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The Effect of Postponement Strategy Towards the Financial Performance of Manufacturing Companies in Malaysia

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ABSTRACT

Today's manufacturing companies must simultaneously deal with externally increasing customers multi-item requirements with rapid lead-time, demanded high-quality products, but internally on a limited capacity. This study aims is to explore the important elements in postponement strategies and to identify the impact of postponement strategies towards financial performance of the manufacturing companies in Malaysia. Using qualitative research method, this study employs standardized open-ended interviews with five key informants from electronic manufacturing services, solar panel, telco, medical, and latex industries. ATLAS.TI was used to analysed the data. This study reveals that postponement strategies implemented have saved various costs, enhance its product quality, increase production speed, and definitely enhance their profits which results from increase revenue. Overall, this study supports the Service Level Model which suggest that by integrating demand management processes in the postponement strategies, the service level offered to customers can be achieved and it leads to the improvement on the yearly financial performance. The empirical evidence of this study provides a solid foundation for the manufacturing companies in Malaysia to incorporate postponement strategies while observing the market strategy to grab more customers for business enhancement.

Keywords: Postponement Strategy, Financial Performance, Manufacturing

INTRODUCTION

Postponement strategies is a part of supply chain management strategies where a deliberate action to delay final manufacturing of a product until receipt of a customer orders (Prataviera et al., 2020). Postponement is known as delayed differentiation is an adaptive supply chain strategy that enables manufacturer to dramatically reduce inventory while improving customer service (Zinn, 2019). For instance, when a shirt manufacturer know what is the demand from the customers on the color of shirts, then the manufacturer will produce white shirts and color them later when as per demand at the later stages. In this way, the manufacturer can stock up on white shirts ahead with low labor costs and when the confirmed

order of colors is given, the manufacturer will deliver the exact colors of shirts within the short period of time. Postponement strategy helps the manufacturer to change their product according to the customer's needs at the last moment of the sale (Alim & Beullens, 2022). With the assistance of postponement strategies in the business, it delays the supply chain activities and further productivity depends on the customer's demand. Cavinato and Kauffman (2009) stated that postponement strategy helps to minimize a chance of wrong manufacturing or deployment of incorrect inventory. This strategy has been identified as one of the key strategies to improve the efficiency and performance of the supply chain management field (Raj et al., 2022).

Malaysia is likely to experience a transition to a high-income economy between 2024 and 2028, a reflection of the country's economic transformation development trajectory over past decades. The country has the opportunity to undertake bold reforms to sustain future growth and to ensure that the proceeds of growth benefit all segments of the population. To ensure that this aim is achieved, all the business sectors in Malaysia need to be more focused. Panigrahi et al. (2023) opined that due to this, the manufacturing sector is facing a lot of pressure because the customers are demanding more features be added to their products. At the same time, customers are not willing to wait longer for the products, not willing to pay extra for them, and manufacturers are unwilling to hold unnecessary high inventory. With rising customer expectations on one side and manufacturers less willing to hold finished products inventory on the other side, industry and market leaders are struggling to find ways to improve efficiency while remaining agile enough to respond to changes in the global marketplace. To meet this demand while maintaining customer satisfaction, manufacturers have historically targeted to improve the efficiency of the supply chain, with the bi-fold objectives of minimizing the costs of production and holding enough inventory to ensure high order fill rates. According to Turner et al. (2019), this means that the mnufacturers have to keep in mind that the production costs does not going up, and at the same time, make sure that the quality of the product cannot be compromised.

Postponement strategy have significantly affected overall cost efficiency (Qin, 2011). It impacts the distribution package postponement strategy that effectively decreases the inventory in the same service level (Qian et al., 2011). Normally, the manufacturer needs to postpone their production because they want to improve their quality of the product or reducing the production cost cause of the high monetary density or low frequency of product that was ordered by customers (Ciptani & Dewantari, 2020). However, some costs shall be taken into consideration, such as in the context of a cement manufacturer in Indonesia, postponement incurred double administration (manual and computerized) as well as truck allocation for transportation and distribution by minimizing idle and stayed overnight trucks (Romadlon et al., 2020). Besides, Szmelter (2015) argued postponement concept to increase costs while decreasing others such as the benefits of economies of scales. According to Jafari et al. (2022), the risk in escalating costs can be occurred at three generic supply chain structures, namely as upstream (sourcing), midstream (manufacturing), and downstream (distribution). Due to inconsistency in costs incurred, this raised the second research question on does postponement strategies have an impact on financial performance of the manufacturing companies? Therefore, this study aims to investigate the impacts of postponement strategies towards financial performance of manufacturing companies in Malaysia.

LITERATURE REVIEW

Enhancing Financial Performance by Implementing Postponement Strategies

Majority of the studies have emphasised that the ultimate goal of supply chain management strategies is to enhance and improve the performance of companies (Abdul Rasib et al., 2020). Manufacturers must develop business strategies like the supply chain strategies that are concerned with its performance. The type of supply chain management strategies describes how the manufacturers will respond to its competitors, customers, suppliers, and governmental authorities in the market. According to Raj et al. (2022), postponement strategies have been identified as one of the key strategies to improve the efficiency and financial performance in the supply chain management field.

Few of the manufacturing companies have succeeded in improving the performance of the supply chain through the implementation of postponement. For instance, Karani (2022) found that postponement supply chain strategies had a positive and significant effect on the performance of manufacturing firms in Kenya. His result implied that a change in postponement strategies by one unit would result to a change in performance of manufacturing firms by 0.572 units. Consistently, Nyaoga et al. (2015) asserted that postponement supply chain strategies significantly influenced firm performance of large-scale manufacturing firms in Kenya. Further, Romadlon et al. (2020) found that implementing postponement practice in Indonesian's cement industry affects their daily cement production. Therefore, cement company shall increase its revenue by ascending the production capacity. According to them, this postponement model seems like a hub and spoke that will reduce inventory holding cost and help the cement factory to enhance its revenue.

In some other cases, the manufacturers who implement postponement strategies indeed end up collecting a higher amount of revenue from its buyers (Tien et al., 2019). In a case of HP re-engineered the distribution process in order to implement postponement, Prataviera et al. (2020) revealed that this strategy helped HP to assess the preferences and demands of the consumers better before designing its supply chain activities. With these delaying strategies, the net revenue of HP for the year 2014 was €111.5 billion and its cash flow from operations increased to €12.3 billion (Prataviera et al., 2020). However, Stuart et al. (2012) stated that HP had to make additional investments for redesigning the products. Moreover, the enhancement of the distribution center capabilities also increased the expenditure. Contrary, Zijm et al. (2019) pointed out that the additional investment was easily balanced by the inventory savings due to the implementation of postponement. This indicates that profit can be generated because of the amount that is being saved in the entire production process.

In Jordan, Jum'a et al. (2021) found that postponement strategies significantly influenced financial performance of Jordanian manufacturing companies and there is a positively influence mediating impact of sustainable environment on the postponement and firm's financial performance. Thus, their findings suggest that decision-makers of the supply chain should adopt a postponement strategy, which leads to the improved financial performance where the relationship is enhanced by the presence of environmental sustainability. However, Pride and Ferrell (2016) said the financial benefits derived from the postponement strategies will vary depending on the kind of products that the manufacturer concerned is produced. It must be remembered that there are also several manufacturers who unable to implement the

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postponement strategies, and this means that they will also not be able to make any extra revenue. In several situations, postponement strategies have increased the additional investment of the manufacturers because new distribution plants and equipment have to be built and designed which proves to be expensive. Moreover, redesigning the products also involves a substantial amount of time and cost.

Service Level Model

Service Level Model has widely used as a measure to quantify the market conformance of a manufacturer. Between the manufacturer and the retailer, there exists service competition, i.e., higher service level in one channel will attract more customers, leading to less demand in the other channel (Paul & Chowdhury, 2020). The manufacturer controls all three decisions, which are quality effort level, the direct service level, and the selling price. On the other hand, the retailer only determines the retail service level. Since manufacturers face constant price competition and narrowing margins, they require both low inventories and high service levels to ensure profitability on product development investments (Biçer et al., 2022).

The Service Level Model used to explain about how postponement strategies implemented in a supply chain management able to enhance financial performance. Guericke et al. (2012) commented that under the Service Level Model concept, there is a direct relationship between the ability of an organisation to achieve a certain service level. This also includes financial performance and cost of a supply chain. For instance, the diverse demands and lead times often determine the amount of inventory that a supply chain holds. However, sometimes it is difficult for the manufacturers to estimate the demands that a product will create. Due to that, this will create stock out which includes components like loss of goodwill and delay in the supply chain. Service level is an appropriate substitute of stock out. Manufacturers may set a safety stock level for products with the help of service level.

According to Chen et al. (2020), Service Level Model helps to satisfy the ever-changing needs and preferences of the consumers. Manufacturers may consider implementing all or one or multiple of the supply chain strategies (one of it is postponement) to improve the service level. However, different strategies will have a different impact on improvement. When manufacturers collaborate and share resources with supply chain entities to increase the availability of raw materials, the production quantities and, ultimately, the service level is increased. Service level is a performance measure independent on any cost parameters, defined as the fraction of customer orders or customer demand, filled on or before their due dates (Sawik, 2015). The better service level is believed related to better revenue. For instance, Ben Ali et al. (2019) revealed that by integrating demand management processes, the service level offered to customers can be achieved and it leads to the improvement on the yearly profit margin.

RESEARCH METHODOLOGY

This study adopts qualitative research design using standardized open-ended interviews. The population of this study is the manufacturing companies in Malaysia. This study covers manufacturing companies from a diverse industry such as electronic manufacturing services (EMS), solar panel, telco, medical, and latex. Manufacturing companies chosen must be qualified with two pre-conditions: (i) the manufacturing plant is located in Selangor; and (ii) has been

implemented postponement strategies in their production or any supply chain management process. The five key informants (Table 1) consist of the management personnel who are directly involved in the production and manufacturing process. This field of study had been chosen because the researcher wanted to get an accurate information directly from the management level of the manufacturing companies regards to implementation of postponement strategies.

Table 1: Demographic Profile of the Five Key Informants

Information	Key Informant 1	Key Informant 2	Key Informant 3	Key Informant 4	Key Informant 5
Current Position	Operation Manager	Procurement Director	Project Manager	Operation Manager	Operation Manager
Manufacturer	A	B	C	D	E
Sector	EMS	Solar Panel	Telco	Medical	Latex
Major Market	Export	Export	Export	Export	Export
Year of Establishment	27 years	15 years	15 years	22 years	30 years
Sales Turnover (USD)	1.2 bil	3.2 bil	4.0 bil	0.46 bil	2.51 bil
No of Employees	1,800	7,000	5,000	1,800	10,000

Data Analysis

The data in this study is obtained through semi-structure interview which gives opportunity to the key informants to provide information that do not restrict the participants' opinion. The interview protocol included several open-ended questions. All key informants were given the transcripts shortly after the interview for review purposes, which contributed to the verification of the accuracy of the transcripts (Hagens et al., 2019). This study employed an inductive approach to find patterns throughout the interview transcripts. It used a manual open coding process (Yin, 2015), in an iterative analysis approach, in order to categorize and understand the raw data. This resulted in an initial list of themes and patterns (McKim, 2017). This study then performed a series of axial coding, in order to interconnect and link the previous categories of themes, unravelling the causal links between them.

FINDINGS AND DISCUSSION

Postponement Practiced in the Manufacturing Companies

Table 2 shows that manufacturers implemented postponement strategies that is focusing on different types of organisational activities of supply chain management process. One of the key informants is reluctant to share his company's postponement journey, hence, the postponement implementation in this section is concentrates on the other four manufacturing companies only.

Table 2: Postponement Strategies Implemented by the Participating Companies

Companies / Industry	**Postponement Strategies**
A: EMS	Manufacturing and Assembly Postponement
B: Solar Panel	Production Postponement
D: Medical	Packaging and Production Postponement
E: Latex	Manufacturing Postponement

Source: Interview with the Key Informants

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Manufacturer A is a manufacturing company under the electronic manufacturing services (EMS) sector, implemented delayed configuration as one of the main mechanisms to achieve flexibility in manufacturing of electronic components. In this company, there are three levels of manufacturing and assembly postponement, which can be translated as in Table 3. Each type of postponement implement by the Manufacturer A describes a different way of electronic parts can be designed to be customized without knowing final demand of electronic components.

Table 3: Manufacturing & Assembly Postponement Implemented by the Manufacturer A

Levels of Postponement	Description
Component-swapping modularity	A variety of components are designed to fit into a standardized port.
Component-sharing modularity	A component is standardized to fit into a variety of different platforms.
Fabricate-to-fit modularity	The finished product is a specific quantity from a batch of bulk product tailored to customized dimensions.

Source: Interview with the Key Informant 1

According to the Key Informant 1, component-swapping modularity occurs when two or more alternative types of a electronic parts can be paired with the same basic feature creating different product variants belonging to the same product family. In component sharing, the same basic electronic parts are used in different product families. Note that component-swapping modularity and component-sharing modularity are identical except that the "swapping" involves different electronic parts of the same basic products and "sharing" involves different basic products using the same electronic parts. Having these two levels of postponement allows the production of Manufacturer A to take place without knowing specific volume requirements for different stock keeping units.

The Manufacturer A can begin their production process when a customer order in place at the level of fabricate-to-fit modularity whereby exact electronic parts are tailored to customized dimensions for making electronic components and this production is done closer in both time and location to the point of sale. The Key Informant 1 shared that,

"Semi-components may be produced to stock, but final assembly or customization does not take place until customer requirements are known. By doing so, a limited inventory of generic components can be held, while final assembly can lead to a variety of end products."
Key Informant 1

Further, the Key Informant 1 revealed that the delayed process in his company mainly be conducted in two steps. The first step can be called "production preparation stage", whereby the initial production capacity is converted into a different semi-finished electronic parts inventory, including general semi-finished electronic parts inventory corresponding to production differentiation points (PDP) and dedicated semi-finished electronic parts inventory corresponding to Customer Order Decoupling Point (CODP). The second step can be called the "order fulfillment phase", which is to use the general semi-finished electronic parts inventory and the dedicated semi-finished electronic parts inventory to complete the production of the electronic components according to the customer's order request. In this company, the use of postponement in continuous production phase are important means to adjust the production

time and costs between the locations of PDP and CODP and their corresponding semi-finished electronic parts inventory which will be assembled to make electronic components.

Solar panels produced by the Manufacturer B is considered a product bought in bulk or customized packaged configurations because this company's main customers consist of two different segments, namely residential and commercial customers which creates high variability for end products. Solar panels sold for these two customers segment has different packaging and security tagging requirements. In producing the solar panel, each segment of solar panel manufacturing requires various types of special equipment (such as silicon purification, ingot, wafer and cell production, and module assembly).

Manufacturer B implemented the production postponement mainly using the delivery of engineer-to-order (ETO) solar panels, due to the need to consider the specific requirements of each customer segment. Engineer-to-order postponement strategy are traditionally considered to perform all engineering and production activities based on specific orders. ETO production systems is the ones in which the CODP is located at the design stage, whereby the customer order is delivered at the beginning of the design phase of a solar panel. This demands a high degree of integration in the supply chain as there are interdependencies between customer orders and processes carried out by Manufacturer B.

According to the Key Informant 2, engineer-to-order is adapted after the customer order entry point, with major or minor modifications, or simply finalized through selection and combination of the existing variants in a final structure of solar panels. Manufacturer B do not consider the possibility of performing all the engineering activities based on forecast because engineering work is always required, to some extent, after the order. The Key Informant 2 said that,

"We define a product catalogue and the sales managers act on it to negotiate with the customers. However, modifications in the end-product solar panels are always required by the customer during negotiation, and components could be added, adapted, or removed after the order."
Key Informant 2

In this manufacturing company, the strategic components (key parts of the machine with high utilisation rate) and the critical components (complex parts of the solar panel with installation of high duty solar power system) are the generic parts or subassemblies. Whereas, specific parts or subassemblies are the customised components (parts of the power system that are usually different from one customer order to another). The residential customer, for example, can ask for different types of sensors and different standards (depending on the usage). Also, the installation of the solar panel depending on the layout of the customer's house or plant. Hence, the production is delayed until the engineers customized the customer's request for the solar panel.

Medical equipment sold by the Manufacturer C are high value and forecasts are generally compiled based on sales representatives' predictions. Because of the high cost of the medical equipment, complicated decision making process, and financial constraints of the customers, it

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is somewhat difficult to know when products will be ordered. Additionally, instruments were designed or configured to local country requirements which exasperated the forecasting impact. As a result, Manufacturer C was plagued with less than optimum service levels for some medical equipment and higher than planned inventories for other pharmaceutical products. All of these conditions were catalysts for a postponement strategy, which became even more important as a result of an industry itself.

Usually, medical equipment must come packaged with local language manuals and labeling. In total, more than 10 different language manuals were eventually required. For certain medical equipment, manuals are approximately ±200 pages in length and therefore it did not make sense to create a single manual with all more than 10 languages included nor package 10 different manuals with each medical instrument. Manufacturer C initiated the switch to language specific packaging in the industry through the postponement of packaging materials at distribution centers and flexible language (English) capability within the operating software. This is a straight forward process accomplished by marrying a language specific accessory box to the instrument during the shipment process. The Key Informant 4 revealed that,

"We offer "live" printing of labels and manuals during last stage of customization which allows the company to not keep any labels and manuals inventory in the supply chain. In future, we might shift to online manual that can be assessed from our website."
Key Informant 4

Shortly after achieving successful packaging operations, Manufacturer C initiated another postponement strategy in their Product X line. This next strategy was to redesign the Product X so that it could be configured-to-order at the end of the assembly process. Through a carefully designed manufacturing process, Manufacturing C is able to manufacture to a specific model as soon as that specific model is shipped to fill a customer order. This strategy involved the redesign of the manufacturing process so that the Product X could be configured-to-order at the end of the assembly process. This meant that all of the commonalities between the two different variations of each model would be combined into an intermediate product that would be produced to a forecast, stored as intermediate inventory, and configured-to-order once an order was received on the assembly line. The supply chain became vastly more efficient and service levels increased dramatically.

At the point of postponement, a work-in-process is held in inventory awaiting a customer order. This allows Manufacturer D to reduce customer lead time from roughly 20 days 4 days for test and delivery time. In the testing stage, the medical equipment of Product X must go through a standard process in which multiple cycles of different testing scenarios take place. Before delivery, the equipment is placed in buffer inventory waiting for shipment. The shipment of a Product X is a trigger for the replacement of that configuration in buffer inventory. With this postponement, customer service levels improved and inventory was significantly reduced by eliminating the need to store high value finished goods. Inventory across the supply chain was reduced through a 50 percent reduction in buffer stock. Service levels went from oscillating between 70 to 80 percent to greater than 98 percent.

Postponement practices are adopted by Manufacturer E because they provide the most significant benefits when demand variability is high, and production capacity is moderately tight especially during pandemic Covid-19. Manufacturer E has begun to use the color coding technique to classify their rubber gloves. Colored gloves are frequently used the doctors and other health workers when working with highly their patients. For instance, they need for extreme protection involves using two gloves, one white and the other color such as blue or purple, or any other colors, so they can identify a glove puncture as soon as it occurs. Rubbler gloves come in colors other than the standard white. Besides, gloves should be packaged as specified having described size and color in the appropriate quantity.

Manufacturer E postponed the color process of the rubber gloves. This company found a way to implement this strategy by producing white, or uncoloured gloves, and postponing dyeing until the gloves was completely finished, which allowed the product to more accurately reflect exact color that has been order by the customers. According to the Key Informant 5,

"For some finished products, we can perform the customization steps quickly enough to allow it to build to order."
Key Informant 5

By focusing on the postponement, Manufacturer E is able to dye plain gloves in advance and specify the colour during the selling point based on the colour forecasting. Implementing the dyeing postponement process has allowed a drastic cost reduction due to less expensive inventories and a smaller unsold amount. Finally, labeling postponement being considered when the rubber gloves are marketed under several brands utilizing the same box packaging format.

The Impact of Postponement Strategies on Financial Performance

The basic motivation of any manufacturers to implement postponement strategies are to meet customers' demand, reduced inventory, increase cost, and enhance financial performance. Basically, when the postponement strategies have been implemented, the manufacturers will focus on the changes that will contributes a huge profit for the particular operations. Otherwise, if the postponement strategies do not contributes any increment in term of revenue or profits, it will affect the whole supply chain entities because postponement involves the changes along the supply chain management process.

According to the feedback received from the key informants, this study finds that majority of the key informants revealed that their company enjoyed a significant increment in the company's financial performance. Postponement strategies implemented have enhance non-financial performance (enhance its product quality) and also financial performance such as saved various costs, increase production speed, and definitely enhance their profits results from increase revenue on sales. Both of the Key Informant 3 and Key Informant 4 revealed that,

"As a result of postponement practices, it has an impact on material management costs, product quality, production speed, reliability, production cost, flexibility, and enhance profit."
Key Informant 3

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"The company shows adequate aggressiveness in saving cost with numerous profit improvement projects. The finance department uses to publish monthly overhead report to reveal the areas where the company is spending an excess amount."
Key Informant 4

The obtained results seem to be rather logical, as the greater extent of postponement triggers the higher level of productivity and raises flexibility. It should be noted that the flexibility of changing output volume and products mix contribute to the higher level of products' customization. This also confirms the previous research showing that in many industries, postponement is considered to be a supply chain strategy for mass customization (Benbouja et al., 2021; Guo et al., 2021; Phelan et al., 2017). The obtained results of this study suggest that essentially those industries are electronic manufacturing (Manufacturer A) and rubber latex gloves (Manufacturer E). According to the Key Informant 5,

"The die-bank push postponement strategy for gloves offers performance improvements, it is acceptable for customers that require fast deliveries."
Key Informant 5

Production postponement has also significantly improved financial performance at solar panel manufacturing company. Manufacturer B has always kept performance metrics since it first introduced production postponement. After observing the implication of the postponement, Manufacturer B found that this strategy helped it to reduce inventory in just half a year. This translates directly into cost savings and improvements in the company's return on assets as well as return on investment due to additional plant that has to set-up for delaying strategy. At the same time, customer service, measured by the percentage of times that customer orders are filled on time, has remained the same. This is particularly impressive because during that period, Manufacturer B released an unusually large number of new products. According to the Key Informant 2,

"These improvements saved an additional savings of 39% came from material efficiency innovations to reduce and reuse waste for the last few years."
Key Informant 2

Based on this finding, it could not be denied the fact that the adoption of postponement in the supply chain process of manufacturing companies greatly reduces the production cost and, in that way, increases financial gain of the manufacturing companies. Previously, Key Informant 1 revealed that his company preferred a cost cutting option, but not willing to put aside the quality standard. To reach this end, they have to mostly depend on the EOQ model which assists themto control the procurement process and reduce the costs but not quality. The Key Informant 1 mentioned that,

"Postponement brings the CODP closer to final customers, EOQ enabling customization to be achieved within a short time frame, resulting in a quick response to market. Of course, we can sell more and gain our revenue."
Key Informant 1

The Key Informant 1 also agreed that postponement strategies assist the company to laid down the inventory whereby they able to control the purchase storage and thereby the raw materials are used in a systematic manner. The EOQ model is proven help them to minimize the carrying inventory cost, reduce the cost of the purchasing order processing, and save the cost of set-up of production plant. This effort assists the company in regulating the flow in production process to avoid the excess cost.

CONCLUSION

The turbulent market conditions of the present times compel manufacturers to think about the application of postponement strategy in the supply chain management. The market uncertainty attached with the changing customers' demands and the failure of conventional forecasting process give rise to the possibility of adopting postponement strategy in the supply chain process. Manufacturers are also confronted with several challenges such as pressures from customers' demands that are not willing to wait longer for their products order, manufacturers are unwilling to hold unnecessary high inventory, increasing production costs, decreasing economies of scales benefits, and opportunistic actions from either the buyer or the suppliers. Thus, it will not be an exaggeration to say that uncertainty and fluctuation in market demands are among the key driver of postponement strategies. Overall, the finding of this study supports the Service Level Model (Guericke et al., 2012) as the postponement strategies implemented by the manufacturing companies able to enhance certain service level and subsequently increase the financial performance of the manufacturers. With postponement strategies, the manufacturing companies able to achieve product quality, product customization, product innovation, price competitiveness, product innovation, and standardization.

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