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THE DIGITAL INNOVATION LIFE CYCLE AS A MECHANISM FOR STRENGTHENING THE DYNAMIC CAPABILITIES OF ENTERPRISES

In an increasingly uncertain and rapidly evolving technology environment, the ability of businesses to adapt and sustain growth depends to a large extent on the ability of businesses to develop and exploit dynamic capabilities. This concept, first formulated by David Teese and colleagues, describes the ability of an organization to integrate, build and reconfigure both internal and external resources to respond adequately to a rapidly changing environment [1, p. 1319]. Dynamic capabilities are not considered as static competencies, but as a set of organizational processes and actions that ensure the ability of firms to sense and realize opportunities, maintaining competitive advantage. In the digital era, where technologies are emerging and evolving at an unprecedented rate, understanding the life cycle of digital innovations is critical to enhancing these capabilities.

The digital innovation lifecycle describes the path of a new digital technology or product from inception to maturity and potential decline. Understanding this cycle allows organizations to predict future trends, make informed decisions about investment and development, and respond effectively to market changes. In a volatile environment where technological breakthroughs can rapidly change industry rules, timely identification and implementation of innovations is crucial to maintaining and enhancing competitiveness.

To analyze the evolution of technologies, it is advisable to pay attention to existing life cycle models. One of the most common is the Gartner Hype Cycle Model, which visualizes the development of technology through five main phases: Technology Trigger, Peak of Inflated Expectations, Trough of Disillusionment, Slope of Enlightenment, and Plateau of Productivity. [2] Each phase is characterized by a different level of attention, expectations, and practical application of the technology.

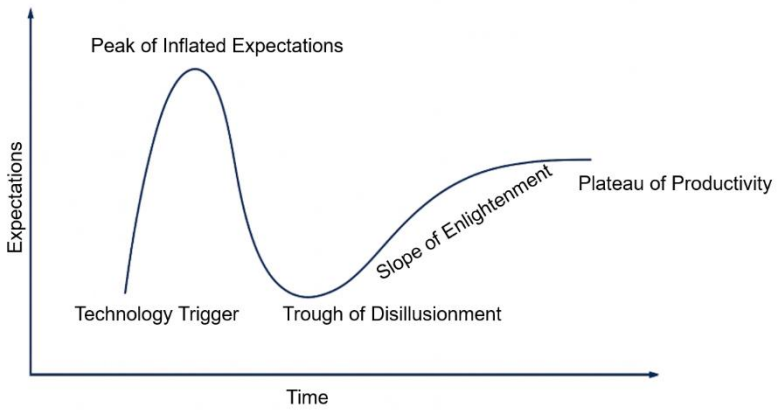

Figure 1 – Gartner Hype Cycle Model
Source: created by the author based on [2]

Another widely used model is the concept of Technology Readiness Levels (TRLs). This scale, developed by NASA and later adapted by the European Union and other organizations, assesses the level of technology maturity in nine levels, from basic scientific principles to actual use [3, c. 4].

Both models, although different in nature, provide valuable information about the current state and potential trajectory of technology development.

In addition to technical maturity, it is important to take into account the readiness of society to adopt new digital innovations. The concept of the Social Readiness Scale, first proposed by the Danish Innovation Fund [4], allows to assess the level of acceptance, understanding and readiness of society for new technologies by analyzing cultural, ethical, legal and social factors.

Another important tool is the Delphi method. This method involves an anonymous survey of a group of experts to obtain a consensus opinion on the future development of technology. The Delphi method can be especially useful for assessing the future potential of new digital innovations for which there is not yet sufficient historical data.

To effectively utilize the concept of the digital innovation lifecycle, businesses can also apply a variety of data-driven approaches. Trend analysis helps identify new technologies and their development dynamics by studying publications, news, industry reports, and other sources. Patent analysis provides information on the directions of technological development and the activity of key players in the market. Analysis of the structure of venture capital investments helps to identify promising technologies that attract significant investments. The methodology of monitoring weak signals is aimed at identifying early signs of new technologies or changes in existing ones that may have a significant impact in the future.

A comparative analysis of these approaches allows us to identify their strengths and weaknesses, which is important for developing optimal strategies for implementing digital innovations.

Table 1 – Comparative characteristics of analytical approaches to assess the maturity of digital innovations

Approach	Strengths	Weaknesses
Trend Analysis	Objectivity; ability to process large volumes of data; identification of general technological development trends.	Dependent on data quality and availability; may overlook unexpected breakthroughs as it primarily reflects existing trends.
Patent Analysis	Indicates directions of technological development; identifies key market players and their innovation activities; assesses technology novelty.	May not capture innovations that are not patented; focuses on formal inventions.
Venture Capital Investment Analysis	Identifies promising technologies attracting significant investments; serves as an indicator of market interest and growth potential.	Primarily oriented toward commercially attractive projects, potentially overlooking strategically important technologies; subject to shifts in investment trends.
Weak Signal Monitoring	Enables early detection of potentially significant changes and new technological developments, supporting timely adaptation to future challenges.	Requires advanced analytical capabilities and systems; vulnerable to false positives or negatives, complicating interpretation.

Source: created by the author

In order to enhance the dynamic capabilities of enterprises in the field of digital innovation, it is recommended to introduce a proactive approach to the analysis and use of the technology life cycle.

Table 2 – Proactive approach to analyzing and utilizing the life cycle of digital innovations

Activity	Description
Continuous Monitoring of the Technological Landscape	Systematically tracking new technologies, analyzing their development, and assessing their potential impact on the business environment.
Integration of Multiple Analytical Methods	Combining data from diverse sources with expert assessments to provide a more comprehensive and objective analysis.
Early Detection of Weak Signals	Developing and implementing systems for identifying and analyzing early signs of emerging technologies.
Experimentation and Piloting	Testing new technologies at early stages of their life cycle to accumulate practical experience and assess their potential applications.
Flexibility and Adaptability	Maintaining the ability to rapidly adjust strategies and invest in technologies that demonstrate high potential.
Engagement of External Experts	Collaborating with research institutions, startups, and other organizations to access cutting-edge knowledge and technologies.

Source: created by the author

This proactive approach allows companies to respond quickly to changes in the technological environment, strengthen their dynamic capabilities and ensure sustainable competitiveness in the face of constant instability.

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