INTERNATIONAL PRODUCT LIFE CYCLEIN THE CONTEXT OF DIGITAL TRANSFORMATION

Sofia Serdiuk
Bachelor's degree student, group US-41, National Technical University of Ukraine
'Igor Sikorsky Kyiv Polytechnic Institute', Kyiv, Ukraine
us41.fmm.serdiuksofia@gmail.com
Olena Korohodova,
PhD in Economics, Associate Professor, Associate Professor of the Department of International Economics, National Technical University of Ukraine
'Igor Sikorsky Kyiv Polytechnic Institute, Kyiv, Ukraine
o.korogodova@kpi.ua

The product life cycle is a marketing concept that is applied to study the capabilities of a product and its time on the market. The product life cycle is comprised of distinct stages that a product must undergo in order to be sold. Cyclical fluctuations in product life cycles are associated with many factors that are considered within both the micro and macro environment and include natural, demographic, social, technological and other factors that influence the cycle. However, digital transformation will be considered as a long-term driving influence on the length of the cycle. The ultimate goal of an effective analysis in the study of the international product cycle is to measure the entry of a product into the international market and the level of its exports.

The first stage in the product life cycle is the implementation of a sales strategy, the creation of a product model, the search for potential consumers, and the comparison of the life cycles of substitute products. This stage is characterised by high promotion costs. Initially, the manufacturer focuses on the domestic market, and then analyses the possibilities of entering foreign markets. The launch of a product is the next intermediate stage that actually determines the future of the product. First of all, it allows to formulate strategic goals for scaling up production in order to enter foreign markets. At this stage, the effectiveness of sales strategies is determined and a high level of marketing and operational expenses is incurred. The next stage of the life cycle is the transition of products to the growth phase. This stage is characterised by the highest profitability and the highest prices for products. The number of consumers is increasing, the amount of advertising may decrease or remain the same, and the product is on the rise. It is at this stage that production costs are covered.

The transition to the maturity phase is accompanied by an increase in exports and relative stability in demand. If the production technology, product range or advertising remains unchanged, the value of the product to the consumer will decrease, resulting in saturation, which leads to the decline phase, the last stage of the cycle. Saturation may occur more quickly in the foreign market due to changes in the structure of the domestic market in the country, political and legal factors, and under the influence of customs tax burden.

In addition to the factors affecting the product life cycle discussed above, it is worth analysing changes in the cycle in the context of information technology. To analyse the impact of innovations on the product life cycle, it is necessary to define the technology life cycle, since technology is the driving force behind the introduction of new products and is the main object of this paper. According to a chapter from 'Product Life Cycle' by Matthias Kreimeyer, Merlin Gerald Stölzle and Valesko Dausch, 'The technology life cycle describes not just a single product, but fundamental technologies that can be used in products either alone or in combination. After its launch, a technology only starts slowly; early adopters use it in isolated cases. As the technology moves into a growth phase, it increasingly becomes more accepted or mature, before gradually moving to saturation in a maturity phase. At some point then, the degeneration phase begins, as new technologies emerge and take over, and existing ones become obsolete' [1]. Analysing the technology life cycle makes it possible to predict product sales strategies, marketing activities and assess the possibilities of entering the foreign market at different stages of the product life cycle. The technology life cycle is longer than the product cycle [1]. Thus, several product cycles can take place during one technology life cycle, which affects the cumulative change in the duration of the product life cycle stages. Therefore, it is important for manufacturers to adjust their strategies to different stages of the technology cycle to achieve the most effective results. A rational approach will facilitate the optimal use of technology for the maximum volume of products, which will reduce costs. In addition, a qualitative approach will help to predict the time required to switch

to innovative technologies in the event of a new product life cycle, cycle stage or external factors. Sustainable production can be achieved through the introduction of appropriate digital transformations at different stages, focusing on the life cycle of both technology and products. Digital transformation is a key condition for the production and sale of competitive products. As technology advances, changes in the product life cycle occur. In particular, digital transformation facilitates the automation of production, marketing and sales processes, which affects the duration of the cycle. Digitalisation improves product advertising processes, rendering them more innovative and adapted to current trends.

The main goal of digital transformation is to ensure the maximum duration of the maturity phase in the product life cycle with the minimum duration of the product launch phase, as well as to delay the saturation and decline phases. In addition, digital transformation can serve as a tool to 'rescue' products at the saturation stage. In order to comprehend the impact of digitalisation on the product life cycle, it is necessary to consider the formation of product supply. The initial phase encompasses product development and market analysis. The utilisation of software in this stage facilitates the research of competition, consumer demand, and the assessment of opportunities and threats to the product. Large investments are made in promoting products using technology. In particular, advertisements are broadcast on social media, such as Instagram, Telegram, YouTube, TikTok, which corresponds to the preferences and trends of potential consumers, especially young people. As a result, it is possible to reduce advertising costs and change the product launch strategy at different stages if necessary. For example, countries with a high level of technological development invest heavily in research and innovation to gain an edge over competing products. Countries such as the USA, Japan and Germany provide the global market with innovative products that are new to consumers, which will stimulate demand in the domestic and foreign markets. In addition, technology is used to design a product prototype and study consumer response to it, both during the launch of the first units and at the saturation stage. These studies require significant investments and technological implementations to ensure maximum adaptation of the product to the consumer, as well as prompt response to external factors. In addition, if the product is export-oriented, marketing research should operate on several levels at once. This involves the use of artificial intelligence and Big Data technologies to compare market segments and adapt to the specific conditions of each target consumer group. Thus, it can be concluded that digital transformation technologies help to reduce the duration of the development phase by speeding up the distribution of an advertising campaign, creating a model of future products and using automated processes to predict changes in the market. Equally important is the innovation of production technologies that will optimise costs and increase the productivity of production processes. It is inappropriate to consider the transition of production from manual to machine labour in the digital transformation phase, but some mechanised work performed by people in modern enterprises is indeed being replaced by automated processes. A simple example of such a replacement is the work of an answering machine, which everyone encounters almost every day. Previously, this work was performed by humans in a mechanised manner that required significant resources. In the context of international trade, digital transformation helps to process incoming big data faster, which speeds up the development phase and allows for the development of a strategy for the long-term existence of a product in the international market in a competitive environment.

In light of the preceding stage, the products have the potential to transition more expeditiously to the market entry phase. Given the adaptation of the products to the target consumers, an increase in consumption is already evident at the initial stage. At this stage, advertising continues to operate on a large scale. Tastings or fairs are held - although the business does not yet fully cover its costs, the company is already able to hold promotional offers to attract a wider range of consumers and to 'retain' existing customers. As a result, the products enter a growth phase, and the time to market is also shortened.

The duration of the growth phase, precipitated by the utilisation of information marketing technologies at the inception stage and their escalation during the sales process, has the potential to be protracted. This is attributable to the stimulation of demand, provided that the product is of high value, aligns with consumer preferences, and is not encumbered by substitute products in the market. Consequently, the growth phase may be prolonged in the context of a pre-digital evolution, as producers perpetually calibrate demand through product innovation. This dynamic process contributes to the fact that products are heterogeneous and consumers do not quickly become saturated with goods. In addition, a manufacturer in the growth phase can increase prices by using advanced technologies and consumers will be willing to pay a high price for a certain period of time. The environmental friendliness of production and packaging plays a significant role and can influence consumer choice and affect

product reputation. Going green requires innovative approaches that can only be achieved through digital transformation of production.

The main success in the digital transformation in the product life cycle is the length of the maturity stage. This is the stage that has stable demand, when consumers are interested in the product and are ready to prefer it to the competition. An important aspect that helps to keep products longer in the maturity stage is the continuous improvement of products in line with the desires and needs of consumers. Digital transformation has a significant impact on the duration of the maturity stage. For example, digital technologies make it possible to reduce production costs by improving the company's assets, which in turn optimise depreciation charges and increase production per unit of equipment used. At the maturity stage, market research is also automated with the help of artificial intelligence. The manufacturer improves and updates packaging for the consumer, thus stimulating demand. Products are increasingly integrated with smart systems and IoT devices, adding new levels of complexity and functionality [1]. Changing and expanding the product range allows us to postpone the stage of product saturation. In this way, products are adapted to consumer needs and remain at the maturity stage longer. This stage is beneficial for both the manufacturer and the consumer, as the consumer receives constantly innovatively improved products, while the manufacturer increases profits and minimises costs through technology.

Nonetheless, in accordance with the trajectory that any product undergoes, a decline in production will occur, preceded by a period of saturation. The market will be inundated with more affordable and innovative products, which consumers will begin to favour. The advent of technological innovations has the potential to facilitate the resilience of businesses during periods of economic downturn, thereby enabling a more expeditious recovery from such crises. Since automated systems will calculate the required output at the saturation stage to prevent the accumulation of excess goods, the company will receive the minimum amount of damage.

In conclusion, it can be stated that digital transformation has the capacity to artificially modify the cycle time by adapting the product to the consumer, whilst taking into account competitors. Multinationals have the ability to artificially extend the phase of the cycle by exporting capital to countries with less advanced technology and, conversely, shortening the product life cycle to encourage consumers to buy new variations of goods [3]. Digital transformation, in particular automation, helps to improve product testing through automated simulation, reducing errors and improving supply chain management and inventory control [2]. Industry 4.0 is changing the product life cycle, increasing the duration of the stages that bring the most profit to the company and reducing the costs of the stages associated with the adaptation of goods in domestic and foreign markets. In the context of the international digitalisation of processes, innovations have been shown to increase exports, promote international cooperation, and ensure the stable growth of the global economy.

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