

Measuring the Effectiveness of Road Transportation Logistics Performance in East Malaysia: A Conceptual Model

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Abstract

The successful of any tasks or jobs entrusted to logistics service providers is measured by performance. A good performance means the logistics service providers succeed in fulfilling customers' requirements and perceptions. Among customers' requirements are delivery of goods on-time, reasonable costs, the safety of their goods and so forth. However, nowadays this performance is being disturbed by road congestion problems due to the flooding of road logistics transportations which are used to deliver products or goods to their customers, together with the addition of public road transportation. As a result, the delivery of customers' goods is delayed and the operation costs also increased. This hustle and bustle happens since the global manufacturing sector grows dramatically these days. Consignees do not agree with several solutions to this issue, since it is found to be favouring the customers, without any concern to the consignees themselves. Hence, this study adapted several previous models in order to come out with a new model which can prevent delivery delay and reduce operation cost. This is a promise for an effective and efficient logistics service providers' performance. With regards to the prior literature, the capability of logistics service providers is very valuable to maintain the good performance of a logistics firm, IT implementation is empirically proven as an enabler for time and cost saving, and innovation capability is important in differentiating one firm to another. Hence, it can sustain the competitive performance and advantages. Therefore, the formation of the mentioned variables has constructed a new model for this study which is expected to benefit logistics service providers to improve their services and simultaneously provide a nice picture to potential investors to invest in our country, Malaysia.

Keywords: information technology, innovation capability, logistics capability, Malaysia, performance

1. Introduction

Manufacturing now becomes an engine to the present world. Britain seemed to be the pioneer of the industrial revolution, followed by Germany and the United States. They firstly introduced textile industry and later expended by a variety of other industries. This happened during the period of Industrial Revolution and Second Industrial Revolution (Schmenner, 2001). A little bit later, as in 1990s, Malaysia started being an innovation-led-economy country (Hasnan, Noordin, & Osman, 2014).

Leaving the agriculture sector behind, the economic transformation of our country was successful as the manufacturing sector rose the GDP up to 33.1% in 1995 (Bank Negara Malaysia, 2003) and does continue its stability (Salina, 2004). This manufacturing sector is like a catalyst to the trade activities all over the world. Similar to Malaysia, exports of manufactured goods increased from MYR413 billion to MYR461 billion, while imports of manufactured goods increased from MYR359 billion to MYR430.5 billion in the year 2009. This expansion of import and export activities seemed to increase up to 20% (MITI, 2010). In the near future, the total of export and import trade is expected to increase to MYR2.8 trillion (MITI, 2012).

Every sector needs mobility to move. The mobility is called as logistics. As defined by (Coyle, 1996, p. 5), *"Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of raw materials, in-process inventory, finished goods, services and related information from point of origin to point of consumption (including inbound, outbound, internal, and external movements) for the purpose of*

conforming to customer requirements.” Thus, logistics sector plays a vital role in being the backbone to the movement of manufactured goods from one place to another until they reach their final destinations, either locally or overseas. They move by using logistics transportations ranging from rail transportation, air transportation, sea transportation and road transportation. Among these transportations, road transportation seems to cater all types of transportations as the goods move from land to sea, from land to air, from land to rail and vice versa, before they finally reach their intended locations.

Therefore, due to the importance of logistics sector in supporting the manufacturing sector as a whole, the logistics sector is marked in the Third Industrial Master Plan (IMP3) as an engine growth to increase the GDP by approximately 10% by the year 2020 (MITI, 2009). Additionally, logistics sector is one of the important components in the service sector, which is supported by National Key Economic Areas (NKEAs) and contributed 55% to the GDP in 2008 (MIDA, 2012). Malaysia’s Minister Industrial Trade and Industry added, the service sector will be a major contributor to our country’s economy as it is targeted to contribute 60% to the GDP by 2020 (MITI, 2014). As such, it shows that manufacturing sector and logistics sector work hand in hand to cater the economy development, especially in terms of road transportation logistics. Hence, according to National Bureau of Statistics (2011) in Mahpula, Yang, Kurban, and Witlox (2013), out of 27, 806.3 million tons total freight traffic in Beijing, more than 76% of cargo travels by road, 11.9% by rail and 11.4% travel by water. This is evident that the road transportation logistics is very important in completing the whole cycle of logistics processes.

However, the increased in road traffic volume has developed unwanted effect in certain countries; road congestion. China (Speece & Kawahara, 1995), New York (Trunick, 2004) and UK are among countries that are affected by road congestion which resulted to cost increment, delay in delivery process, customer dissatisfaction, and exposure to risk of accident (McKinnon, Edwards, Piecyk, & Palmer, 2009). Same goes to Malaysia as the East Coast region is reported facing with congestion especially in Kemaman and Kuantan (Zuraimi, Mohd Rafi, Mohamed Dahlan, & Nur Fadiyah, 2012) and some other metropolitan areas (Almselati, Rahmat, & Jaafar, 2011). Logistics players there commented that their business is affected by the congestion, especially during the peak hours (Zuraimi et al., 2012). In Charlotte 2007, their business community lost about 20.3% of delivering and receiving goods, caused by congestion. In other words, congestion delay the delivery time and weaken the business control (Hartgen, 2007). Other than delay, associated costs like administration cost and transportation cost of importers and exporters also increased by 71.5% and 65.7% respectively (Zhang & Figliozzi, 2010). The high percentage of cost increment gives a hint for the scholars to conduct more research on this issue. Off-peak deliveries once have been a trend in order to reduce the congestion but most consignees disagree as they need to alter workers’ schedule, increase operational and insurance cost as well as security issue (Trunick, 2004).

Hence, the objective of this study is to come out with a model that provides effective and efficient services which actually reduces operation cost and delivery time. One more thing to consider is that the model should have elements of competitive advantage so that the logistics service providers can sustain in the dynamic market. Based on the literature review, this study believes that the combination of these three constructs can help the logistics service providers to sustain their performance by reducing operation cost and delivery delay; capability of LSPs, implementation of IT and innovation capability. According to the previous literatures, capability of logistics service providers (Lai, 2004; Shang & Marlow, 2005), IT implementation (Langley et al., 2007; Lai et al., 2008; Qiang Wang, 2008, Evangelista et al., 2012) and innovation capability (Hult, Hurley, & Knight, 2004; Yang, 2012) have significant positive relationships with firm performance. Since previous literatures reported that some places in Malaysia are also facing this problem, this study is investigating the relationships of capability of logistics service providers, IT implementation and innovation capability with firm performance in East Coast region of Peninsular Malaysia.

2. The Resource-Based View (RBV) Theory

RBV and firm competitiveness are two entities that cannot be separated. The heart of RBV is; firms can gain and sustain competitive advantages by developing and deploying valuable capabilities and resources (Wernerfelt, 1984). Based on RBV, core capabilities are normally identified from firms’ resources and capabilities. In RBV, resources and capabilities are the major structures of the theory (Barney, 1991). Agreed with Barney, Grant (1991) also claimed that the resources and capabilities are considered as core inputs for an organization.

What are resources and capabilities in this RBV theory? According to Draft (1983) in Barney (1991), firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. that are controlled by a firm which enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness. While Amit and Schoemaker (1993) explained the capabilities as the ability of the

firm to combine, develop and employ its resources to create value. In other words, capabilities refer to the firm's capacity to transform its resources into outputs valued by the customer, which can affect desired ends.

Just like other types of firms, RBV is also very close to the study of logistics service providers. It is because the main business of logistics service providers is serving customers with a variety of resources such as transportation, delivery, warehousing and so forth, thus its performance relies greatly on how these resources are delivered (Karia & Wong, 2013). Moreover, RBV theory argued that the distinction of resources deployed among logistics service providers determines the level of competitive performance in the same marketplace. There are no two logistics providers that will retain the similar capability level and organizational routine. This is why the adaptation of RBV theory has been considered in logistics literature. It includes inspecting the types of resources and capabilities in order to understand the concept of logistics performance from the view of RBV theory (Karia & Wong, 2013; Olavarrieta & Ellinger, 1997; Skjoett-Larsen, 1999). From there, there are numbers of logistics studies investigating the impacts of logistics service providers' capability and resources on their performance, since both are very important for competitiveness (Karia & Wong, 2013).

From the observation of previous models which contain capability and resources, the model in this study is very interested to adapt certain constructs used by those models. The selection made is based on the issue highlighted in this study, which is to develop a model that can reduce cost and decrease delivery delay because of road congestion. Therefore, three independent and dependent variables are adapted from the model of Karia and Wang (2013), Wang, Huo, Lai, and Chu (2010) and Yang, Marlow, and Lu (2009).

Thus, this study conceptualizes the non-financial or operational performance based on cost and service as indicated by Wang et al. (2010). There are three independent variables which are chosen to develop this model; capability of logistics service providers and innovation capability are adapted from Yang et al. (2009), while IT implementation is adapted from Karia and Wong (2013). Not only those models, there are numbers of literature also supported that the chosen variables have great influences on the performance of logistics providers. The literatures and theories will be discussed in the next section.

3. Theories and Hypotheses

3.1 Capability and Firm Performance

Logistics service capability is the ability of logistics service provider firms to generate and employ resources to provide satisfaction to their customers and for the sake of a better service performance (Lai, 2004). The logistics service providers are considered effective in delivering their services when they achieve their goals (P. M. Panayides & So, 2005). What are the goals of logistics service providers? They are including on-time service delivery, ability to solve problem, timely response to request, accurate storage and delivery information, as well as assisting customers to accomplish their own objectives. Fulfilling all these services effectively is equal to satisfy the customers' need, thus increasing the performance of logistics service providers (Leuthesser & Kohli, 1995). This is the reason why capability is said very valuable to a firm (Hafeez, Zhang, & Malak, 2002; Prahalad & Hamel, 1990; Tampoe, 1994; Yang et al., 2009).

Under the roof of capability, there are numbers of capabilities which normally provided by the logistics service providers like capability of service reliability, capability of value-added, capability of relationship building, information integration and capability of being flexible (Yang et al., 2009). More importantly, agility is very important to the firm to provide quick response and adapt with sudden changes in schedules and orders, especially when it is due to traffic congestion (Krauth, Moonen, Popova, & Schut, 2005). Furthermore, customers have their own measures in order to select the service providers such as good capability in handling information, cost and service experience, company reputation, compatibility of information systems and total package offered (Dapiran, Lieb, Millen, & Sohal, 1996).

In the meantime, Singapore, as a Tier 1 logistics country, gives so much attention about their logistics services. Based on a survey done to 51 logistics service providers in Singapore, most of them concentrate to serve reliable and consistent delivery time, special request for low cost operation, good service design and performance, flexible in accommodating sudden changes and maximum value added to products of customers in satisfying customers' needs (Sum & Teo, 1999). In developed country like USA for example, their logistics service providers give a great concern to total order cycle time, on-time delivery, backorders, accuracy of inventory and fill rates (McMullan, 1996).

Whereas for Shanghai, China, they are mostly good at solving customers' problems such as putting great effort in assisting customers in emergency, helping customers in solving problems of cargo transportation as well as they show their sensitivity to the customers by giving pre-alert notice for every delivery and delivery problems

(Chin, Bae, & Kim, 2007). Likewise, Taiwan has lined out the key logistics capabilities of their logistics service providers such as flexible operation, economic scale, innovation and logistics knowledge ability, and customers' responses (Lu & Yang, 2006). They added that all of these capabilities contribute so much to the international distribution centre and the performance of organization as well. Moreover, almost similar to Taiwan and Shanghai, most logistics customers in Malaysia are happy with capability of logistics service providers which care on their needs like providing flexible service operation in order to avoid problems, responding to customers' requests in flexible manner, helping customers which are in emergencies and handling customers' complaints (Zuraimi et al., 2012).

This is in line with the RBV theory which mentioned that capability is the most important component among other competitiveness factors (Liu, McKinnon, Grant, & Feng, 2010). Also, many empirical studies claimed that there is a significant relationship between capability and firm performance (Barnett, Greve, & Park, 1994; Hafeez et al., 2002; Huselid, Jackson, & Schuler, 1997; Ray, Barney, & Muhanna, 2004). In this case, logistics capability thus is claimed to have a significant positive relationship with its firm performance (Lai, 2004; Shang & Marlow, 2005). It is agreed by Yang (2012) who assured that service capability and flexibility capability of logistics service providers have significant effect on their performance. Additionally, Yang et al. (2009) fully supported that service capability has a significant positive relationship with the logistics firm performance.

Hypothesis 1 (H1): Capability of logistics service providers has a significant positive relationship with performance of logistics service providers.

3.2 IT Implementation and Firm Performance

Since IT is like a connector to the whole world, its implementation nowadays is seem as a must for traders especially for the traders doing import and export trades. The sharing of IT and information developed the information-based capability, which can boost up the distribution performance, lead to the success of supply chain and facilitate the integration of logistics (Chopra & Meindl, 2001; Shang & Marlow, 2005; Stenger, Dunn, & Young, 1993; Williams, Nibbs, Irby, & Finley, 1997). The leading edge firms are also motivated to adopt IT as it is a catalyst to improve services and reduce cost, as well as greatly influence the competency of overall logistics (Burgess, 1998; Closs, Goldsby, & Clinton, 1997; Shang & Marlow, 2005).

Developed countries like Germany and the US for example use IT widely in their logistics activities, making them very advanced in logistics. Developed Asian country like Singapore also enjoys the benefits of IT and many more of their logistics service providers are planning to implement the IT systems in their firms' business system. By implementing the IT, they use new technologies, thus obtaining new knowledge and skills in order to operate those new technologies. Thus, it can be said that IT is actually a great medium for them to be more successful in their business and enable them to more focus on their specific industry (Piplani, Pokharel, & Tan, 2004). IT is a contributor to a better operation capability, thus the logistics industry can attain higher values of product quality and customer service, parallel with the Singapore's target to be a logistics hub for Asia Pacific (Sum & Teo, 1999).

On the other side of the coin, developing countries like Malaysia and China somehow give a great effort in IT implementation in order to put their countries in the same row with the developed countries. The biggest trucking company in Malaysia for example, Tiong Nam has implemented IT in their trucking and business system as a way to be more efficient in providing services by decreasing the loading and unloading time. Moreover, it is an advantage for Tiong Nam to expend their business abroad, catching up with the current international market (Sullivant, 2013). Sadly, there are local logistics service providers in Malaysian Northern Region which are reported unable to go international due to lack of IT capabilities, capital investment and world networking (Thong, 2007). As for China, their logistics service providers improve their systems by adding IT values, either basic technologies or advanced technologies. However, based on a survey done to 177 logistics service providers there, not many are capable implementing advanced IT systems since majority are small and medium firms (Chin et al., 2007).

Corresponding to this era, IT services is also facilitated in less-developed countries in order to sustain wide range of ICT products which has developed rapidly there (Chadee & Pang, 2008). As such, it is proven that IT has really changed the business world by providing timely, reliable and most importantly, accurate information. This situation can improve the supply chain performance directly, including the logistics activities (Li, Yang, Sun, & Sohal, 2009). Therefore, it is agreed that the IT implementation is a significant element that critically influence the contemporary logistics firms (Evangelista, Mogre, Perego, Raspagliesi, & Sweeney, 2012).

Recently, many researchers associate the logistics providers' performance with the involvement of IT in their firms and its beneficial output (Qiang Wang, 2008). Specifically, a research on transportation logistics sector in

the European Union has found that there is a positive relationship between IT implementation and firm performance, as the implementation of IT has boosted up the sales growth and increased market share of the logistics service providers or third party logistics. Accordingly, it is summarized that IT adoption has positive effects towards efficiency and effectiveness of the logistics service providers' performance (Evangelista et al., 2012). This fact is supported by previous literatures which claimed that the implementation of IT shall results in the enhancement of process quality, productivity and customer service (Bowersox & Daugherty, 1995; Calder & Marr, 1998; Chow, Choy, Lee, & Chan, 2007; James, Grosvenor, & Prickett, 2004; Lau et al., 2006; Liu et al., 2010).

Hypothesis 2 (H2): IT implementation has a significant positive relationship with performance of logistics service providers.

3.3 Innovation Capability and Firm Performance

Innovation is all about producing or enhancing something by using your capability and creativity. According to Bentz (1997), innovation is about presenting new or improved products, processes or services to the marketplace. Similarly, Afuah (1998) defined that innovation is the practice of new technologies and knowledge to create new services or products. On the other hand, innovation is seen as the process of transforming opportunity into fresh ideas and using it widely (Tidd, Bessant, & Pavitt, 1997). Thus, Lawson and Samson (2001) claimed that innovation capability is the ability of a firm to continuously transform knowledge into new process, products and systems to gain benefits. In other words, innovation capability is a crucial ability of a firm to utilize resources in new ways in order to create improved values (Yang, 2012).

Damanpour (1987) as well as Tuominen and Hyvönen (2004) in Yang (2012) claimed that innovation is famously divided by technological and administrative innovation. Technological innovation is about new products, services and technologies, while administrative innovation covers new procedures, policies and forms of organization. Previous literature did mention about radical or incremental innovation and product or process innovation but they are rarely used (Cooper, 1998). The combination of technological and administrative innovation seems to cover a huge surface of a firm's innovation capability. The technological innovation capability enables a certain organization to produce new products or processes (Yang, 2012), while the administrative innovation capability focuses on ability of the administration in encouraging the employees by rewarding them for their creativity and commitment. This encouragement indirectly motivates them to be more creative in executing their tasks (P. Panayides, 2006). However, according to Lin (2006), the organization's structure, culture and climate somehow influence the administrative innovation capability. To combine these two components of innovation capability, it can be said that the innovation capability focuses on improving specific goals on existing products, processes or systems which resulted to good firm performance where managers need to endlessly concern about (Tok, 2007).

Related to this matter, Richey, Genchev, and Daugherty (2005) confirmed that the capability of a firm should be dynamic, timely changed and fulfilling customers' needs. Therefore, the firm must always improve their capabilities (Mahoney, 1995). This situation shall happen if the firm has the innovativeness in managing their business, which then leads to a greater firm performance (Calantone, Cavusgil, & Zhao, 2002). The study of Yang (2012) proved that a firm can have the highest level of overall performance if the firm has high level of innovativeness and customer responsiveness. Meanwhile, some other studies proved that innovation capability and technology profile of a firm are two important resources to attain competitive advantages (Yeoh & Roth, 1999). Richey et al. (2005) added, proactive innovations can result in efficiency and effectiveness of marketplace competitive advantage and greater financial performance. Thus, the empirical studies concluded that innovation capability eventually has a significant positive influence on the firm performance (Hult et al., 2004; Oke, Burke, & Myers, 2007; Panayides, 2006).

Hypothesis 3 (H3): Innovation capability has a significant positive relationship with performance of logistics service providers.

3.4 Performance

Good performance is a goal for each and every firm, including logistics service providers. Performance is the character and behaviours' quality of an organization in accomplishing their jobs and functions to gain profit (Sink, 1991). Performance is defined by two core dimensions: financial and non-financial (operational) performance (Bagorogoza & de Waal, 2010; Bakar & Ahmad, 2010; Darroch, 2005; Venkatraman & Ramanujam, 1986). Generally, operational performance measure the firm's performance in terms of its flexibility, quality and on time delivery (Wang et al., 2010). Whereas, some said that operational performance can further be divided into two main dimensions, which are cost and service performance (Huo, Selen, Yeung, & Zhao, 2008). Cost

performance is about cost and price, while service performance is about quality and flexibility of service, as well as on-time delivery (Bernardes & Hanna, 2009; Daugherty, Chen, Mattioda, & Grawe, 2009; Green Jr, Whitten, & Inman, 2008; Ketokivi & Schroeder, 2004; Neely, Gregory, & Platts, 1995; Ruamsook, Russell, & Thomchick, 2009).

On the other hand, Dehler (2001, p. 208) in (Deepen, 2007) argued that logistics performance is built based on two dimensions, which are logistics cost and level of logistics service. In this case, logistics costs represent entire costs that are involved to provide the selected logistics services. Meanwhile, level of logistics services relates to the capability of a firm to supply customer's timely as well as reliability and flexibility products which fulfil the dynamic market demand. Since cost and service performance are two important measurements in road transportation logistics performance, Krauth et al. (2005) mentioned that efficiency and effectiveness are very important for performance measures. The balance of cost and service shall contribute to the efficient and effective logistics performance. Therefore, Krauth et al. (2005) listed out three indicators for the efficiency, which are "total distribution cost decrease, total delivery cost decrease and employees' overtime hours decrease", while three more indicators represent the effectiveness of road transportation logistics; "on-time delivery performance increase, number of delivery per day increase and total loading capacity increase". With the consideration of operational operation, this study follows the works of Huo et al. (2008) and Krauth et al. (2005).

As a result, a new adapted model has been designed based on the study of previous literatures. In regards to the discussed issue, four constructs with seven dimensions are selected to represent the effectiveness and efficiency of road logistics transportation performance in East Coast region of Peninsular Malaysia. As mentioned before, the effectiveness and efficiency of performance is an output of the balanced of cost and service. Therefore this study conceptualizes the logistics service provider firms' performance through two dimensions; effectiveness and efficiency. Meanwhile, the first independent variable, capability is characterized by two dimensions; service capability and flexibility capability. The second independent variable which is IT implementation is represented by basic technologies and advanced technologies. Last but not least is innovation capability, which is denoted by administration or managerial innovation. The conceptual model of this study is shown in Figure 1.

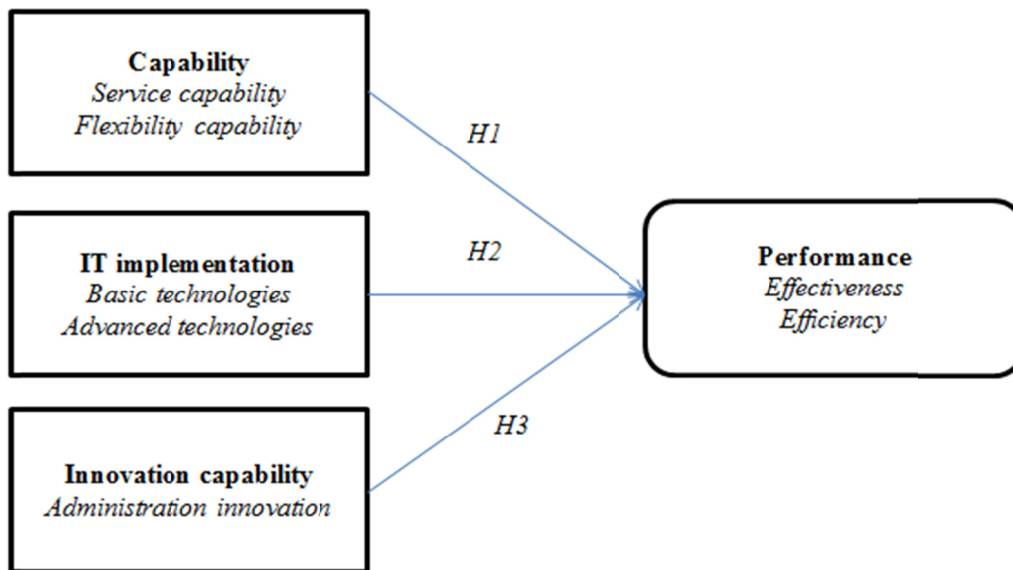


Figure 1. The conceptual model

4. Conclusion

The expansion of manufacturing industry in the whole world has boosted up the demand of logistics services in order to cater the movement of manufacturing products. The most affected part is road transportation logistics which somehow created road congestion, especially in urban areas. The congested road logistics transportation and public road transports makes the delivery of products or goods are delayed. It simultaneously increases the operation costs. The delay and cost increment has negatively affected the business performance of logistics service providers that provide the road logistics transportation service. Therefore, in order to deal with this situation, a research model is developed to ensure the logistics firm performance is always effective, efficient

and competitive. Based on the prior literatures, logistics capability, IT implementation and innovation capability are found effective in influencing good firm performance, thus sustaining its competitive advantages in the dynamic market. Hence, this study proposes the relationships of capability, IT implementation and innovation capability with the performance of logistics service providers.

In a certain research, not all existing constructs from the literatures can be included in a model. As for this study, only certain selected constructs are chosen with regard to the highlighted issue. Thus, other researchers are invited to add more constructs in this model in order to provide more angles of determinants affecting the performance. Besides that, this conceptual model can be adapted or adopted into empirical study of any interested research areas, especially in Malaysian context since Malaysia is still lack of logistics literature. Therefore, it will provide more insights on logistics performance in future, and this is very important for the academic world.

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