Omni-channel customization of industrial production

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Abstract. The customizing technologies development stimulates the industry transition to implement into the production practice some new business models how to interact with the consumer some new manufacturing business processes to personalize the items. The industry adaptation for new models to control a production may explain the consumer mentality significant transformation and a result of which the production project priority tasks become the tasks to provide some individual requirements for a consumer. In short term the industry customizing is the turn moment of the State technological politics which already today modifies the population cultural code to prepare some productions oriented for the knowledge economy services. There are schemes and descriptions of technologies how to project and produce a customized item in the factories of the future. The customer interaction technologies with web resources applications are described to support some optional settings of customized item properties. There is a scheme of the industrial item omni-channel customizing coil scheme oriented for the end consumer. There are some research results and practical recommendations how to transform industrial companies business processes oriented for a customized item as the society development dominating factor in the postindustrial economy conditions.

1. Introduction

The production development modern concept defined the new type of the consumer demands related to a variety of industrially manufactured item execution [1, 2]. An item option is a customizing way based on the item manufacturing responding to the personal preferences of the mass consumer. Orientation to make an item individual is the market relationships world practice extrapolation for a developing economy industrial sector [3, 4].

The product unique consumer value is formed with the interest of different population social groups and provides a showcase production method [5]. The consumer preferences through a service oriented web-application is transformed into operational teams to control the cyber-production equipment because of which the industrial item modification is produced [6, 7].

The production cycle operational dependence on consumer individual requirements is the customized industry specific feature and which is done by the technological equipment adaptive settings [8]. A company with a position in the customized item market must re-structure its business processes and implement new business models and consumer interaction technologies based on pre-marketing...
researches [9, 10].

The industry customizing is an effective tool to increase the personalized items market offer elasticity. A medium choice of standardized industrial items may stimulate the consumer with requirements and mass consumer to improve the vendor-customer system relationship control mechanism and that forms a range of unique products [11, 12].

The industry customizing task might be solved with the production intensive automatizing method and some mandatory solutions to provide business systems adaptation for the day global agenda defiance. The production automatizing intensive way justifies the business capital investments to integrate special and universal technologies and equipment with an industrial potential for several decades ahead [13, 14].

The product customizing is an advertising strategy for a commercial company oriented to acquire in the unique items market some competitive advantages and to make some additional profit from the goods selling out made with individual order. As for the Industry 4.0 the product and industry parallel customizing may form the State economic development strategy on the branch scale [15, 16].

The product customizing task could be solved in the stage of its projection or in the stage of its production. The project customizing requires consumer to participate to prepare the product digital twin [17, 18]. The production customizing is based on consumer involvement into item manufacturing technological processes. That why the best way to satisfy consumer individual requirements could be achieved only the item open projection technologies (production).

2. To project a customized product

The customized product projection is a way to realize a digital engineering innovative project. The customized projection is a way to construct an item with consumer participation based on modern technological feats. In the customized relationships system the product customer is a commercial company industrial partner who must be interacted with to prepare the electronic technical documentation. The item designer and consumer joint efforts provide the item necessary individual level for the customer obtained with some configuration tools application.

The project customizing forms in the market a new type of commercial service supported by the transparent configuration tools and oriented for the consumer demand industrial segment. The project management of a commercial company innovative activity to realize the customizing applies the standard technologies in their business processes adapted for the private consumer communication. The project customizing business model has a wide perspective to apply the knowledge economy into an intellectual society.

The project customizing is an Industry 4.0 sub-technology made in a business process operational level after the industry transformation concepts strategy initiatives are done. The project customizing approach oriented for the client defines the new complex solution to optimize the marketing, which is actual to implement into the digital factories project technologies. The customized product customer with the project company informative resources scheme is given in figure 1.

![Figure 1. The customized product customer with the project company informative resources scheme.](image-url)
To manage the project content in the customizing business model requires the company owner to make some financial investments in the project technologies and to apply some media resources (the virtual prototyping) as an item consumer properties setting tool. The company changes vanguard objects may include its informative environment which architecture include the item technical specifications consumer expanded access rights.

The customized product customer and designer interaction strategy is focused on new culture how to conduct a business to coordinate their actions with the consumer. The customizing target orientation is an effective marketing model design, which includes the population scaled involvement into the ready digital product manufacturing technological processes.

Under current economical conditions the project customizing is a manager technological defiance where the certified informative technologies and project tools must be integrated with increased pace into high-tech business based on knowledge.

3. The customized product production
The customized product production today is one of the most dynamically developing consumer demand sector oriented to satisfy the requirements of different population groups. The production customizing business model requires to make some commercial company profit by creating in the market a differentiated offer which has some optional manufacturing of the unique product. The customized item production is a company marketing strategy oriented for the business to acquire some competitive advantages in the market related to the completion of special consumer orders to provide the manufacturer target auditor loyalty.

The personalized marketing is based on the company industrial range target oriented fragmentation done by the tools of the private properties modification of the item being produced. The Industry customizing is an Industry 4.0 sub-technology adapted for the modern market requirements.

The product optional manufacturing for the individual customer requirements provide the item manufacturing standard technologies and include the special communication environment development for the product consumer and manufacturer. The communication environment is a web-application in the Internet, which contains the product configurator, which grants the user some item properties optional settings interface. The serial item standard modification tools item configurator supports a possibility to create an exclusive product oriented for a narrow target auditor.

The economy industrial sector customizing implements new options how to automatize the production into personalized item manufacturing technological processes. The central attention in the customized production projection is paid for smart factory digital processes development to provide the completion of some fixed and externally settable technological operations. The customized product consumer and manufacturer interaction scheme is given in figure 2.

![Figure 2. The customized product consumer and manufacturer interaction scheme.](image-url)
The customizing production service is a form of the manufacturer industrial response for an industrialized product increased market demand. To take into account consumer requirements let a commercial company abstain from their competitors in the market to form a new type technologically oriented business service in the industrial sector.

To manufacture items taking into account customer individual modifications transmits customized product into increased price category related to manufacturing industrial complexity rising and web resources configuration services expenses. Besides unique items wide nomenclature and a lot of retail customers may significantly complicate the company consumption logistics. So the industry customizing is for small businesses today with some individual settings of the item being manufactured only in production cycle final stages.

4. Multi-project customizing

To organize a mass production, which supports product customizing requires to design some management solutions to provide manufacturer and consumer interaction coordination and to design a communication system to support content information exchange in multi-user mode. Those management solutions are based on marketing methods and let companies concentrate in customized products range advancing in the market. A communication system is a computer net with end devices based on junction base and significantly reduces the process complexity to form a customized order.

The product individual configuration creates as a result of customer and manufacturer joint interaction with customizing web-services. The population consumption activity bit is a company marketing strategy to generate additional profit. The customizing service may modify the base product configuration in all available configurations for the manufacturer. The product adaptation for the consumer requirements and expectations is an Industry 4.0 actual innovation, which changes customer role in the market.

Customizing is a business technology, which includes [19, 20]:

- a special way to realize intellectual production system to provide a mass consumption product expanded range manufacturing;
- a special way to construct some designing solutions to a product additional perfection possibility by its consumer;
- a special way to organize a service oriented customer and consumer interaction to provide marketing net creation for additional value product customer («smart sales» system).

The multi-projection product customizing economic features includes:

- to form ultra fragmentized product range, which contain individual consumer modifications;
- the appearance of the additional manufacturer expenses to justify business load which contradicts with consumer company interests;
- a dis-balance appearance in comparison to the traditional manufacturing volumes of optional and standard products which influences the production cycle structure and which reduces the company productivity;
- the service technology «directly into demands» industrial grasp, which includes a reasonable compromise between the designing creativity and the after sale product accompanying level;
- a new culture of corporate reasoning is established to reflect the business efforts to satisfy the society demands by non-standard thinking consumption;
- new consumption market development and popular goods cyber sales centers of several properties and specifications which must be established by joint efforts of consumer and manufacturer;
- the specialist professionalism increase level and new occupation appearance defined in the Industry 4.0 for post-mass economy;
• the appearance of new economic theories and specialist science positions to justify the alternative business models and business processes in existence reasonable application and other.

The huge industrial business customizing requires new business models and business processes development, which are for industrialized item mass consumption. For the product consumer web resources create a metadata omni-channel coil through which the product customer will form individual requirements for the customized item properties. The industrial item customizing omni-channel coil scheme is given in figure 3.

5. Conclusion
The industrial sector economic growth model dictates today new conditions how commercial companies must conduct their business. A perspective way to increase labor efficiency and business additional margin is customizing which is based on the Industry 4.0 concept. The customizing means for a business to complete the production orders of the item being manufactured individual matter.

The customized product target auditory is a consumer who interested in acquiring a unique item with some additional attractiveness. The customized production functions with innovative business model obtained classically determined business processes after re-engineering which correspond to the Industry 3.0.

The industry customizing demonstrates an absolutely new way for the project management and for the production marketing. The customizing concept idea reveals the problem of existing technological chasm between the mass production capabilities and population actual demands for a post-industrialized product. The first measures to eliminate this chasm is to develop some service oriented industrial technologies to provide the one time production orders tides control specially for a particular person.

The customizing technologies collecting centers are the Industry 4.0 digital and smart factories, which are competitive subjects of the personalized product market. The communication digital technologies provide the inclusive consumer access to the product technical specifications and transform the factories of the future into service factories to provide original item production tasks solutions on the national scale.

The industry customizing far consequences for the consumer demands segment are:
• reduction in the gross stock trading volume after the mass production product nomenclature re-structuring for individualized items;
• increase in retail trading volume after an increased item demand oriented for a customized product;
• development of net marketing mechanisms and digital logistics, more secured role of a web resource, which is in new economic conditions is the main trading site;
• cyber-production resources re-sharing in the advanced development territories and special economic zones with a favorable environment of the industrial production and customizing consumption;
• to minimize the number of intermediates in the economic relationships of the customized product manufacturer and consumer;
• the development of outsourcing mechanisms of the capital volume business functions and crowd-funding development into the innovative industry.

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