

Diku Eurasia Programme

**Free online course on the topic of  
"Sustainable Manufacturing  
in Industry 4.0:  
Technologies and Solutions"**

September 14th to 17th

Register online  
until September 10th

NTNU  
Norwegian University of  
Science and Technology

Summer School

Joint Ukraine-Norway project "NTNU-KPI Collaboration within Industry 4.0 Education"  
Organizing institutions: Igor Sikorsky Kyiv Polytechnic Institute (Ukraine)  
Norwegian University of Science and Technology (Norway)

# Product Development based on Needs, Wants and Wishes of the Customers in Industry 4.0

---

*OLENA KOROHODOVA, Ph.D., Associate Professor,  
Department of International Economics,  
Igor Sikorsky Kyiv Polytechnic Institute*



The process of product development based on the needs, wants and wishes of the customers has gained attention since the shift of the main focus from direct production to the causes of consumption, the manifestation of utility, and the marginal utility of the product.



Fig.1 The first studies in field of consumption

This process causes the product life cycle to increase its duration, due to the appearance of its international stages. But with the development of technology, the economic cycles of production gradually reduce. This situation stipulates the decrease of the duration of the international product life cycle

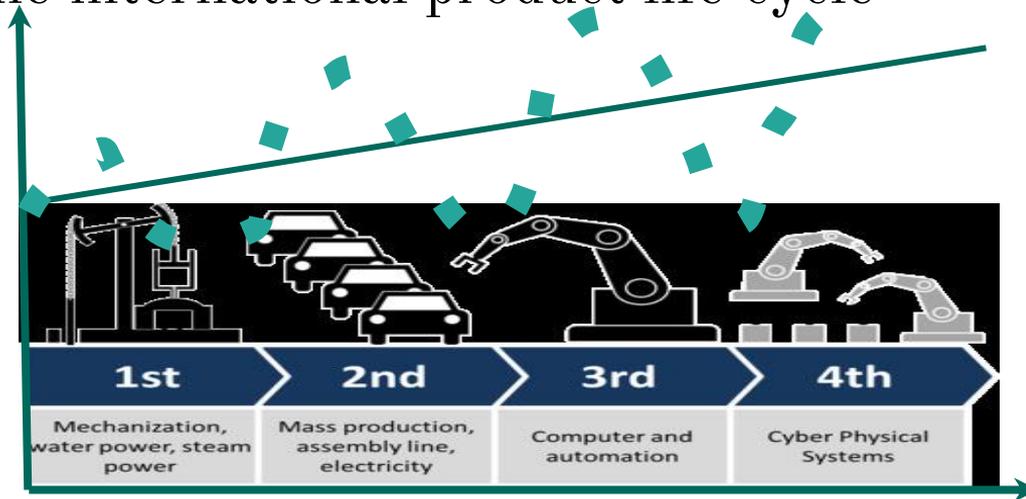


Fig. 2 Industrial development

# Product life cycle in Industry 4.0

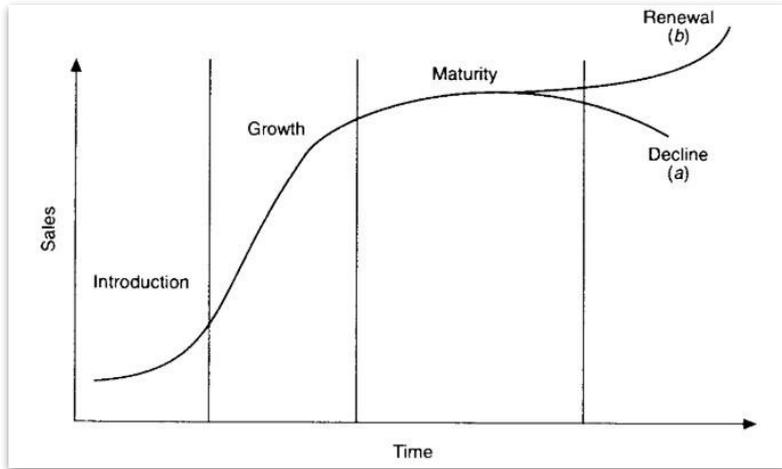


Fig.3 Product life cycle

- needs
- wants
- wishes



C  
U  
S  
T  
O  
M  
E  
R

# In Industry 4.0

**Product development can take several iterations to prototyping a product according to changes in customer`s needs.**

*With 3D printing, this process becomes less expensive in:*

- money resources,*
- labor factors*
- time terms.*

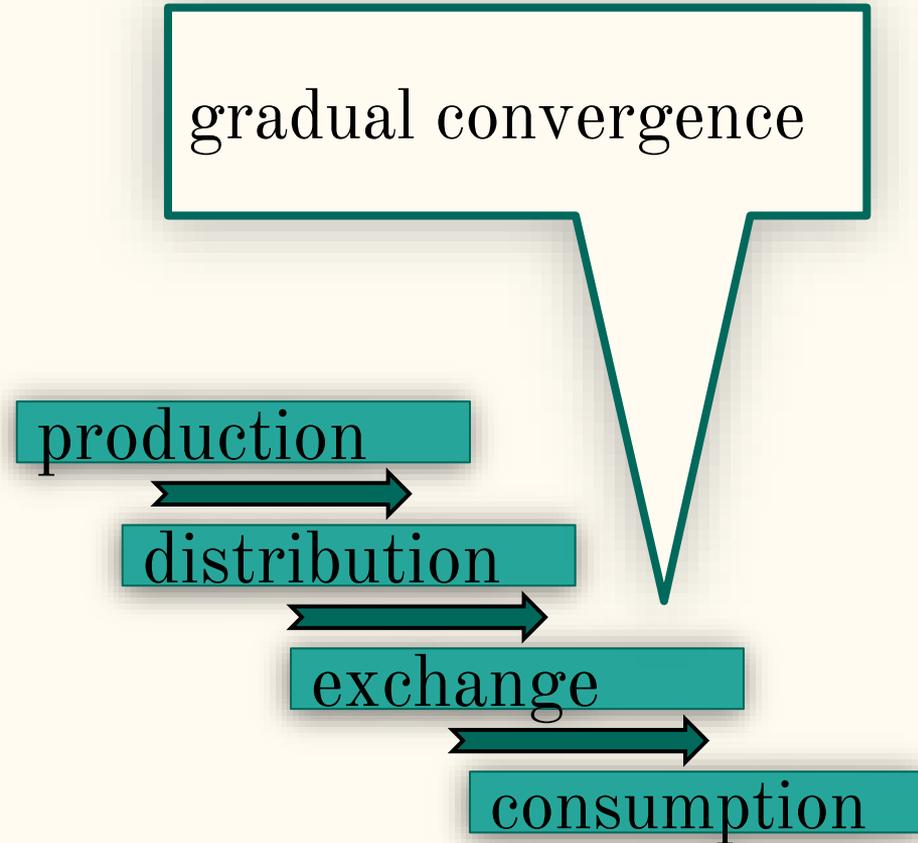


Fig. 4 The phases of common production

*Unlike the traditional product development model, where novelties and marketing activities are parallel processes, leading companies today use models that take into account the features of product development and marketing as one element.*

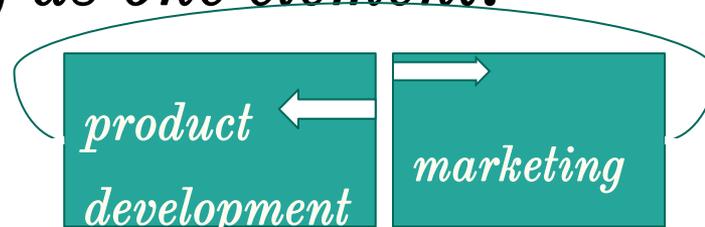


Fig. 5 Product development and marketing: the convergence

**The process of Product Development, traditionally, consists of the following phases:**

- ★ idea generation and selection,
- ★ conceptual idea formation about the product,
- ★ marketing strategy planning,
- ★ evaluation of planned effectiveness indicators,
- ★ manufacturing of products,
- ★ and then, selling.

In this case the company uses the methods of trial production and sales of the product to evaluate its product qualities: **cost and consumer value.**

An important element in product development is the **product life cycle planning**, which has specific features depending on whether the destination is the **domestic** or the **international** market.



Fig.6 Domestic and international markets

R. Vernon

# The concept of an international product life cycle

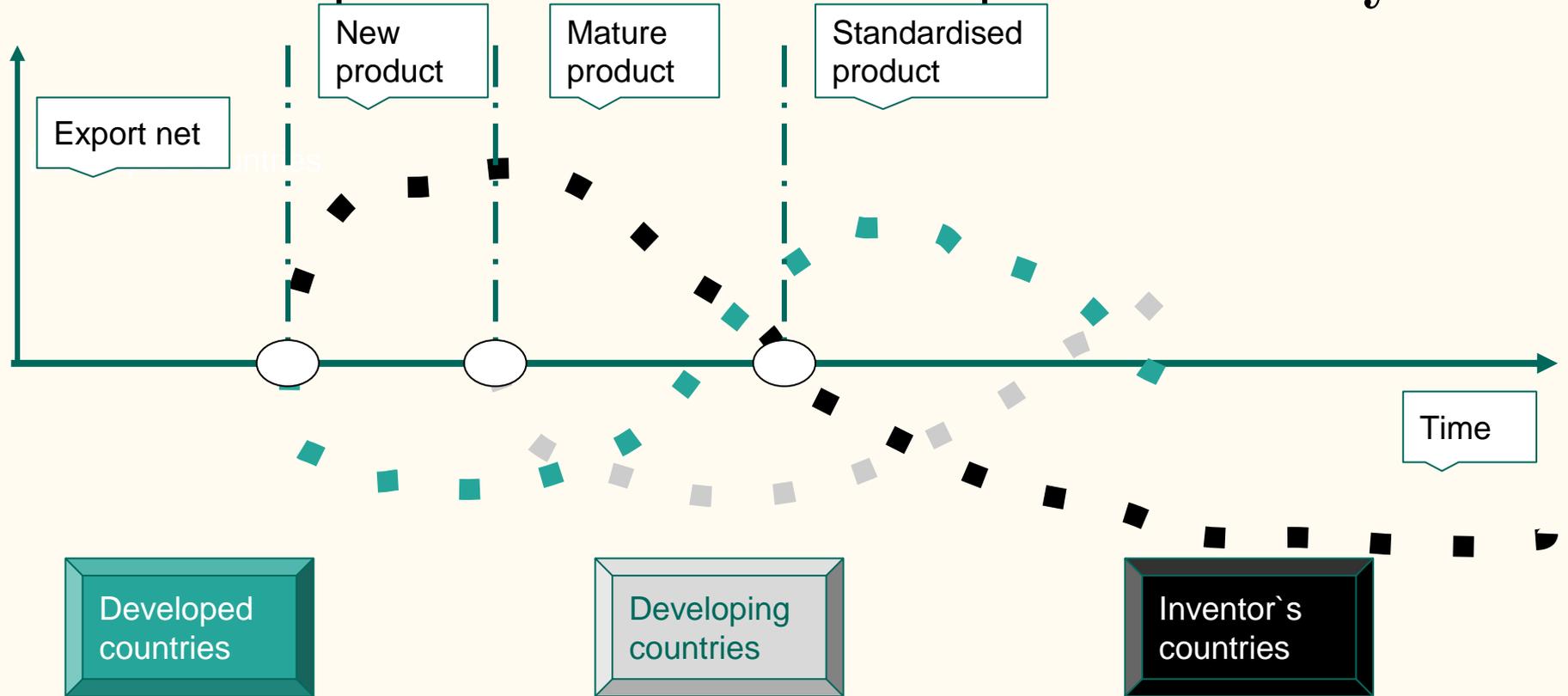


Fig. 7 Product life cycle for inventor's countries, developed countries and developing countries

# International product life cycle

1. Product development. The entry into the domestic market of a country with a differentiated product, which has almost no analogs, is characterized by new features, functions, and properties.
2. In the domestic market, the product is characterized by the loss of benefits associated with its market novelty, the loss of the status of "differentiated".
3. The company decides to present the product on the foreign market, since here the product has a clear differentiation again.

# International product life cycle

4. Under the influence of competition law, the product loses its uniqueness in the foreign market due to the emulation of similar products by local producers with lower production and logistics costs.
5. The multinational company starts exporting capital to the foreign market of the host country, trying to take advantage of local production. Some decades ago these actions were breakthrough for profit keeping.
6. Costs of manufacturing goods are much lower in the host country than in the home country. Management of a multinational company considers it expedient to export the goods to the country of origin. International product life cycle carries on developing.

The standard model of international trade, based on differences in tastes and preferences of consumers

Features:

given the complete identity of the production capabilities of the countries (lack of comparative advantages), trade between them is appropriate in determining differences in tastes and preferences of consumers

**Model of international trade,  
based on differences in tastes  
and preferences of  
consumers in Industry 4.0**



- cybersecurity
- augmented and virtual reality
- cloud computing
- Big Data
- robotization
- historical
- education
- traditions
- etc



I  
N  
T  
E  
R  
N  
A  
L

**Model of international trade,  
based on differences in tastes  
and preferences of  
consumers in Industry 4.0**



- influence of international trade
- import of cultural heritage
- integration processes
- globalization
- etc



**E  
X  
T  
E  
R  
N  
A  
L**

**Model of international trade,  
based on differences in tastes  
and preferences of  
consumers in Industry 4.0**



- influence of international trade
- import of cultural heritage
- integration processes
- globalization
- etc



P  
E  
R  
S  
O  
N  
A  
L

*In the context of rapid scientific and technological progress, there is a shortening of the life cycle of goods in domestic markets. 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. Thus, in the last century, the rapid development of transnational capital has led to a prolongation of the product life cycle by focusing on international stages. However, in the last decade of the 21st century, globalization has contributed to the fact that the duration of the international product life cycle has been gradually declining.*

# Product development in Industry 4.0

1. The small-scale production using 3D-printing takes place - adaption of any product feature to the specific needs of a particular consumer.

The focus on flexibility and cost reduction in the manufacturing process.

The generation and choice of the idea that is offered by the customer,

1. The product does not actually lose its competitive advantage by meeting the specific individual needs of the consumer

“There are many backgrounds for the start to develop a new product such as a “need”, a “want” or a “wish”

Stig Ottosson

“Industry 4.0 is a type of production focused on the combination of production processes and individual stages of the Product Life Cycle with the Internet based on the Internet of Things technology”

Serhii Voitko

“On the whole, there are four main effects that the Fourth Industrial Revolution has on business—on customer expectations, on product enhancement, on collaborative innovation, and on organizational forms”

Klaus Schwab

---

Today there is an increasing share of industries where the beginning of the product life cycle is a need, that is, a customer.

Product development methods: integrated product development; dynamic product development. The changes in the approach to understanding the product life cycle occur in accordance with the trends of the circular economy, where the sequential passage of goods at all stages of the life cycle before decommissioning can be recycled, reconstructed or reused.

Logistics is especially important in the context of the 4th Industrial Revolution and the circular economy. As an example, companies utilize reverse logistic networks in order to reduce their carbon footprint and increase their contributions to sustainability\*. Defining tolerance limits is one of the most important management tasks. Thus, the importance of estimating tolerance allocation on the product for each stage of the product life cycle is undeniable.

\* [19] Josiah J. Greena, Elif Elçin Günaya,b. and Gül E. Okudan Kremera Josiah J. Green et al. A simulation model of consumer take-back decisions regarding product design / Procedia Manufacturing 33 (2019) P. 671–678

It is of interest to tolerance allocation on the product for each stage of the product life cycle. And the influence of global problems of Humanity (as COVID-19) changes the approaches to definition of needs, wants and wishes of customers.

So, the application of Industry 4.0 tools will allow businesses to unlock a wider range of potential business opportunities.

These factors will contribute to the implementation of effective management activities that will ensure the long-term dynamic development of enterprises, encouraging them to innovate and enhance international competitiveness.

# References

- [1] Schwab, K. “The Fourth Industrial Revolution: what it means, how to respond”, retrieved from <https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution>
- [2] Voitko, S. “Conception of Industry 4.0 in the Sustainable Growth of Ukraine”. Creative Business for Smart and Sustainable Growth, CreBUS 2019
- [3] Schwab, K. “The Global Competitiveness Report 2019 Insight Report”, retrieved from <https://www.weforum.org/reports/global-competitiveness-report-2019>
- [4] Vojtko, S. V. Upravlinnia proektamy ta startapamy v Industrii 4.0 : pidruchnyk / S. V. Vojtko. Kyiv : KPI im. Ihoria Sikors'koho, vyd-vo “Politekhnika”, 2019. 200 p. Войтко С. В. Управління проектами та стартапами в Індустрії 4.0 : підручник / С. В. Войтко. Київ : КІП ім. Ігоря Сікорського, вид-во “Політехніка”, 2019. 200 с.
- [5] Vernon, R. «International Investment And International Trade in Product Cycle». Quarterly Journal of Economics 80. – № 2 (May 1966). – P. 190–207.
- [6] Steve Blank, Bob Dorf “The Startup Owner’s Manual: The Step-By-Step Guide for Building a Great Company”, Wiley, 2020. 608 p., retrieved from [https://media.wiley.com/product\\_data/excerpt/84/11196906/1119690684-6.pdf](https://media.wiley.com/product_data/excerpt/84/11196906/1119690684-6.pdf)
- [7] Stig Ottosson, Sri Sudha Vijay Keshav Kolla “Which Product Development Method is Best for Need-based New Product Development?” 11th International Workshop on Integrated Design Engineering IDE Workshop, April 5th – 7th, 2017, Magdeburg. P. 145-155.
- [8] Vi Kie Soo, Paul Compston, Matthew Doolan “Life Cycle Modelling of End-of-Life Products: Challenges and Opportunities towards a Circular Economy” / Procedia CIRP Volume 80, 2019. P. 607-612.
- [9] Karl Marks. Kapital: Kritika politicheskoi ekonomii. Tom 1. EKSMO. 2016. 1200 p. Карл Маркс. Капитал. Критика политической экономики. Том 1. ЭКСМО. 2016. 1200 с.
- [10] Vojtko S. V., Havrysh O. A., Korohodova O. O., Moiseienko T. Ye. Transnatsional'ni korporatsii: uchebnoe posobyе. Kyev, NTUU “KPI”, 2016. 208 p. Войтко С. В., Гавриш О. А., Корогодова О. О., Моїсєєнко Т. Г. Транснаціональні корпорації: учебное пособие. Киев, НТУУ “КПИ”, 2016. 208 с.
- [11] Gottfried Haberler. Survey of international trade theory special papers in international economics no. 1, July 1961 revised and enlarged edition international finance section ' department' of economics princeton university 1961, retrieved from <https://pdfs.semanticscholar.org/721d/9efb34f560fa8db1c115f572d3275e855278.pdf>
- [12] Kureev A.P. Mezhdunarodnaia ekonomika. V 2-kh ch. - Ch. I. Mezhdunarodnaia mikroekonomika: dvuzhenye tovarov u faktorov proizvodstva. Uchebnoe posobyе dlia vuzov. - M.: 416 p. Киреев А.П. Международная экономика. В 2-х ч. - Ч. I. Международная микроэкономика: движение товаров и факторов производства. Учебное пособие для вузов. - М.: 416 с.
- [13] Andreasen, Mogens Myrup, Hein, Lars.: Integrated Product Development, Berlin: Springer-Verlag, 1987.
- [14] M. Kumar and M. Mani, “A Methodological Basis to Assess and Compare Manufacturing Processes for Design Decisions,” in Research into Design for Communities, Volume 2: Proceedings of ICoRD 2017, A. Chakrabarti and D. Chakrabarti, Eds. Singapore: Springer Singapore, 2017, P. 301–311.
- [15] A systems-based sustainability assessment framework to capture active impacts in product life cycle/manufacturing Manish Kumara, Monto Mani. Procedia Manufacturing, 33, 2019. P. 647–654.
- [16] Industriya 4.0 v mashinobuduvanni. Stan v Ukraini ta perspektivi rozvitku. Analitichnij zvit. Vipusk №1, 2017. Індустрія 4.0 в машинобудуванні. Стан в Україні та перспективи розвитку. Аналітичний звіт. Випуск №1, 2017.
- [17] Yue Wang, Sydney Calhoun, Lisa Bosman, J. W. Sutherland Tolerance Allocations on Products: A Life Cycle Engineering Perspective. Procedia CIRP. Vol. 80, 2019. P. 174-179.
- [18] ISO. (2015). ISO 9001 quality management systems – requirements, 8.2 requirements for products and services, 8.3.4 design and development controls (c). Geneva
- [19] Josiah J. Greena, Elif Elçin Günaya,b, and Gül E. Okudan Kremera Josiah J. Green et al. A simulation model of consumer take-back decisions regarding product design / Procedia Manufacturing 33 (2019) P. 671–678

Diku Eurasia Programme

**Free online course on the topic of  
"Sustainable Manufacturing  
in Industry 4.0:  
Technologies and Solutions"**

September 14th to 17th

Register online  
until September 10th

NTNU  
Norwegian University of  
Science and Technology

Summer School

Joint Ukraine-Norway project "NTNU-KPI Collaboration within Industry 4.0 Education"  
Organizing institutions: Igor Sikorsky Kyiv Polytechnic Institute (Ukraine)  
Norwegian University of Science and Technology (Norway)



# Thanks for the attention!

---

*OLENA KOROHODOVA, Ph.D., Associate Professor,  
Department of International Economics,  
Igor Sikorsky Kyiv Polytechnic Institute  
korogodova.olena@gmail.com*

