

Customer Co-Creation throughout the Product Life Cycle

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Abstract

To sustain their competitive advantage, companies rely more and more on customers' knowledge and experiences in product innovation processes. Considering that for radical innovations a distance from current market needs is crucial, customers are not in great amount involved in the development of products that represent breakthroughs on the market. However, customers' knowledge and experience is very important for the incremental product improvements. Co-creation can be seen as a powerful engine for innovation. This paper focuses on giving the answer to the research question – is it possible to map co-creation processes throughout the product life cycle? By means of a literature review, the authors try to provide the understanding of this relation and offer the distinction of three co-creation levels (breakthrough level, high co-creation and low co-creation level) throughout the life cycle of a product.

Keywords: *Co-creation, innovation, product development, product life cycle*

1. INTRODUCTION

In contemporary business environment companies are realizing the importance of collaboration for creating and sustaining competitive advantage. There is a shift in how product value is perceived and created. Customers no longer accept the traditional push of offerings from companies. They pull these offerings, demanding more meaningful and sustainable goods and services. The traditional company-centric view is being replaced by the customer-centric view, creating a market environment in which companies and customers co-create experiences [1]. The value chain becomes the value system, where customer is not a passive target of the company, but an active individual with who a company establishes a sustainable relationship in value co-creation.

Customer perceived value is considered fundamental to company's competitive advantage [2]. According to Vargo et al. (2008), value is always co-created, jointly and reciprocally, in interactions among providers and beneficiaries through the integration of resources and application of competences [3]. Ramaswamy (2011) also stated that value is a function of human experiences and that experiences come from interactions [4]. As specialization, knowledge intensiveness and technological complexity are growing in many industries, companies and customers are more dependent and relied on each other's knowledge and resources [2]. The active role of

customers can be seen as a key component of value co-creation in innovation activities. Customers' needs, experience and knowledge are crucial for the process of joint value creation with customers and other stakeholders in the integrated value network.

Since new products often do not succeed to meet customers' needs, establishing the interaction with customers in innovation processes of new product development is an important challenge in order to avoid market failures. Co-creation as a powerful engine for innovation has become very interesting research area.

According to Kristensson et al. (2004), involving users as co-creators in innovation produces ideas that are more creative, more highly valued by customers, and more easily implemented [5]. Kirah (2009) defines co-creation as the continual feedback loop and collaboration with all stakeholders in a value network throughout any given process of designing, developing and implementing meaningful products, services, organizational and strategic changes [6]. In addition, Rahbek (2009) states that doing innovation with customers rather than just for customers can help shift value creation and business concepts away from the product towards holistic solutions [7].

Piller et al. (2012) focus on the context of new product or service development and define the co-creation as an active, creative and social collaboration process

between producers and customers, facilitated by a company [8]. Similarly, Russo-Spena and Mele (2012) define innovation as a co-creation process within social and technological networks in which actors integrate their resources to create mutual value [9]. They have developed a co-creation model, *the five "Co-s" model*, that includes five phases of co-creation: co-ideation, co-evaluation, co-design, co-test and co-launch. These are the traditional phases of the innovation process (e.g. idea generation, evaluation, etc.) by incorporating the idea of co-creation.

However, there is a gap in the literature regarding the relation of co-creation to different stages of the product life cycle. Considering this, the authors of this paper examine the possible link between co-creation and the product life cycle by reviewing the literature. Mapping the types of co-creation processes in each of the stages of the product life cycle can help companies to optimize these processes and increase benefits from them. Focusing on different types of customers and using specific co-creation techniques in different stages can enable companies to improve their motivation and maintain their enthusiasm for the co-creation and with it extend the product growth.

Section 2 explains the product life cycle concept and its five distinct stages. It is followed by section 3 that focuses on types of innovation, radical and incremental, and their connection to S-curve phenomena. Section 4 connects innovation and co-creation as crucial element for products' success on the market. Customers' involvement in innovation in each of the stages of the product life cycle and the distinction of co-creation levels throughout the life cycle of a product are represented in section 5. The conclusion gives a discussion of the significance of the findings and further research directions.

2. PRODUCT LIFE CYCLE CONCEPT

Kotler, Keller, and Cunningham (2006) propose that four things are implied when stating that a product has a life cycle: (1) products have a limited life; (2) product sales pass through distinct stages; (3) profit rises and falls at different stages; and (4) products require different marketing, financial, manufacturing, purchasing, and human resource strategies at each stage [10]. In addition to these implications, this paper examines the possibility to map different co-creation processes through the product life cycle.

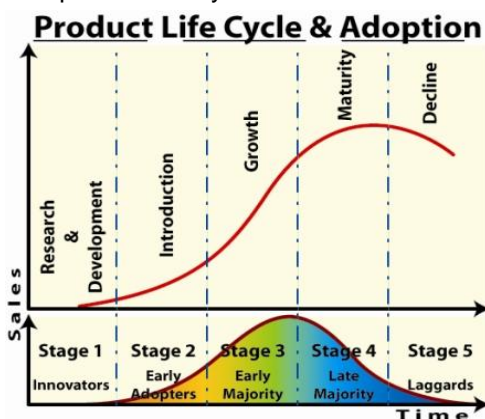


Figure 1. Product life cycle and adoption

The product life cycle is defined as a predictive instrument for forecasting marketing requirements and assisting in the planning of long-term product strategies [11]. It was introduced in the 1950s to explain the expected life cycle of a typical product from idea to its obsolescence (Figure 1). It has remained a stable feature of marketing teaching, despite the critics for its limited applicability. Its influence has also been seen in other theories, from new product management to portfolio analysis [12].

Philip Kotler breaks the product life cycle into five distinct stages: (1) product development, (2) introduction, (3) growth, (4) maturity and (5) decline [13].

The goal of new products is to meet customers' needs with a quality at the lowest possible cost in order to return the highest level of profit. However, during the *product development stage*, sales are low and revenues are negative. It is the time of spending on the research and development with absolute no return [14]. The *product introduction stage* includes the product launch with its requirements to have maximum impact at the moment of sale. Companies build awareness of their products among potential customers. This is the point when companies have to focus on their marketing mix, especially on promotion. Companies in this stage spend a lot of money, but get back only a small portion. During the *growth stage* product sales are increasing and it is the right time to focus on increasing the market share. Competitors try to copy or offer similar products, and frequent product modifications are crucial to forbid this. Promotion and advertising continues, but not in the extent that was in the introduction stage and it is oriented to the market leadership [14]. When the market becomes saturated with variations of the basic product, and all competitors are represented in terms of an alternative product, the *maturity stage* arrives. There are more competitors with the same products and it is the time to extend the product's life [15]. Maturity stage is the period of the highest returns from the product. Sometimes it is difficult for a company to conceptualize the decline signals of a product. Usually a *product decline* is caused by decline in sales, change in trends and unfavorable economic conditions. At this stage market becomes saturated and the company tries to keep loyal customers before it finally withdraws the product from the market.

3. INNOVATION IN PRODUCT DEVELOPMENT

Innovation is the process of making changes, large and small, radical and incremental, to products, processes, and services, that results in the introduction of something new for the organization that adds value to customers and contributes to the knowledge store of the organization. It is crucial for innovation to add value to customers, to make them adopt the product or service and fulfill their requirements. Innovation is built on a foundation of creativity and sometimes on invention, resulting in the creation of new knowledge and learning within the organization [15].

Product innovation is one element in an organization's mission to create value for customers. This value can be created through radical and incremental innovations (Figure 2). *Radical innovations* represent a

breakthrough in product functionalities, determined by an evolution of internal knowledge and competences. They represent the creation of new-to-the-world customer value (e.g., cell phones, microwaves, televisions) and displacing existing ways of delivering value (digital photography vs. silver halide, inkjet and LaserJet printers vs. typewriters) [16]. They can threaten to transform the industry itself by destroying the existing market and thus creating the next great wave [17]. *Incremental innovations* represent small improvements in product functionalities, which are performed in order to support the life of the product, to improve some processes or/and services which will help the company to satisfy customers' needs and to remain competitive on the market [17]. These innovations do not have a dramatic impact on the society that uses them but they do lead to steady improvements in the efficiency of manufacture, and the variety, quality and performance of products [18]. However, it is important to remember that at the end, every technology that people use is going to be replaced by some breakthrough at some point in time [19].

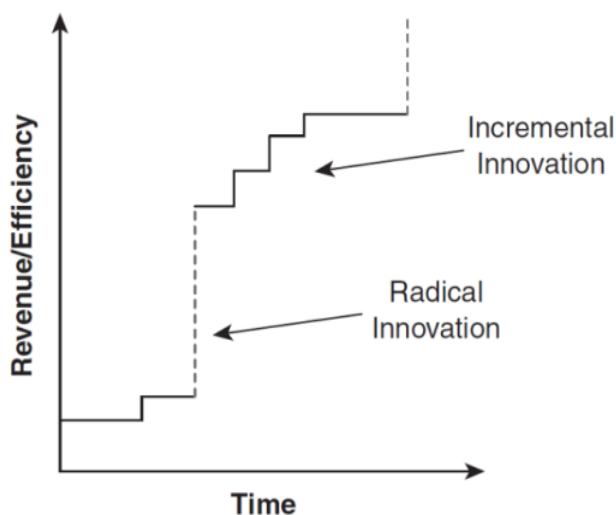


Figure 2. Radical and incremental innovation [15]

When there is a new successful product on the market, there is a lot of competition entry. Companies offer many different versions of the same product and the level of innovation is very high, because there is considerable uncertainty about customer preferences (even among the customers themselves) and the technological means of satisfying them. In this period, market share changes rapidly. As customers experiment with the alternative versions of the product and companies learn about how to improve their product, opportunities to improve the product are depleted [20]. This leads to a decrease in product innovation. However, the evolution can continue with another radical innovation that sets off a whole new wave [17]. A tool that can aid in the identification of breakthroughs is the technology S-curve introduced by Foster (Figure 3). It suggests that technological product performance moves along an S-curve until technical limitations cause research effort, time, and/or resource inefficiencies to result in diminishing returns. The old technology is replaced and a new S-curve is initiated [21].



Figure 3. Technology/Marketing S-curve phenomena (adapted from Foster, 1986) [21]

4. INNOVATION AS CO-CREATION

The information and communications technology, the Internet in particular, is forcing companies to think differently about value creation and to be more responsive to customers' experiences [1]. Nowadays perceptions and opinions about products and services are being shaped real time amongst customers via social networks, virtual communities, chat rooms and the ubiquitous instant messaging. The role of the individual customer is becoming more important and firms must form close relationships with them in order to understand their needs and incorporating those needs in their product and/or service offering [23]. The customers' role in the industrial system has changed from isolated to connected, from unaware to informed, from passive to active, and their great influence in value creation is supported by information access, global view, networking, experimentation and activism [1]. Customers have become a source of competitive advantage [24]. Prahalad and Ramaswamy (2000) represented four levels of the changing role of the customers given in Table 1.

Vargo et al. (2008) see innovation as a process that involves discovering new ways of co-creating value through more effective participation in resource integration [3]. According to Brown and Hagel (2005), co-creation is a powerful engine for innovation: instead of limiting it to what companies can devise within their own borders, pull systems throw the process open to many diverse participants, whose input can take product and service offerings in unexpected directions that serve a much broader range of needs [25]. Organizations must develop their collaborative competence and view customers as active contributors with knowledge and skills rather than simply as sources of information [26]. Companies have to empower and challenge customers to create ideas and solutions by themselves, providing them with social networks, forums, blogs, idea competitions, workshops, consumer opinion platforms, innovation toolkits or communities for social product development [8]. The co-creation of value is a desirable goal as it can assist companies in highlighting the customers' point of view and in improving innovation and the front-end process of product development, by identifying their needs and wishes [27].

Table 1. Four levels of the changing role of the customers [23]

Era	Customer roles
1970s and early 1980s	The customer is an average statistic; groups of buyers are predetermined by the company. Products and services are created without much feedback. One-way communication.
Late 1980s and early 1990s	The customer is an individual statistic in a transaction. Shift from selling to helping via help desks, call centers, and customer service programs; identify problems from customers, then redesign products and services based on that feedback. Database marketing; two-way communication.
1990s	Lifetime bonds with individual customers. Providing for customers through observation of users; identify solutions from lead users, and reconfigure products and services based on deep understanding of customers. Relationship marketing; two-way communication and access.
Beyond 2000	The customer is not only an individual but also part of an emergent social and cultural fabric. Customers are developers of personalized experiences. Companies and lead customers have joint roles in education, shaping expectations, and co-creating market acceptance for products and services. Active dialogue with customers to shape expectations and create buzz. Multilevel access and communication.

Considering that both companies and customers have the information about the products, most incremental innovations are developed in response to customers' needs. These innovations ask for the customers' involvement in innovating processes, because they refer to improvements of already existing products, exploitation of existing technology and have low level of uncertainty. However, radical innovations refer to the development of completely new products, exploitation of new technology, high level of uncertainty, and usually exclude customers' involvement. They often do not address a recognized demand but instead create a demand previously unrecognized by the customer [21]. They come from R&D groups that do not have what the customers want in mind. Researchers and developers have to be visionary and to encourage marketing groups to seek new markets for the developed technology. Breakthrough technologies are pushed to customers, because, in general, customers are ignorant of the benefits of a new technology and cannot visualize how it will help them solve problems. They cannot realize they need it unless they actually get a first-hand experience. However, co-creation on this breakthrough level can be established if there is selection process to involve lead users and experts who meet certain specific participation criteria - club of experts. Another co-creation type for breakthrough ideas is a coalition of parties that represents collaboration between

organizations that share their expertise, knowledge and skills in order to create a common competitive advantage. On the other hand, as it is previously said, incremental innovations ask for higher customers' involvement and the participation is usually not limited. There are another two co-creation types on this incremental level when anyone can join the co-creation process – crowd of people and community of kindred spirits [22]. These are four co-creation types (Figure 4) defined by a consulting firm Frontier Strategy (2009).

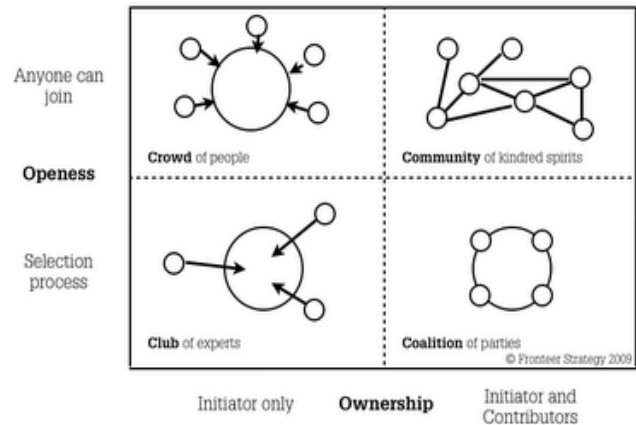


Figure 4. Types of co-creation [22]

To keep customers fully involved and active in the co-creation processes, companies need to enable customers to access all necessary information about the products and to be completely transparent and open in their relations with them. Prahalad and Ramaswamy (2004) proposed *the DART model for co-creation*, which is made up of four building blocks for co-creation: dialogue (D), access (A), risk assessment (R) and transparency (T). They have pointed out that a careful combination of these building blocks results in better engagement of customers as collaborators in value creation [23] through product innovation. *Dialogue* at every stage of the value chain encourages knowledge sharing and understanding between companies and customers. By focusing on *access* to value at multiple points of exchange, companies can broaden their view of the business opportunities creating good experiences. If they are willing to reveal more information about the *risks* associated with the products and services they produce, customers become more involved in co-creation. Finally, *transparency* of information is necessary for customers to become co-creators of value. In that way the trust between companies and customers is created [28].

This kind of companies' openness supports faster product adoption among customers. Considering this, it can be assumed that co-creation causes shorter product life cycles. However, information access, global view, networking, experimentation and activism of customers do not allow companies to develop their products without co-creation. Co-creation is crucial for products' success on the market.

5. CO-CREATION IN THE PRODUCT LIFE CYCLE

Focusing on radical and incremental innovations, it can be proposed that levels of co-creation are connected to

different levels of innovation activities throughout the product lifecycle.

Considering that this product life cycle is analyzed for completely new products, *the first stage* implies radical innovation processes in *product development*. These include different research activities, experiments, tests, prototyping, new technology development, etc., in which customers are usually not involved, because radical innovations are based on unarticulated customer requirements. Companies try to decrease the level of uncertainty that follows radical innovations. However, they can engage field experts and lead users into co-creation, who are found through active selection processes, or establish a coalition through idea and knowledge sharing with other parties.

During *the second stage*, when the new product is introduced to the market, involvement of customers in product improvement processes increases. Incremental innovations represent small improvements in product functionalities, usually determined by co-creation of knowledge and competences. Companies establish the co-creation with early adopters, who help them to improve their product. The product becomes more recognizable in the market and enters *the third stage*, where its sales grow and it is accepted by the early majority of customers. They are not risk-takers and prefer products of the proven quality, but companies continue to maintain co-creation activities with them. *The introduction and growth stage* are characterized by the high-level of co-creation in the continuous product improvements usually through online communities and crowdsourcing. Incremental innovations can help extend life and drive differentiation and growth, by adding minor features and functionality to create greater variation and options, and adapting existing technology to create the “next iteration” of products [16]. Customers who are involved in the co-creation activities may be called active “adapters” of products, meaning that the success of innovations depends on the users’ willingness and ability to adapt the product innovation to suit their needs [29].

The earlier the customers get involved into innovation processes, the greater is the personalized experience value and knowledge co-creation. The assumption is that the greatest portion of product improvements is made at the beginning of the product’s existence in the market, in the introduction stage, as incremental innovations. On the other hand, in the stage of growth only the minimal improvements are made. At the end of this stage, when almost all possible improvements are done, companies focus on customizing the product according to the customers’ preferences. Customization enables companies to offer variety to customers and creates their emotional connection with the product. However, companies decide what can be customized and the customer’s role is restricted. Companies focus on the product customization, because the possibilities to improve products are limited at this stage.

The difference between “co-creation” and “customization” lies in the degree of involvement of the customer; in general terms, the customer plays a less active role in customization than in co-creation [5]. This trend of lower

involvement of customers in innovation processes leads towards the next stage of the product life cycle.

In *the fourth stage, maturity*, the sales growth slows down, they reach their highest point, new competition appears and innovation pace decreases. Companies have to focus promotion activities on the differentiation and draw the customers’ attention on their product. This is the right time for the companies to focus again their research activities on radical innovations, because all the possible incremental improvements on the product are already made. Another breakthrough should be created, to prevent complete disappearance of co-creation and product decline.

Companies have to choose their next trajectory path at this point. If they create the *product extension* by another radical innovation, the product enters its another cycle and has its new market introduction and growth, where again co-creation activities in product improvement take place. Another scenario is that companies do not undertake radical innovation activities and focus on the late majority customers, who are not so willing to get involved in co-creation. Eventually, following this trajectory path, market becomes saturated and the sales and the profit begin to *decline*, because there is low level of co-creation and almost no changes are made on the product. This is *the last stage* of the product life cycle, when companies are trying to compete with low price on the market, attract laggards to buy the product, and reduce their costs, before they finally retire the product and bring its life to an end.

Carefully analyzing how co-creation rises and falls through distinct stages of the product life cycle, the following levels (Figure 5) can be distinguished:

1. *Breakthrough level*, where the research and new product development activities are undertaken by the company and its experts to create a radical innovation. Co-creation processes can be established through involvement of experts and lead users, who meet certain specific participation criteria. While co-creation on breakthrough level is not open to anyone who is interested to join, there is a selection process to choose contributors. This is related to the first stage - product development, and product extension stage that is parallel with the fourth stage of the product life cycle, maturity stage;
2. *High co-creation level*, where the product improvement and customization activities are undertaken by the company in co-creation with its customers to create incremental innovations. These levels are related to the second and the third stage of the product life cycle, introduction and growth respectively, as well as the new initiation stage if another radical innovation is created on the product;
3. *Low co-creation level*, where almost no changes are made on the product, opportunities to improve the product are depleted and co-creation disappears; this level is related to the decline stage, the last stage of the product life cycle.

These levels represent the focusing areas of further research activities, that are going to be undertaken to examine different aspects of co-creation throughout the product life cycle.

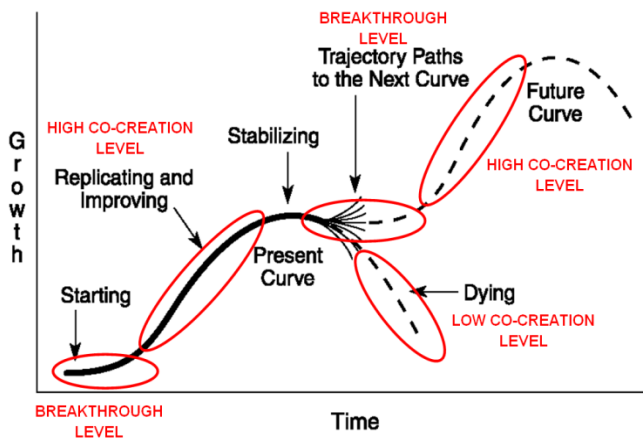


Figure 5. Co-creation levels throughout the product life cycle (adapted from [30])

6. CONCLUSION

Innovation is about developing growth and the process of co-creation drives an evolution within the market, as well as generation of new knowledge in business, academia, and practice. Co-creation is based on solving the problems related to products with customers. These solutions represent changes on products that eventually bring new problems and, again, new solutions. This is the usual flow of problem solving in product life cycle. Considering that it is proposed that there are different levels of value co-creation during the product life cycle, the problem solving in contemporary dynamic environment is much faster than before. Internet and the information sharing make products and companies closer to customers and provide an easy way to establish co-creation.

Products and information about them are more accessible and transparent. The proliferation of social technologies such as online customer communities, social networking sites, instant messaging, and wikis have created both opportunities and challenges for companies in managing the commercialization of products and in value co-creation in each of the three steps involved in the purchase process: awareness, trial and repeat purchase [31]. If the time needed to reach a market audience of 50 million for radio was 38 years, for TV 13 years, for the Internet 4 years and for Facebook 2 years [32], the exponential shortening of product life cycles can be noticed. In addition, all these products support information sharing, which is crucial for the co-creation. Increasing the dialogue, access and transparency enables higher co-creation and, as well, has its influence on shortening the product life cycle.

On the other hand, three levels of co-creation are proposed in this paper and the following assumptions are made. The product growth on the market depends on co-creation in product improvement. As long as there are co-creation activities between the company and its customers, the product growth and success on the market can be expected. The product reaches its maturity when co-creation starts to slow down and stagnates on that low level. With the continuous decrease of the co-creation level and no possibilities for product improvements, starts the decline stage in the

product life cycle that eventually comes to an end. This is the reason of the necessity of breakthroughs during the maturity stage, which can generate product life cycle extension.

The proposition of three levels of co-creation during the product life cycle has its limitations and should be further and deeper examined. In this research authors have relied on common logic and literature focused on the fields of product life cycle and customer co-creation, addressing the relationships between them. Analyzing the characteristics of radical and incremental innovations, as well as characteristics of each stage of the product life cycle, the degree of customers' involvement in product development during the time can be defined.

Even though these propositions are not supported by thorough research on real cases, they are essential for further research that is going to be focused on giving the answers on the following research questions - How can companies optimize the co-creation processes and increase the benefits from them? How do the costs and benefits of co-creation evolve over time through different stages of the product life cycle? How can companies motivate customers and maintain their enthusiasm for the co-creation to extend the product growth? Are companies, that have established co-creation for incremental product improvements, also successful in radical innovations? Do customers really obstruct radical innovation processes? Should specific co-creation techniques be used in different product life cycle stages – living labs, lead user approach, idea competitions, community based innovations?

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Kokreacija sa korisnicima tokom životnog ciklusa proizvoda

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Primljen (23. decembar 2012.); Recenziran (11. januar 2013.); Prihvaćen (14. februar 2013.)

Rezime:

Kako bi održale svoju kompetitivnu prednost, kompanije se sve više oslanjaju na znanje i iskustvo korisnika u procesima inoviranja proizvoda. Imajući na umu da je za radikalne inovacije udaljenost od trenutnih tržišnih potreba od velikog značaja, korisnici nisu u velikoj meri uključeni u razvoj proizvoda koji predstavljaju proboje na tržištu. Međutim, korisničko znanje i iskustvo su veoma značajni za inkrementalna poboljšanja proizvoda. Kokreacija da se posmatra kao snažni pokretač za inovaciju. Ovaj rad se fokusira na davanje odgovora na istraživačko pitanje – da li je moguće mapirati procese kokreacije tokom životnog ciklusa proizvoda? Pomoću pregleda literature, autori pokušavaju da obezbede razumevanje ove relacije i predstave razliku između tri nivoa kokreacije (nivo proboja, nivo visoke i nivo niske kokreacije) kroz životni ciklus proizvoda.

Ključne reči: Kokreacija, Inovacija, Razvoj proizvoda, Životni ciklus proizvoda