

# The Effect of Product Life Cycle in Managing Aging Asset: A Case Study in Royal Malaysian Navy

M.Halizahari

School of Technology Management and  
Logistics, Universiti Utara Malaysia  
(UUM)

Royal Malaysian Navy  
halizahari@yahoo.co.uk

Melan Mustakim

School of Technology Management and  
Logistics, Universiti Utara Malaysia  
(UUM)

mustakim@uum.edu.my

Jamaludin Roslan

School of Technology Management and  
Logistics, Universiti Utara Malaysia  
(UUM)

jroslan@uum.edu.my

**Abstract—** This research represents a case study on the challenges faced by Royal Malaysia Navy (RMN) in managing their aging assets. After observations has been made, it can be presumed that the RMN assets were used beyond their economical life. The study will reveal the dilemma faced by the RMN by which the Product Life Cycle strategies employed by the marketers has left a big implication in the maintaining and managing their aging assets. The stages involved in Product Life Cycle were elaborated to allow research to be done in this matter. This paper is based on literature review and RMN's experiences in managing their aging assets. At the end of this study, the author has successfully identified the strategies in managing aging assets even though PLC has made the spares and component that required maintenance to be the asset that are no longer in the market. This paper also discloses that by applying these initiatives, RMN are now able to utilize their assets perdurably without compromising the asset's performance. These initiatives can be applied as the guidelines for military and other sectors especially in the industries of logistics and transports in the future.

**Keywords—** Product Life Cycle, Aging, Life Extension, Obsolescence, Replacement.

## I. INTRODUCTION

Every year many new products are being introduced in the market. These new products is the strategy used by the marketer in order to sustain a company's position in the market [1]. By adding new products to the company's production line, it makes apparent that the company is innovative and constantly tries to bring a better solution to the consumer [2], either products for both home living or businesses. It can also be observed not all new products introduced in the market are of new ideas. Some are already in existence or the improvised version that are resold by the marketer in order to gain profit and to compete with other competitors in the industry [3]. As of now, the products introduced in the market that are genuinely original and new to the buyer only make up 13 percent of the whole market, whereas others are already part of the existing product [4].

After all, it must not be ignored that a new improvised product or even a new product, should still be considered an innovation. Companies that fail to appear innovative will then decline in sell and subsequently phase out of the industry [5]. Although new product is essential for company to sustain in the industry, this innovation has manifested a great deal of dilemma to organization that utilizes long life assets for example, the military organization.

The idea of supporting the whole life cycle of asset is very crucial in order for the asset readily can be used and is fully operational when it is required. Capital assets used by the military is always expensive and usually difficult to be replaced [6]. This asset were used for a longer duration. The problem faced by this organization is to maintain their assets since logistics support often does not coexist with the product's life cycle in the market.

## II. THE ROYAL MALAYSIAN NAVY DILEMMA

The Royal Malaysian Navy (RMN) was established in 1934, also known as the Straits Settlement Royal Navy under the British Colonial. The transformation of RMN flourished from having only a small flotilla consisted of KD RAHMAT and KD HANG TUAH in 1970s to the procurement of Perdana Menteri Class of Submarine in 2009.

Currently the RMN have 44 ships with variety of sizes and functions. Due to the limitation in defence budget, the RMN has to continuously use the assets even when they have reached the economical age [7]. Therefore, it is inevitable that the RMN has to manage the assets by maintaining the assets to the highest readiness. However, it becomes a dilemma to the RMN when most of the parts and components used onboard ship are obsolete. The parts and components are no longer available in the market due to the rapid innovation and new product replacement [8].

**III. OBJECTIVES OF STUDY**

Generally, this study embarks on the objectives as follows:

- To understand how does Product Life Cycle affect the aging asset management?
- To determine the initiatives used by the RMN in order to prolong the aging asset life.

**IV. LITERATURE REVIEW**

In order to sustain in an open market, the marketer will have to find ways to continue producing new product. This new product development will go through many phases of Product Life Cycle until it reaches its declining phase as shown in Figure 1.

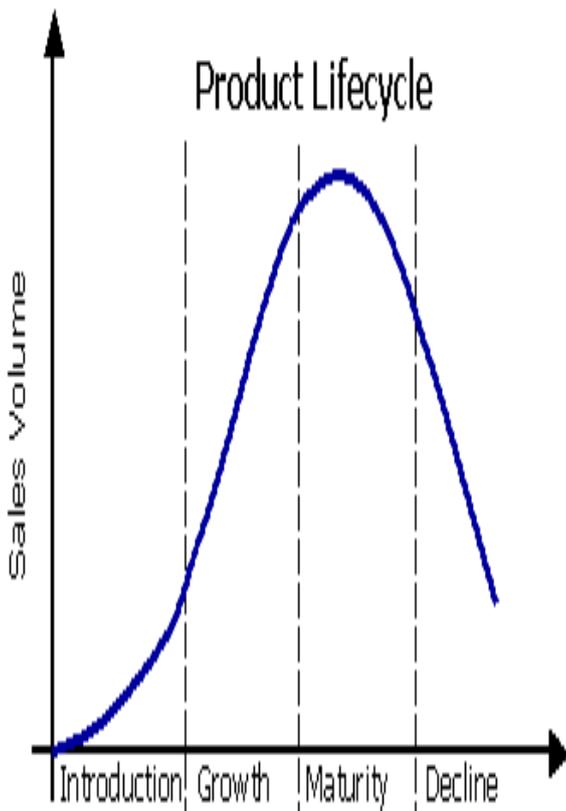


Fig. 1. Product Life Cycle Phase

Nonetheless, there are many opportunities to increase company’s profit and reduce the production cost while implementing a good product life cycle strategy [9].

Phases	Description
Introduction	A product is first introduced in the market. Since it is new and unknown to the potential buyer, the sales volume is small.
Growth	Buyers have some information on the product and begin to buy the product. New buyers will enter the market and previous buyer will repeat the purchase [5]. Sales increase and the competitors begin to enter the market.
Maturity	Market are saturating. Buyers consist of repeat buyers. High competition from competitor causes price to be a factor in making decision to purchase.
Decline	Buyers moving to other product that benefit the buyer more, due to innovation as the other product might be a new product or the improvised version of the same product. Sales are dropping and the demand is declining. The production of the existing product will be stopped or produced in smaller scale based on the market demand. To some extent, the company will have to produce other product as to continuously stay in the industry.

Table 1. Product Life Cycle Phases.

The Product Life Cycle is a basic concept of marketing strategy. PLC strategy is incompatible to the Integrated Logistics Support (ILS) approach in which ILS supports the assets from cradle to grave while the PLC fail to provide the foundation when it reaches the declining phase.

Therefore, in many cases, most of the assets are only used for several years according to the asset’s life cycle summarized in Figure 2. The assets are operationalised and maintained for as long as the spares and component are still available in the market. However, when the spares and component reach the declining phase, the assets will be phased out and disposed, or to be simply put, the product will then complete the Product Life Cycle Phase.

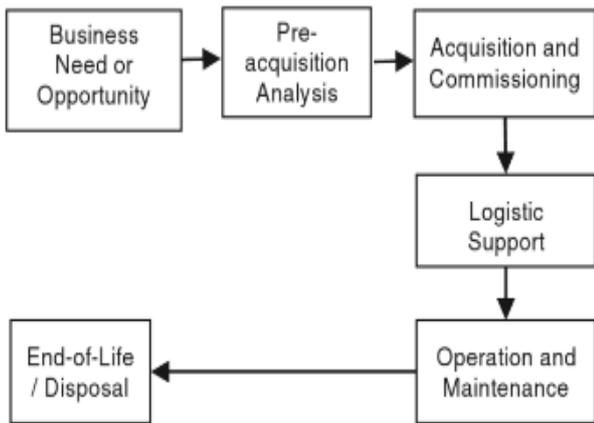


Fig. 2. The Asset Life Cycle [10]

Hence, it is being observed that the PLC has left a big implication to long life assets such as the military assets. These assets are used for decades [11] and cannot be easily replaced since they are expensive [6]. Thus, the organization has no choice but to continue maintaining the assets by replacing the component and spares. However, the PLC strategy that is commonly employed by the marketer has made the maintenance difficult and usually imperfect.

**V. METHODOLOGY**

This study aims to present RMN’s experience and challenges in managing and maintaining their maritime assets. It is known that the RMN ships are aging and has been in service for more than 20 years. These assets are operationalised over their shelf life. Most of the parts and components onboard the ships are now obsolete and can no longer be found in the market. The researcher uses case methodology to support the study. Case study is a methodology of analysing a phenomena, that bound by pace and time [12]. This study opted to utilize semi-structured interview which was focused in the workplace and environment of 21 research participants who are involved directly in asset management. The semi-structured interview method was chosen as mean of data collection since this type of interview is free flow which allows research participants to express their involvement in asset management without any disruptions and pressure. Additionally, document reviews on related log and files were used to collect data and evidence. Literature reviews of previous study were used as well, as to support the key findings on the research.

**VI. DISCUSSION AND FINDINGS**

The RMN practices a good maintenance system by implementing preventive maintenance in order to prolong their asset’s life span. Corrective maintenance only takes place when there is any defect on any onboard ship system and component. However, maintenance can only be implemented if the parts and components are available in the market [8].

Since the assets were procured for the last 20 years, it currently becomes a challenge for the RMN to get the required spare parts. In this situation, logistics support such as the availability of spares play an important role to ensure the assets are operational when they are in need.

Since PLC has impacted negatively in supplying the necessary support for RMN’s assets, RMN has taken many initiatives in order to continuously put their aging assets into operation.

*A. Contract on Spare Parts and Maintenance Services*

To ensure all ships are maintained to the highest operational availability, the logistics support thus play an important role. The logistics support also includes the ensuring the availability of spare parts, as to make the ship readily available for tasking. Fortunately, the RMN has a good support from the Original Equipment Manufacturer (OEM). OEM’s role holds vital importance especially concerning the logistics support [13] where most of the main items and the system on the onboard ships are also included in the spare parts contract which has been tied to the OEM, who were also the supplier of the product. Moreover, the RMN has also signed a contract with Dockyard. The contract covers all the conditions and defects defect that cannot be repaired by the ship staff or depot, by which the ship will then be repaired by the Dockyard.

Since the RMN’s assets are aging and the products offer used for maintenance has reached its declining phase and some are even unavailable anymore in the market, the initiative of having contract is one of the best solution in maintaining aging asset. However, there are also other issues that RMN has to endure when managing the contract especially the spare parts contract. It is observed that the contract has a long lead time in which the delivery period may reach up to 24 months from the ordering date. On the other hand, some contracts have the ordering quantity fixed, which means the Minimum Order Quantity (MOQ) for each spare parts is also included in the contract’s clause. The reason that the OEM has to enumerate the specific Lead Time and the MOQ is because of the ceased of production for most of the spare and were made to order.

Hence, RMN has no choice but to obey the requirement made by the OEM or they will have to face the consequences regarding the national security. The case mentioned is expected to rise when the assets cannot be operational due to the failure on getting the right spare parts in order to perform the required maintenance.

*B. Obsolescence Management*

Starting from 2014, the RMN has implemented the obsolescence management project. The obsolescence management project are focused on the components that are still operational but stand in a critical state, by which a fast replacement is required. The replacement on the obsolete component is implemented phase by phase, that are initiated according to ship squadron.

One of the main challenges faced by the RMN is the time taken for the replacement to take place. For example, a complete replacement of an obsolete component for each squadron usually takes 3 years long.

### C. Ship Life Extension Program

When maintenance is no longer an option and replacement of the involved component cannot fix the problem, the best solution available is to conduct the Ship Life Extension Program (SLEP). RMN has first implemented SLEP for its corvette ship, KD KASTURI in 2009. KD KASTURI has been in service for the past 25 years before it underwent SLEP. The decision to implement this program is considered to be the best alternative since the budget constrain and the Ministry of Defence could not promise on the procurement of a new ship. At the same time, KD KASTURI has also been showing a decline in its capabilities and could no longer perform its task effectively.

KD KASTURI completed SLEP in 2013 and the ship were refurbished with new modernised components and system onboard. In a nutshell, its operational capabilities has improved massively and was fully accessible. However, there are issues coming to surface after the implementation of SLEP. Since the purpose of SLEP is to replace all the components and system onboard KD KASTURI, therefore all the spare parts which have been procured previously cannot be used anymore. It cannot be helped that the amount of stocks and the value are both high. Although, it manages to improve the ship's capabilities, in the meantime the RMN has to constantly sought after the spare part stocks which has piling up in the warehouse store.

## VII. CONCLUSION

The PLC strategy has made a notably sum of profit to the company that make sure every product undergoes through the 4 phases; Introduction, Growth, Maturity and Declining. To remain relevant and exist in the saturated and competitive industry, company will have to continue developing other product, which can mean improvising the existing product or creating a new one. Since it is the objective of every company to attain profit, choosing to produce the same product when the demand drops after the product has reached the declining phase is never a wise option.

Thus, this PLC strategy has remarkably given a huge impact to the organization that own long life assets such as military organization. Previously, this organization usually had to hold their assets for decades since the assets are expensive and difficult to be replaced. The challenges faced by RMN in order to maintain the assets because most of the spare parts are now obsolete and no longer available for purchase in the market. Therefore, many initiatives have been taken by the RMN to prolong the assets life by having spare parts contract with the OEM, the implementation of Obsolescence Management project and SLEP project specifically for critical ship.

As a conclusion, it can be summarized that the RMN indeed has been enduring difficulty in managing their aging asset. As a solution to that, PLC strategy has proven to be a smart alternative for when an asset reaches its declining stage and the product to support long life asset is no longer in the market. Hence, this paper is crucial for organization that owns long life assets and opens up avenues and initiatives in managing their assets.

## REFERENCES

- [1]. G. K. Lee and M. B. Lieberman, "Acquisition Vs .Internal Development As Modes of Market Entry," *Strategic Manag. J.*, vol. 31, no. July 2009, pp. 140–158, 2010.
- [2]. Siemens, "Enabling Innovation for New Product Development," 2012.
- [3]. K. Kamoche and M. Pina, "Minimal Structures : From Jazz Improvisation to Product Innovation," 2003.
- [4]. P. Singh and P. Sandborn, "Obsolescence Driven Design Refresh Planning for Sustainment-Dominated Systems," *Eng. Econ.*, vol. 51, no. 2, pp. 115–139, 2006.
- [5]. P. Kotler, S. Burton, K. Deans, L. Brown, and G. Armstrong, *Marketing*, 9th Editio. New South Wales: Pearson Education, 2013.
- [6]. R. & C. on B. the T. and A. of L. ; N. R. Council and 2012 Research & Committee on Benchmarking the Technology and Application of Lightweighting ; National Research Council, *Application of Lightweighting Technology to Military Vehicles , Vessels , and Aircraft* Committee on Benchmarking the Technology and Application of Lightweighting ; National Research Council. Washington: National Academies Press, 2012.
- [7]. M. Halizhari and M. Melan, "Initiatives to Prolong the Life Cycles of Aging Assets in the Royal Malaysian Navy," *Int. J. Supply Chain Manag.*, vol. 5, no. 2, pp. 122–126, 2016.
- [8]. F. Rojo, R. Roy, and E. Shehab, "Obsolescence Management for Long-life Contracts : State of the Art and Future Trends," *Int. J. Adv. Manuf. Technol.*, vol. 49, no. 9, pp. 1235–1250, 2009.
- [9]. S. John, "Product Lifecycle Management," in *Product Lifecycle Management*, vol. 2, Springer International Publishing., 2016, p. 253.
- [10]. N. Anthony and J. Hastings, *Physical asset management*. 2010.
- [11]. A. Glas, E. Hofmann, and M. Eßig, "Performancebased logistics: a portfolio for contracting military supply," *Int. J. Phys. Distrib. Logist. Manag.*, vol. 43, no. 2, pp. 97–115, 2013.
- [12]. J. W. Creswell, *Research Design: Quantitative, Qualitative and Mixed Method Approaches*, Fourth Edi. University of Nebraska, Lincoln: Sage Publication, 2013.
- [13]. D. Berkowitz, J. N. Gupta, J. T. Simpson, and J. B. McWilliams, "Defining and Implementing Performance-Based Logistics in Government," *Def. Acquis. Rev. J.*, vol. 11, no. 3, p. 15, 2005.