*Materials of Conferences*

## DEVELOPMENT OF INNOVATION

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**Innovation** is a new idea, more effective device or process. Innovation can be viewed as the application of better solutions that meet new requirements, inarticulated needs, or existing market needs. This is accomplished through more effective products, processes, services, technologies, or ideas that are readily available to markets, governments and society. The term innovation can be defined as something original and more effective and, as a consequence, new, that "breaks into" the market or society.

While a novel device is often described as an innovation, in economics, management science, and other fields of practice and analysis innovation is generally considered to be a process that brings together various novel ideas in a way that they have an impact on society.Innovation differs from invention in that innovation refers to the usage of a better and, as a result, novel idea or method, whereas invention refers more directly to the creation of the idea or method itself. Innovation differs from improvement in that innovation refers to the notion of doing something different rather than doing the same thing better.

**Sources of innovation.** There are several sources of innovation. It can occur as a result of a focus effort by a range of different agents, by chance, or as a result of a major system failure.

According to Peter F. Drucker the general sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood and meaning, in the amount of already available scientific knowledge, etc.


Original model of three phases of the process of Technological Change

In the simplest linear model of innovation the traditionally recognized source is *manufacturer innovation*. This is where an agent (person or business) innovates in order to sell the innovation.Another source of innovation, only now becoming widely recognized, is *end-user innovation*. This is where an agent (person or company) develops an innovation for their own (personal or in-house) use because existing products do not meet their needs. MIT economist Eric von Hippel has identified end-user innovation as, by far, the most important and critical in his classic book on the subject, *Sources of Innovation*.

The robotics engineer Joseph F. Engelberger asserts that innovations require only three things:

1. A recognizedneed.
2. Competent people with relevant technology.
3. Financialsupport.

However, innovation processes usually involve: identifying customer needs, macro and meso trends, developing competences, and finding financial support.The Kline chain-linked model of innovation places emphasis on potential market needs as drivers of the innovation process, and describes the complex and often iterative feedback loops between marketing, design, manufacturing, and R&D.

Innovation by businesses is achieved in many ways, with much attention now given to formal research and development (R&D) for "breakthrough innovations". R&D help spur on patents and other scientific innovations that leads to productive growth in such areas as industry, medicine, engineering, and government. Yet, innovations can be developed by less formal on-the-job modifications of practice, through exchange and combination of professional experience and by many other routes. The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice – but there are many exceptions to each of these trends.

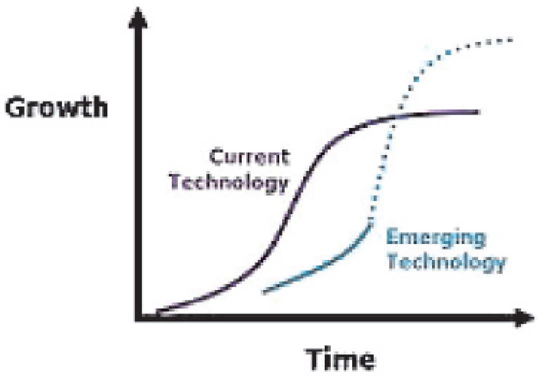
Information technology and changing business processes and management style can produce a work climate favorable to innovation. For example, the software tool company Atlassian conducts quarterly "ShipIt Days" in which employees may work on anything related to the company's products. Google employees work on their own projects for 20% of their time (known as Innovation Time Off). Both companies cite these bottom-up processes as major sources for new products and features.

An important innovation factor includes customers buying products or using services. As a result, firms may incorporate users in focus groups (user centred approach), work closely with so called lead users (lead user approach) or users might adapt their products themselves.

The lead user method focuses on idea generation based on leading users to develop breakthrough innovations. U-STIR, a project to innovate Europe's surface transportation system, employs such workshops. Regarding this user innovation, a great deal of innovation is done by those actually implementing and using technologies and products as part of their normal activities.

In most of the times user innovators have some personal record motivating them. Sometimes user-innovators may become entrepreneurs, selling their product, they may choose to trade their innovation in exchange for other innovations, or they may be adopted by their suppliers. Nowadays, they may also choose to freely reveal their innovations, using methods like open source. In such networks of innovation the users or communities of users can further develop technologies and reinvent their social meaning.

Diffusion of innovation




Main article: Diffusion of innovations

Diffusion of innovation research was first started in 1903 by seminal researcher Gabriel Tarde, who first plotted the S-shaped diffusion curve. Tarde (1903) defined the innovation-decision process as a series of steps that includes:

1. Firstknowledge.
2. Forminganattitude.
3. A decision to adopt or reject.
4. Implementationanduse.
5. Confirmationofthedecision.

Once innovation occurs, innovations may be spread from the innovator to other individuals and groups. This process has been proposed that the life cycle of innovations can be described using the 's-curve' or diffusion curve. The s-curve maps growth of revenue or productivity against time. In the early stage of a particular innovation, growth is relatively slow as the new product establishes itself. At some point customers begin to demand and the product growth increases more rapidly. New incremental innovations or changes to the product allow growth to continue. Towards the end of its lifecycle, growth slows and may even begin to decline. In the later stages, no amount of new investment in that product will yield a normal rate of return

The s-curve derives from an assumption that new products are likely to have "product life" – i.e., a start-up phase, a rapid increase in revenue and eventual decline. In fact the great majority of innovations never get off the bottom of the curve, and never produce normal returns.

Innovative companies will typically be working on new innovations that will eventually replace older ones. Successive s-curves will come along to replace older ones and continue to drive growth upwards. In the figure above the first curve shows a current technology. The second shows an emerging technology that currently yields lower growth but will eventually overtake current technology and lead to even greater levels of growth. The length of life will depend on many factors.

Many scholars claim that there is a great bias towards the "science and technology mode" (S&T-mode or STI-mode), while the "learning by doing, using and interacting mode" (DUI-mode) is widely ignored. For an example, that means you can have the better high tech or software, but there are also crucial learning tasks important for innovation. But these measurements and research are rarely done.

A common industry view (unsupported by empirical evidence) is that comparative cost-effectiveness research (CER) is a form of price control which, by reducing returns to industry, limits R&D expenditure, stifles future innovation and compromises new products access to markets. Some academics claim the CER is a valuable value-based measure of innovation which accords truly significant advances in therapy (those that provide "health gain") higher prices than free market mechanisms. Such value-based pricing has been viewed as a means of indicating to industry the type of innovation that should be rewarded from the public purse. The Australian academic Thomas AluredFaunce has developed the case that national comparative cost-effectiveness assessment systems should be viewed as measuring "health innovation" as an evidence-based concept distinct from valuing innovation through the operation of competitive markets (a method which requires strong anti-trust laws to be effective) on the basis that both methods of assessing innovation in pharmaceuticals are mentioned in annex 2C.1 of the AUSFTA.

**Future of innovation.** Jonathan Huebner, a physicist working at the Pentagon's Naval Air Warfare Center, argued on the basis of both U.S. patents and world technological breakthroughs, per capita, that the rate of human technological innovation peaked in 1873 and has been slowing ever since. In his article, he asked "Will the level of technology reach a maximum and then decline as in the Dark Ages?" In later comments to *New Scientist* magazine, Huebner clarified that while he believed that we will reach a rate of innovation in 2024 equivalent to that of the Dark Ages, he was not predicting the reoccurrence of the Dark Ages themselves.

His paper received some mainstream news coverage at the time.

The claim has been met with criticism by John Smart, founder of the Acceleration Studies Foundation, who asserted that research by technological singularity researcher Ray Kurzweil and others showed a "clear trend of acceleration, not deceleration" when it came to innovations. The foundation issued a reply to Huebner in the pages of the journal his article was published in, citing the existence of Second Life and eHarmony as proof of accelerating innovation; Huebner also replied to this. However, in 2010, Joseph A. Tainter, Deborah Strumsky, and José Lobo confirmed Huebner's findings using U.S. Patent Office data. Additional verification was provided in a 2012 paper by Robert J. Gordon.

**References**

1. Ivanov V.V., Ivanova N.I., Roozeboom J., Haysbers H. National innovation systems in the EU and Russia. – M.: TSIPRAN RAS, 2006. – 280 с, S. 9.

2. The Russian Federation Innovative Development Strategy for the period up to 2020. Electronic resource. – URL: http://innovation.gov.ru/taxonomy/term/586 (reference date: 04.28.2014). – 122, S. 114.

3. Haschin SM, DM Zozulya, AE Safronov Management of innovative projects. – Rostov n/D: Publishing Center DSTU, 2013. – 226, S. 124.

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## LIGHTING TECHNOLOGIES USING LED

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Lighting is an integral part of the infrastructure of the city, region and country. The security of the population and its operability depend on the lighting. Street outdoor lighting – means of artificially increasing the optical visibility on the street at night to ensure the safe movement of vehicles and pedestrians. Outdoor lighting system consists of the following parts:

– exterior lighting of buildings in residential areas;
– street lighting township, city and main roads;
– lighting of city parks and recreation areas.

Outdoor or exterior lighting should ensure that the functional and security needs of a development are met in ways that do not adversely affect the adjacent properties or neighborhood. The degree to which outdoor night lighting affects a property owner or neighborhood shall be examined considering the light source, level of illumination, hours of illumination and need for illumination in relation to the effects of the lighting on adjacent property owners and the neighborhood.

With the exception of lighting for public streets, all other project lighting used to illuminate buildings, parking lots, pedestrian walkways, bikeways or the landscape shall be evaluated during the site plan review process. The following Table A gives maximum lighting levels for outdoor facilities used at night averaged over the entire activity area.

**Table 1**

Maximum Lighting Levels

| Area/Activity | Foot-candles Maximum unless otherwise noted |
|---|---|
| Building surrounds | 1,0 |
| Bikeways along roadside: | |
| Commercial areas<br>Intermediate areas<br>Residential areas | 0,9<br>0,6<br>0,2 |
| Bikeways distant from roadside | 0,5 |
| Walkways along roadside: | |
| Commercial areas<br>Intermediate areas<br>Residential areas | 0,9<br>0,6<br>0,5 |
| Park walkways | 0,5 |
| Pedestrian stairways | 0,3 |
| Loading and unloading platforms | 5,0 |
| Parking areas in residential zoning district | 1,0 |
| Parking areas, including outdoor display and retail areas | 2,0 |
| Playgrounds | 5,0 |

Sources: Illuminating Engineering Society of North America (IESNA), Lighting Handbook (1987 and 9th (2000) editions) and Lighting for Exterior Environments (RP-33-99).

All other illuminance shall not exceed IESNA recommendations as published in the Lighting Handbook (9th ed. 2000), Lighting for Exterior Environments (RP-33-99), Recommended Practice for Lighting Merchandising Areas (RF-2), or other applicable IES publications, as these publications are amended; and The amount of nuisance glare (light trespass) projected onto a residential use from another property shall not exceed one-tenth (0,1) foot-candle at the property line.