r}				R		
CP (11)		{s,ik,o,b}	{s,ik,b}	{s,ik,b}	{b}		{ik}	{ik,r}	{ik,r}	{s}	

customers/passengers, especially for payment.

The conventional taxicab companies were initially threatened by Go-Jek, and several conflicts had risen in the streets where taxicab drivers fought with Go-Jek's drivers. However, the collaboration between the biggest taxicab firm in the country (BlueBird) and Go-Jek has been settled, and now taxicab drivers can utilize Go-Jek's apps to find passengers like other Go-Jek drivers. This gives taxicab drivers an optional benefit as they can opt to find passengers using the conventional way or through the Go-Jek app. Initially, Go-Jek has two competitors, Uber and Grab. However, Grab has merged with Uber in ASEAN, making it Go-Jek's singular competitor in providing ride-hailing and other related services.

Ⅵ. Go-Jek Network Expansion and Competitive Strategies

Go-Jek started its business ecosystem with a simple two-sided semi-digital platform by recruiting motorcycle drivers and offered transportation services to customers in Jakarta, the capital city of Indonesia. Jakarta is well known for its constant traffic jam in many parts of the city. Hence, easily accessed motorcycle transportation offered by Go-Jek that can avoid traffic jam was well accepted by consumers. Chicken and egg problems discussed in two-sided market literature was not an issue for Go-Jek as it had to start with the driver side to attract the consumer side, and the source of its main income comes from drivers (Caillaud and Jullien, 2003).

The first obvious strategy to grow the business is to keep the balance on the small ecosystem created and to expand the number of drivers to tap more income. However, Go-Jek must make sure that the demand for transportation services offered by drivers

keep increasing; hence, it needs to grow the customer network or market. To attract more customers and drivers, Go-Jek must set the right tariff structure. Go-Jek does not charge registration to its platform both for the supply and demand sides. Go-Jek has three tools to keep the balance between the supply side and the demand side and at the same time to grow the networks or the ecosystem in general. Managing these tools is part of Network Promotion and Contract Management of the value network depicted in <Figure 3>. The tools are the tariff structure, incentives for drivers, and promotions for customers. Go-Jek decides the tariff per kilometer of the transportation service dynamically, and the price for transportation to be paid by a customer is calculated based on the tariff applied, and the distance traveled. Go-Jek takes a 20% commission from the calculated price above. Go-Jek makes sure that the price charged to customers is attractive and lower or at least at par with equivalent services. A proper tariff structure will attract both sides (drivers and customers). The other two tools also aimed to stimulate the growth of the network. Promotions are targeted to customers. During the promotion period, the price of services is much lower than normal to attract existing and new customers to increase transactions. The lower price of services during a promotion will not affect the amount paid to drivers as the normal tariff is used for the calculation of the price of a service. Incentives are given to drivers to motivate them to work diligently. For each service delivered by a driver, there is a bonus point allocated to it. An accumulation of bonus points collected by a driver will be converted to money to be deposited into the driver's account. The following information will provide figures on how Go-Jek grew in the early stages. Go-Jek's app was introduced in January 2015 (Ford and Honan, 2016; Porter, 2016). offering motorcycle ride-hailing

(Go-Ride) and two more services: courier (Go-Send) and shopping. Go-Jek grew quickly; the app was downloaded by 3 million people only within the first 3 months of its launching, and by June 2015, Go-Jek processed 0.7 million orders (Lee, 2016).

The second strategy is service expansion to attract more customers to join the platform. This is an interesting strategy for ecosystem expansion. It increases the value of Go-Jek's platform as well as its ecosystem members, and the number of value exchange increases. Go-Jek has this strategy from an early stage. To execute this strategy, Go-Jek needs to cooperate with many partners to provide various related services. Among the early services offered (in 2015) are food delivery (Go-Food), moving or sending consignment using trucks (Go-Box), home massage service (Go-Massage), buying cinema tickets (Go-Tix), and home service for a personal stylist (such as hair care, makeup, and waxing) (Go-Glam). Go-Jek also expanded its services geographically, reaching other big cities. By mid-2015, services are available in Bali, Bandung, and Surabaya. Few more cities (Balikpapan, Medan, Palembang, Semarang, and Yogyakarta) were reached by the end of 2015. Eleven million people downloaded the Go-Jek app by the end of 2015 (Ford and Honan, 2016). With this expansion, Go-Jek at-

tracted more than 300,000 riders in August 2015 (Pratama, 2016) and scored 10.5 million orders in December 2015, an expansion of 1400% in one year(Lee, 2016).

The third strategy for expanding the ecosystem is to attract large investors and collaborate with large companies such as insurance, motorcycle and car dealers/manufacturers, banks, traditional taxicabs, and local governments. This collaboration helps provide better services to both drivers and customers. The large business ecosystem built by Go-Jek in a very short time and its expansion has attracted many investors. Go-Jek had successfully attracted Sequoia Capital and some other investor in October 2015, however, the amount of funding injected into Go-Jek was undisclosed. <Table 4> shows Go-Jek investors, time and amount invested, and Go-Jek's valuation.

There must be a reciprocal relationship between Go-Jek ecosystem growth with the amount of investment attracted by many international and local investors. This means investors are interested because Go-Jek's value is growing. Once investors invest large funds in Go-Jek, Go-Jek's valuation will increase significantly. The large amount of funds received by Go-Jek extends Go-Jek's engine of growth, igniting both service expansion and geographic expansion.

<Table 4> Investors of Go-Jek

Time	Investors	Amount (US$)	Valuation (US$)
October 2015	Sequoia Capital, Northstar Group, DST Global, NSI Ventures	Undisclosed	
August 2016	Sequoia, KKR, Rakuten, Warburg Pincus, Farallon Capital Management, Formation Group, DST Global, Capital Group, Open Space Venture	550 million	1.3 billion The first unicorn from Indonesia
February 2018	Tencent Holdings, Temasek Holdings, Via ID, PT Astra International Tbk, New World Strategic Investment, Meituan-Dianping, JD.com, Hera Capital, Google, Blibli	1.5 billion	3.5 billion
October 2018	Tencent Holdings, JD.com, Google	1.2 billion	7.8 billion
January 2019	Tencent Holdings, JD.com, Google, Mitsubishi Corp	1 billion	10 billion

Note: https://www.crunchbase.com/organization/go-jek#section-funding-rounds and Iwamoto and Tani (2019).

In 2018, Go-Jek expanded its service to Vietnam, Singapore, and Thailand. Go-Jek's app has been downloaded by 108 million users. This means both Go-Jek demand-side and supply-side networks are very large and will attract more investors.

Many companies are interested in collaborating with Go-Jek to tap into its large business ecosystem. Bluebird, a well-known and large taxicab company in Indonesia, initially felt threatened by Go-Jek, especially when Go-Jek launched its car ride-hailing in April 2016. However, a month later, in May 2016, Go-Jek and BlueBird signed an agreement for collaboration in which BlueBird Taxi drivers can use the Go-Jek app to accept orders from passengers via their smartphones. Consequently, BlueBird is now part of the Go-Jek ecosystem and both Go-Jek and BlueBird exchange their values, as expressed in <Table 3> (between CTC and Go-Jek Platform). Other companies, such as insurance and financial institutions, are enjoying their collaborations with Go-Jek, tapping the core Go-Jek networks.

Car and motorcycle manufacturers have definitely enjoyed benefits from their collaboration with Go-Jek. In fact, PT Astra International Tbk, the giant automotive company in Indonesia, one of the Go-Jek's investors (<Table 4>), invested $US 150 in 2018, the largest local investor. This collaboration helped Go-Jek to serve its drivers better, and hence strengthening the balance in its ecosystem.

The fourth strategy is strengthening the ecosystem while expanding it further. This strategy is implemented through the creation of Go-Pay, a digital payment system. Essentially, Go-Pay is Go-Jek's core ecosystem currency that helps Go-Jek add value to its ecosystem significantly. It also helps Go-Jek sustain its ecosystem and at the same time, open a wide opportunity to attract more individuals and businesses to join its ecosystem. Go-Pay makes all parties

in the Go-Jek's ecosystem, especially the core one, to have convenient and secure transactions. It is now easy for Go-Jek to expand its ecosystem by attracting businesses or people to use Go-Pay for them to make payments. Essentially, the main goal of Go-Pay is to maintain the existing and attract new customers, hence, help to expand the networks and to retain the existing ones and encourage them to make transactions.

It is important to note that Go-Pay boosts intangible value or benefits furnished by Go-Jek, especially the convenience and security for payments. It greatly contributes to the value of co-creation with the main actors in the ecosystem. For example, with Go-Pay, a customer can make a payment of any available services in Go-Jek's ecosystem. For example, *Pluang* (pluang.com) is a virtual gold shop that offers customers to buy any fraction of gold. By joining Go-Jek's ecosystem, Go-Jek customers can buy any fraction of gold with *Pluang* using Go-Pay, which is very easy, convenient, and secure. Of course, *Pluang* gains many benefits by joining Go-Jek's ecosystem. It taps into a huge market, millions of Go-Jek's customers. Go-Jek's expansion strategy is its main competitive strategy. Go-Jek stimulates the expansion of its supply and demand sides to amplify the cross-network effect in its core ecosystem while attracting other players in its larger ecosystem to support the stability and wellness of its ecosystem while expanding (Iansiti and Levien, 2004a). These strategies create a strong entry barrier for new entries, neutralize the traditional competitors, and create a solid defense to its strong and sole competitor (Grab). According to the TCE theory, to keep the platform attractive and to strengthen its ability to glue participants in its ecosystem, especially its core ecosystem, the platform needs to strengthen its assets specificity. This can be done carefully to expand and strengthen its VEN, which can be managed through its VND.

Ⅶ. Conclusion

Go-Jek's large and strong multi-sided networks business ecosystem started with a simple, small and weak two-sided network of a non-digital intermediary platform. The quick expansion was ignited by transforming the platform to a mobile-based digital platform, creating a wide opportunity to become a digital marketplace with a large and complex ecosystem. The proposed framework for mapping and analyzing business ecosystems is the amalgamation of TCE, two-sided market, value exchange, and value network theories. It has a very good expressive power that can zoom in and out of the ecosystem to be observed and studied from different perspectives. The framework can easily map Go-Jek's core ecosystem. The core Go-Jek ecosystem contains Go-Jek's platform and actors related to its transportation service, meaning that most of the other services need the transportation service to complete. Therefore, Go-Jek needs to take care of its drivers and make sure they can provide good quality services.

The ecosystem mapped through value exchange network (VEN) clearly revealed values exchanged between actors in the ecosystem and co-creation of value between the actors, especially between actors and the keystone (Go-Jek's platform). Value network diagram (VND) is a very useful tool to manage VEN. Since Go-Jek mediates all value exchanges, it can control the quality of exchanges and maintain the balance in the ecosystem. Go-Jek's competitive strategy is embedded in its expansion strategies while keeping its ecosystem in good shape by creating the dependency of all participants in the ecosystem on its digital platform. In other words, Go-Jek keeps strengthening its keystone's asset specificity to keep its ecosystem in check.

Acknowledgment

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◆ About the Authors ◆

Mohammad Nabil Almunawar

Dr Mohammad Nabil Almunawar is currently an associate professor at School of Business and Economics, Universiti of Brunei Darussalam (UBDSBE), Brunei Darussalam. He was the former dean of UBDSBE. He received his bachelor's degree in 1983 from Bogor Agricultural University, Indonesia, master's degree (MSc) from the Department of Computer Science, University of Western Ontario, London, Canada in 1991, and Ph.D. from the University of New South Wales in 1998. Dr. Almunawar has published more than 100 papers in refereed journals, books, book chapters, encyclopedias, and international conference proceedings. He has more than 30 years of teaching experience in information systems. His overall research interests include applications of IT in management, e-business/commerce, digital marketplace/platform, digital business ecosystem, health informatics, information security, and cloud computing. Currently, he focuses his research on digital transformation, digital marketplace, digital platform, and digital business ecosystem.

Muhammad Anshari

Dr Muhammad Anshari is researcher and academic staff at Universiti Brunei Darussalam School of Business & Economics. His professional experience started when he was IT Business Analyst at Astra International and Lecturer at State Islamic University Yogyakarta Indonesia. He was research fellow at National Taiwan University (Jan-Dec, 2014) funded by The Government Republic of China (Taiwan) and also research fellow at King Saud University - the Kingdom of Saudi Arabia 2009.