PRICING OF MARINE PRODUCTS AND SERVICES IN THE MODULAR AGE
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EXECUTIVE SUMMARY

WHAT IS THE ISSUE?

Pricing can be a particular challenging issue for marine suppliers with multiple products and services especially when suppliers want to address specific customer needs and at the same time achieves the efficiency in pricing.

WHY IS IT IMPORTANT?

Appropriate pricing of products-and-services combination can have a much broader impact on the business. First, it will boost the sales and revenue by differentiating customers' varied preference between offerings while reducing the transaction costs. In addition, it will enhance the competitiveness and minimize the ability of new entrants to compete in the market. Lastly, customer satisfaction and loyalty will be increased accordingly.

WHAT CAN BE DONE?

The pricing challenge for multiple products and services can be overcome by applying the modular concept on pricing, where each product or service is offered as a module, so suppliers can either set different prices for each module or offer a couple of modules at a bundled price. Pursuing price bundling will allow suppliers to balance the tradeoff between customization and standardization in pricing, thus creating a potential win-win situation.
Suppliers are increasingly confronted with difficulties in pricing their products and services appropriately. This challenge goes hand in hand with another pressing issue facing many firms. It is to develop an offering that is both flexible and capable of being tailored to fit the specific requirements of customers (Edvardsson, et al., 2007) and at the same time achieve the efficiency through standardizing processes (Rahikka, et al., 2011). Pricing can be particularly complex when customers can choose from a wide variety of products and services and make their own combinations, or when customers look for a reliable solution but do not necessarily require the product itself.

This challenge can be overcome by applying the price bundling based on modules, where each product or service is offered as a module, so suppliers can either set different prices for each module or offer a couple of modules at a bundled price. Modularity has been a hot topic discussed mainly in manufacturing engineering and design for an extended period. Previous studies argued that firms can increase efficiency and achieve useful customization through implementing modularity, which primarily concerns limiting the number of parts in a particular design and achieve the highest degree of customizability (Brusoni and Prencipe, 2001).

However, in the service industry, we don’t see much attention given to such concept, even that some recent literature focused on it due to the realization of its applicability in various fields of the service industry such as supply chain and maintenance. Price bundling, which applying the modular concept on pricing, turns to be an efficient way to balance the tradeoff between customization and standardization in pricing, thus creating a potential win-win situation.

In this report, the essence and advantages of price bundling are first introduced in Section 2, followed by the discussion on which factors could be having an influence on the price of bundles in Section 3. Sections 4 addresses how these factors affect the optimal bundling strategy in various contexts. Section 5 makes reflections on the price bundling from the perspective of marine supplies industry. The conclusion is offered in Section 6.
A module is the smallest (or most basic) unit that can be offered to the customer and serves as the core building block for the bundling – offering two or more separate products or services in a package (Stremersch and Tellis, 2002). This integration generally creates added value for consumers (such as compactness or enhanced performance) and thereby raises consumers’ reservation prices for the product bundle compared with the sum of the reservation price of the separate products (Stremersch and Tellis, 2002). However, bundling is not a random and straightforward mix and match process since it is more a long-term differentiation strategy and requires a new design and optimization of the interfaces among the products or services. Nevertheless, Bundling has become a widespread sales practice for multi-products or services enterprises and served as a powerful strategy for gaining competitive advantage and better-exploiting profit potential.

There are different ways of mixing and matching modules, in other words bundling: pure component (also known as unbundling), mixed bundling, and pure bundling. In a pure component strategy, the product or service is offered separately, and it is the simplest form of a bundle and considered as the building block for all other bundle types. An example of pure component bundling would be a microwave, or a washing machine, in which such products are usually sold separately. Pure bundling is the opposite strategy, which a firm sells only a group of products or services all together with no option of buying them separately, for example, TV channel subscriptions, which often come in the form of a group of channels bundled together around a certain theme (family, sport, kids, etc.) and the consumer can’t subscribe to only one channel usually. Mixed Bundling serves as a hybrid between the pure component and pure bundling, where customers can either purchase the product/service separately or the bundles. Mcdonalds menu is a perfect example of mixed bundling, where a customer can either pick a meal that combines a sandwich, fries and drink or pick one or more from the single items offered from the value menu. Table 1 summarizes the bundling types and provides some examples on each.
Mixed bundling offers the seller the opportunity of cross-selling, in which bundling would facilitate the sale of products that are added to the bundle that may not be purchased on a stand-alone basis along with a particular single product, which increases potential revenue, as well as increases economies of scale and hence reducing the cost of production. In addition to that, mixed bundling can be used as a method to enhance market presence through more offerings, which will minimise the ability of new entrants to compete in the market, since they will need to offer the same products and bundles to be able to compete, which might not be possible for new entrants due to large fixed investments necessary and brand loyalty.

Table 1. Three Types of Bundling

<table>
<thead>
<tr>
<th>Types</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Component</td>
<td>Sale of a separate product or service</td>
<td>Oil change service, vegetables and fruits.</td>
</tr>
<tr>
<td>Pure Bundling</td>
<td>Two or more products or services sold together and can’t be purchased separately</td>
<td>Sound system, PC, TV channels.</td>
</tr>
<tr>
<td>Mixed Bundling</td>
<td>Two or more products or services that can be bought together or stand alone</td>
<td>Telecom bundles, Luggage, Holiday packages, Season tickets.</td>
</tr>
</tbody>
</table>

Bundling works as a strategy to gain more consumer surplus (increases profit potential) by employing a pricing technique named price discrimination, which works best when customers differ in their relative preference between two (or more) products (Gilbride et al., 2008). Across various forms of bundling mentioned, the mixed bundling strategy generally yields higher profits than either pure bundling or pure component strategy (Yan and Bandyopadhyay, 2011). In particular, a form of mixed bundling called price bundling facilitates second-degree price discrimination - creating a menu of declining prices for different quantities, so as the consumer buy more the price per unit decreases- by selling two or more products or services at a discount in comparison to buying them separately.

From the consumer perspective, apart from the convenience that mixed bundling provides, it also offers price incentives, due to the less amount paid for a bundle in comparison to buying the components individually, as well as the reduction in transaction costs. The Figure 2 below shows the advantages of this form of bundling.
Bundling seems to be an advantageous strategy that any firm can pursue to increase its market presence. However, few issues with bundling should be considered. One of the important issues to consider is the risk of cannibalization – the decrease in sales of one product due to the introduction of new product – which makes it crucial to pay attention to set the right price for the bundle. This price should be lower than the sum price of the independently priced optimized products in order to encourage different customers with different independent product valuations to purchase all products in a single bundle (Bondos, 2014). At the same time, this price should be higher than the price of any specific product within the bundle (Smith, 2012, p.216). Also, firms should keep in mind that too many components in the bundle could cause customers’ anxiety and even fear, so the optimal size of the bundle should take that into consideration (Bondos, 2014).

**Figure 1: Advantages of price bundling**

- **Provider’s perspective**:
  - Fully exploit willingness to pay
  - Cross-selling
  - Increased competitiveness
  - Cost reduction

- **Customers’s perspective**:
  - Price rebates (incentives)
  - Convenience
  - Reduction of transaction cost
  - Solution-oriented, non-product oriented

*Increase in revenue & profit*  
*Increase in customer satisfaction and loyalty*

Source: Wuebker et al., 2008, p. 94.
To unleash the full potential of price bundling, it is crucial for firms to understand which factors could be having an influence on the price of bundles and how these factors affect the optimal bundling strategy in various contexts.

In literature, we came across several methods employed to come up with an optimal pricing model for bundling, which varied from surveys, statistical modeling, to non-linear programming. However, the basic consideration in the design of these various models took into account nature of heterogeneity in consumer reservation prices, costs, and the nature of competition, the objective of the firm (Venkatesh and Mahajan, 2009; Stremersch and Tellis, 2002; Bondos, 2014; Smith, 2012). Our proposed framework share these common characteristics as well few additional ones such as the bundle size and the price of other bundles to primarily account for the cannibalization effect described earlier. Figure 2 shows the basic breakdown for our proposed pricing factors.

**Figure 2: Parameters of Price Bundling**
Consumer reservation price is considered as one of the most important factors in determining the bundle price and which bundling is optimal. As an operational measure of value, it refers to the maximum price the consumer is willing to pay for one unit of a given product or service (Schmalensee, 1984). It also reflects the value that the consumer perceives in a certain product or service and how much it is actually worth from consumer’s point of view. The reservation price can be measured through a survey or assuming a particular distribution, which depends on certain factors such as the degree of product or service differentiation, quality, and substitutability, in addition to many physiological factors. Generally, a higher reservation price improves significantly the perceived benefit of bundling.

Different customers may value different items differently. In other words, it is the nature of heterogeneity in reservation price. This heterogeneity has two dimensions, asymmetry, and variation (Stremersch and Tellis, 2002). An asymmetric distribution of reservation prices for products X and Y can be explained by an example shown in the 2nd and 3rd columns of Table 1. Here, customer A has a lower reservation price for product X than customer B but has a higher reservation price for product Y than customer B.

<table>
<thead>
<tr>
<th>Reservation price</th>
<th>Product X</th>
<th>Product Y</th>
<th>Bundle XY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer A</td>
<td>5</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Customer B</td>
<td>8</td>
<td>6</td>
<td>15</td>
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</table>

A variation of reservation price refers to the bundle of products. Take the same example above, the reservation prices for the bundle XY vary considerably from customer A to customer B.
**Costs:**

The related costs to bundling may also be important. It can be obtained from the firm providing the product or service and is an important consideration since it will allow us to measure the degree of discount that a bundle should carry in comparison to a single component in order to determine the profit maximizing price. Lower the marginal cost contributes significantly in Bundling (Smith, 2012). However, the cost will not be pertinent to the optimality of mixed versus pure bundling because the costs do not vary much between these two strategies (Stremersch and Tellis, 2002).

**Competition:**

Competition is an important factor that leads us to determine the degree of market power a firm holds. Since it means that the bundling firm in the monopolistic market can “force a consumer to do something that he would not do in a competitive market” (Soobert, 1995). It makes bundling a suitable strategy in such market. However, bundling in a perfect competition would have no effect at all due to the fact the firms operating in such market face a horizontal demand curve (price = marginal cost = marginal revenue) and no economic profit is realized on both the short run and the long run no matter how much they sell.

Source: Scanpix/IRIS
Objectives of the firm:
It is common to consider the profit or revenue maximization as the key objective of the firm. However, an important alternative goal may be maximizing market penetration, particularly for the new product in high-tech and Internet environment (Stremersch and Tellis, 2002). In this case, the company will not want to exclude any consumers from buying one of products or services. Therefore, the bundle price set under the goal of market penetration could be lower than the price with the goal of profit.

Bundle Size, Number of Bundles, and the Cross Price between Bundles:
As we mentioned before, too many components in the bundle can cause customers’ anxiety and even fear (Bondos, 2014), so the optimal number of bundles offered by the firm, as well as an optimal number of component in each bundle, should be taken into consideration. Also, cross price relationship between various bundles offered should be examined in order to minimize the impact of cannibalization between bundles. The main idea here is to avoid offering various bundles as substitutes which will only divide revenue between bundles, but rather try to offer them as complements or at least to serve a certain need for the customer with no close alternative to it, and hence increase revenue.
The optimality of price bundling refers to whether a business should offer and price its module components separately at individually determined prices, whether to only offer them within the form of bundles for which a bundle price is asked, or whether to choose a mixed form of the above. The answer is not a straightforward one, and some key considerations should be considered. In this section, attempts have been made to summarize which type of price bundling is optimal in various contexts considering the factors of price bundling discussed in Section 3.

1) **In general, pure or mixed bundling yields higher revenues than unbundling.**

This is largely because bundling exploits consumers’ willingness to pay for added value. When there is asymmetry in reservation prices, different customer segments highly value different products in the bundle. Therefore, a bundle can capture the consumers who would otherwise buy only one product or buy both products at prices below their reservation prices (Stremersch and Tellis, 2002).

2) **When reservation prices for the bundle vary, mixed bundling can yield higher revenue than pure bundling only.**

If consumers vary in their valuations of the bundling, offering only the pure bundling leads to either a loss of consumers with low reservation prices for the bundle or a loss of potential revenues from the segment with a high reservation price for the bundle. In contrast, mixed bundling can accommodate all possible segments at optimal prices and thus result in higher revenue compared to pure bundling.
3) **When a firm’s goal is to maximize market penetration first and profits second, pure bundling is either the best strategy or is no worse than any other strategy.**

If a firm strives to maximize its market penetration, it will price the individual products or bundles at the minimum of consumers’ reservation prices. According to the conclusion that pure bundling generates higher revenues than unbundling, it is optimal to choose the pure bundling.

4) **In competitive markets, mixed bundling dominates unbundling and pure bundling.**

If the market is competitively ranging from oligopoly to perfection competition, companies cannot differentiate themselves from competitors by bundling. The mixed bundling increases variety and is more attractive to consumers, which in turn increases consumer demand.
One of the key pricing challenges identified for the marine supplies industry is the diversified customer needs, which is also the key starting point for applying value-based pricing strategy (Jiang and Hansen, 2017). Marine suppliers generally face multiple customer segments with diversified needs. For instance, high quality or life-long service offerings are not necessarily appeal to shipyards, as yards mainly focus on the short-term first purchase price. While shipowners would prioritize the products in combination with reliable services for the long-run. Even for the same customer segment, customer needs are dynamic and can change over time as well (Jiang and Hansen, 2017). In this context, price bundling can be a powerful tool to balance the diversified customer needs as well as the standardized operation process, especially for the suppliers with multi-products and services. It has been widely adopted in many industries to promote the sales of products and service.

Nowadays, products and services are often sold separately by marine suppliers, rather than as an integrated bundle. Moreover, the sales of services are primarily dominant by the form of a pure component or pure bundling, where customers can find either a price list of all services provided or a few pre-defined service agreement packages. There is a limited possibility for customers to mix and match the products and related services based on their specific needs. The strategic design and promotion of mixed bundling could address this problem, attracting different customers and achieving higher customer satisfaction and revenue. This is particularly relevant for high-tech products with high development costs, as bundling of products and supporting services will create added value for customers, such as improving the performance and reliability of the products and saving costs.
The marine supplier’s industry and its shipping customers currently are also challenged by the tightening of environmental regulation. With the introduction of new regulation, an existing product or service may have to be upgraded along the process. In this case, bundling a new product or performance-based service with an existing product is an ideal introduction strategy because it allows increase the visibility and trial of the new product and facilitate the adoption by customers.

However, as discussed in the previous sections, which types of bundling is optimal depends on various factors that suppliers are facing. One of the very crucial issues connected is to price the bundle appropriately, especially considering the risk of cannibalization. The success of price bundling depends on a number of factors, including the optimal choice of bundling type and price level.
Price bundling strategy is indeed a unique and an exciting area to explore in the context of marine industry, and if it was studied further and implemented in a way to serve better the customer, it could be a valuable tool and a win–win situation for both suppliers and customers. However, as mentioned throughout this report, different parameters affect the successful implementation of such strategy, some of which might be easy to measure (such as cost), while other are really complex and highly subjective (such as reservation price), which requires suppliers to place themselves in the customer shoes and provide substantial effort into understanding the consumer needs and wants. But, we believe such effort made by suppliers will result in better customer satisfaction and an increase in customer loyalty, which at such time of increased pressure due to intense global competition is highly valuable.
The report is part of the dissemination of the Blue INNOship Project No. 15 ‘Servitization: Creating the market by understanding the price, cost, contracts and financing’. The project is part of the Danish societal partnership, Blue INNOship and partly funded by Innovation Fund Denmark (IFD) under File No: 155-2014-10, as well as the Danish Maritime Fund and Orient’s Fond.
Blue INNOship is a societal partnership focusing on creating growth and employment in the Blue Denmark through development of green and energy-efficient solutions.

Blue INNOship consists of app. 40 partners covering suppliers, shipowners, consultants, universities and schools, GTS institutions, authorities and classification societies, who work together in 5 work packages containing 14 active projects and 1 pre-study.

The long term objective of Blue INNOship is to develop an innovation model for the Danish maritime industry and the partnership is an investment in the development of this strong common innovation model that will offer a central, competitive advantage for the Danish maritime industry.

The activities in Blue INNOship are funded by the project partners, Innovation Fund Denmark, the Danish Maritime Fund and Orient’s Fund.
Servitization: Creating the market by understanding price, cost, contracts and financing

Project background
As part of the Blue INNOship, Copenhagen Business School together with Danish maritime carries out the project ‘Servitization - Creating the market by understanding performance, price, cost, contracts and financing’. Focusing on the critical success factor in servitization, the project aims to advance the dialogue between the Danish equipment manufacturers/service providers and ship owners. In particular, the project looks at the pricing practice and cost management of product-service solutions, design of service contracts, and financing of servitized solutions.

Project highlights
This project aims to advance the manufacturer-ship owner dialogue with focuses on the following aspects:

*Price and cost* - Building up the competencies of suppliers in pricing strategy and cost management of product-service solutions by considering market, design, life cycle and value chain; and building up the competencies of ship owners to strategically select the reliable supplier, product and service.

*Contracts* - Establishing new specific knowledge about how contracts can enable the transformation from one-off transactions to long-term collaboration between supplier and ship owner that encourages innovation and technical development by e.g. ensuring balance between risk and reward.

*Financing* - Creating specific insights into understanding how to link scale, profitability and financing of servitized solutions for the industry.

Project participants
CBS Maritime and Danish Maritime

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<td>3 October 2016</td>
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<tr>
<td>service innovation (finalized)</td>
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<tr>
<td>2. Pricing management and strategy for the marine equipment suppliers</td>
<td>14 December 2016</td>
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<td>3. Optimization and handling of risks and cost within contracts</td>
<td>1 March 2017</td>
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<td>4. Pricing products and services in the modular age</td>
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<td>5. Financing of new business models that can promote business and sales</td>
<td>20 September 2017</td>
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<td>within the maritime industry – general</td>
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<td>6. Financing of new business models that can promote business and sales</td>
<td>6 December 2017</td>
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<td>within the maritime industry – cases</td>
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<td>7. Negotiation and collaboration through international contracts</td>
<td>22 March 2018</td>
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<td>8. Final Conference</td>
<td>14 June 2018</td>
</tr>
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<td>Optional: marine equipment leasing workshop</td>
<td>6 February 2018</td>
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Note: The project partners reserve the right to adjust the themes and timing of the remaining seminars according to the interests of the stakeholders and the progress of the project activities.
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For additional information on the project, please contact the project contacts above.


