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## **Impact Of Dynamic Capabilities And Digital Platform-Based Ecosystems On Implementation Of Lean Production : Current And Future Trends**

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### **ABSTRACT**

The research aims to identify the impact of dynamic capabilities and environmental systems based on digital platforms on lean production. The research used a descriptive analytical approach by adopting the questionnaire as the main tool for collecting data. The research used correlation analysis and structural modeling to test the hypotheses. It addresses the basic concepts and ideas associated with these topics, in addition to the different ways in which they interact and affect organizations in the digital age. The research reached a set of conclusions, the most important of which is that dynamic capabilities and environmental systems based on digital platforms are of increasing importance and directly affect lean production.

**Keywords:** Dynamic capabilities, digital platform-based ecosystems, lean production.



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## **Introduction**

Given the increasing complexity of value propositions, it is understood that most digital innovations emerge from larger ecosystems with diverse actors (Kindermann et al., 2022). As digital technologies become more popular the nature of innovation is fundamentally changing (Yoo et al., 2012). The impact of digital platforms on ecosystems has been significant in recent years (Nambisan et al., 2019). Digital platforms, such as social media and e-commerce sites, have changed the way we interact with each other and with businesses (Singh & Singh, 2018). They have also changed the way we consume products and services (Gawer, 2022). On one hand, digital platforms have made it easier for businesses to reach customers and for customers to find products and services. This has led to increased competition and has made it easier for small businesses to succeed. Additionally, digital platforms have made it easier for consumers to access information about products and services, which has led to better-informed purchasing decisions. On the other hand, digital platforms have also had a negative impact on ecosystems (Redjeki & Affandi, 2018). For example, the rise of e-commerce has led to an increase in packaging and shipping materials, which can have a negative impact on the environment. According to a report by the United Nations Framework Convention on Climate Change (UNFCCC), e-commerce is responsible for a significant portion of global greenhouse gas emissions (Chatterjee & Bhagotra, 2020). Additionally, social media platforms can be a source of misinformation and can contribute to the spread of harmful ideas and behaviors. Research conducted by the Oxford Internet Institute (OII) has found that social



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media platforms can be used to spread misinformation and to influence political decisions in ways that can be harmful to ecosystems (Vial,2020).

Overall, the impact of digital platforms on ecosystems is complex. While they have brought many benefits, they have also led to negative consequences. It is important for businesses and consumers to be aware of these impacts and to take steps to minimize them. This can include using digital platforms responsibly, supporting sustainable business practices, and promoting environmentally friendly behaviors.

The term ecosystem originated as a metaphor and refers to the group of interacting firms that can depend on its multiple activities (Jacobides et al., 2018). So there is little agreement on how best to organize the many partnerships involved in the innovation ecosystem. As industrial changes continue to intensify due to rapid technological development, digitalization and circular economy, companies need to be more dynamic. (Kohtamäki et al., 2020).

## **Literature Review**

### **Dynamic Capabilities**

The term “dynamic capabilities” originally dates back to the work of Schumpeter in 1934 from his writings on the concept of competition based on innovation, where competitive advantage depends on what he called the demolition of existing resources and reintegration to obtain new operational capabilities (Pavlou & El Sawy, 2011), as some considered it one of the most important works in this field, and considered dynamic capabilities as the ability to reshape internal and external resources to meet the changing environment (Aichouche, 2021). The concept of dynamic capabilities reflects the importance of updating organizational capabilities to meet and enable the organization to respond to changes in the environment



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(Singh et al., 2022), Through the dynamic capabilities of information technology, to respond with appropriate speed to environmental risks, direct opportunities, and then search for, explore, acquire, absorb and use knowledge about resources and opportunities, and how to organize resources to take advantage of those opportunities. Derived from the change, acceleration or diversity of demands (Bhatt & Grover, 2005). The expression “capabilities” refers to the main role of management in achieving appropriate adaptation, unification and reshaping of external and internal organizational skills, as well as functional resources and competencies in order to comply with the requirements of the changing environment (Jacobides et al., 2018). The concept of dynamic capacity indicates that it is a fixed behavioral direction for the organization in order to integrate, reshape and renew its resources, and rehabilitate its core capabilities in response to the changing environment in order to survive and perpetuate it . Dynamic capacity refers to the ability of a system or organization to adjust its capacity (e.g. resources, personnel, equipment) in response to changes in demand. This flexibility allows the system to respond quickly to changes in the environment, such as an increase or decrease in demand for its products or services, and to optimize its performance. The concept is often used in the context of business operations, transportation, and logistics , It develop and leverage its internal resources and capabilities in order to respond to changing market conditions.This can include things like developing new products and services, expanding into new markets, and building partnerships with other companies. Companies that have strong dynamic capabilities are better able to survive (Redjeki & Affandi,2018).

## **Importance of Dynamic Capabilities**



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The organization seeks, through dynamic capabilities, to draw the right paths to activate its movement and thus achieve a competitive advantage. More interest has emerged as an influential framework for understanding how the organization's resource stock evolves so that it can maintain a sustainable competitive advantage (Aichouche, 2021). One of the key benefits of dynamic capabilities is that they help companies to stay competitive in a rapidly changing business environment. For example, a company that is able to quickly respond to changes in consumer demand or to the introduction of new technologies, as discussed by Helfat et al. (2007), will be better positioned to succeed than one that is slow to adapt. Dynamic capabilities also help companies to maintain their market position by enabling them to respond to the actions of their competitors. Another important benefit of dynamic capabilities is that they can help companies to achieve strategic goals. For example, a company that is able to identify new market opportunities and develop the necessary capabilities to take advantage of them, as proposed by (Zhao & Von, 2020) , will be more likely to achieve growth and profitability. Additionally, dynamic capabilities can also help companies to manage risk, by enabling them to respond to changes in the environment that may pose a threat to the business.

Furthermore, (Redjeki & Affandi,2018) mentions other points of the importance of dynamic capabilities including:

1. Enabling organizations to respond quickly and effectively to changing market conditions, technological advances and other external factors.
2. As a key driver of organizational performance and competitiveness.
3. It is different from traditional resources and capabilities in that they are more difficult to imitate and can provide a sustained competitive advantage.



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4. It involves the ability to discover and take advantage of new opportunities, reshape resources and capabilities, and renew and adapt the organization.
5. Critical for companies looking to achieve long-term success and survival in today's rapidly changing business environment.
6. Organizations that possess strong dynamic capabilities are better able to create and capture value in the long term.
7. It is particularly important for organizations operating in turbulent or uncertain environments, such as those in the technology or startup sectors (Zott, Amit, & Massa, 2011).

## **Dynamic Capabilities Dimensions**

The construct of dynamic capabilities is linked to innovation capacity through different components or dimensions ( Froehlich et al., 2017 ), constituting a multidimensional construct. Teece (2012 ) proposes that the dynamic capabilities of a company can be located in three groups of main activities that must be developed and applied simultaneously to build and maintain competitive advantages:

1. Capabilities to detect, identify, filter, and shape the opportunities of the environment (sensing).
2. Take advantage of opportunities (seizing) by using the skills and resources that you possess and may be expressed through the design of organizational structures, processes, procedures, and operating techniques.
3. Reconfigure or transform intangible and tangible assets through their continuous renewal, improvement, and protection (Rotundo,2020).





In this context, a company with dynamic capabilities and strategies come together to create and refine a business model, guiding the transformation of the enterprise to a level of profits sufficient to allow the enterprise to maintain and enhance its capabilities and resources to make a successful strategy, as shown in Figure 1.

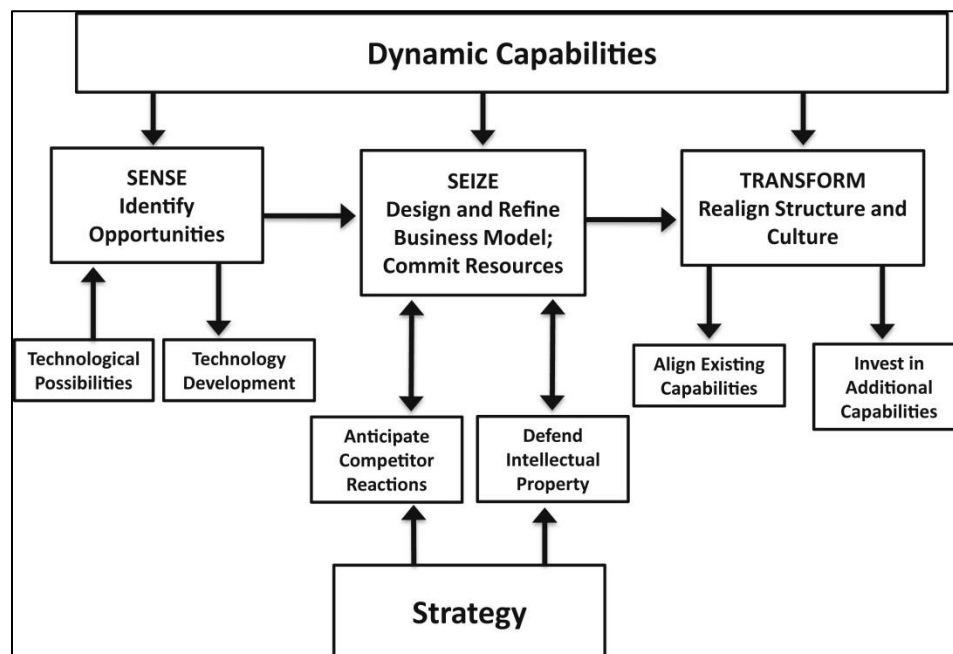


Figure 1. Dynamic Capabilities And Business Model

## Effect of Ecosystems

Platforms and ecosystems have had a significant impact on the way we live and work. They have also facilitated the sharing of information and the democratization of access to knowledge. However, platforms and ecosystems also raise important questions about power and control. Platforms can become dominant players in their industries and can exert significant influence over the actors in their ecosystems. This has led to concerns about the concentration of power and the potential for abuse (Chang et al., 2017). Ecosystems can have a



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significant impact on organizations, both positively and negatively. Positive impacts can include access to natural resources, such as timber or water, which can be used in production processes or sold as products. Ecosystems can also provide opportunities for ecotourism and recreation, which can be a source of income for organizations (MacKenzie & Carter,2019). On the negative side, the destruction or degradation of ecosystems can harm organizations by damaging their reputation, reducing access to resources, and increasing costs associated with environmental regulations. For example, if an organization is found to be responsible for polluting a river, it may face significant fines and penalties, as well as damage to its reputation. Additionally, organizations operating in areas with fragile ecosystems may face disruptions to their supply chains or production processes due to natural disasters or other environmental events (Kumar & Subramaniam, 2021). Digital platform ecosystems, on the other hand, refer to the networks of companies and technologies that exist within a particular industry. These ecosystems can include everything from suppliers and partners to customers and competitors (Hein et al., 2020). Companies that are able to successfully navigate and leverage these ecosystems are better able to capture the value and gain a competitive advantage. (Nambisan,2021).

Overall, it's important for organizations to consider the impact of their operations on ecosystems and take steps to minimize negative impacts and promote conservation and sustainability. By doing so, organizations can minimize risks, improve their reputation, and tap into new opportunities for growth and innovation.





## **Digital Platforms and Ecosystems**

A platform is a set of technologies, tools, and services that enable the development and distribution of products and services. Platforms have become increasingly important in recent years, as they have the ability to bring together different actors, such as developers, users, and businesses, and enable them to interact and create value. Platforms can take many forms, as they can directly affect consumers, such as smartphone systems or coordination and monitoring programs, and there are several types of digital platforms that rely on hybrid installations (Evans & Gawer, 2016). The value of an innovation platform, on the other hand, is added to the system as a whole since it offers a technological and distribution platform on which other businesses can add their own innovation. An illustration of this is the "App" ecosystem from Apple. Platforms for the invention are entirely compatible with the original profit-by-innovation paradigm, which placed a strong emphasis on the necessity for exclusive access to particular supplements. Although the connection between the two is less obvious when it comes to transactional platforms, successful examples like Amazon should draw traders like the Amazon Marketplace (Teece, 2017). Digital platforms and ecosystems refer to the various technological systems and networks that enable the delivery and consumption of digital goods and services. examples include social media platforms, e-commerce marketplaces, and mobile app stores. These platforms and ecosystems have become increasingly important in the digital economy, as they facilitate the creation and exchange of value among users, developers, and businesses (Calabrese et al., 2021). One of the most well-known examples of a platform is the internet. The internet is a global network of computers that enables the exchange of



information and the development of new products and services. The internet has enabled the creation of many different ecosystems, such as e-commerce, social media, and online gaming. Another example of a platform is a mobile operating system such as Android or IOS. Mobile operating systems provide the foundation for the development and distribution of mobile apps and have enabled the creation of ecosystems such as the App Store and Google Play (Kumar & Subramaniam, 2021). The “Big Five” (or FAMGA: Facebook, Apple, Microsoft, Google, and Amazon) are the best examples of digital platforms, which consist of digital structures that allow innovation and interaction (Van et al. 2018). In this field, the literature indicates that there is a close link between digital platform and ecosystem, which works in adding value to the business. Digital platform ecosystems are studied through systemic dimensions that include: platform sponsor, platform provider, complements (supply side) and users (demand side) as shown in Figure 2 (Calabrese et al. 2020).

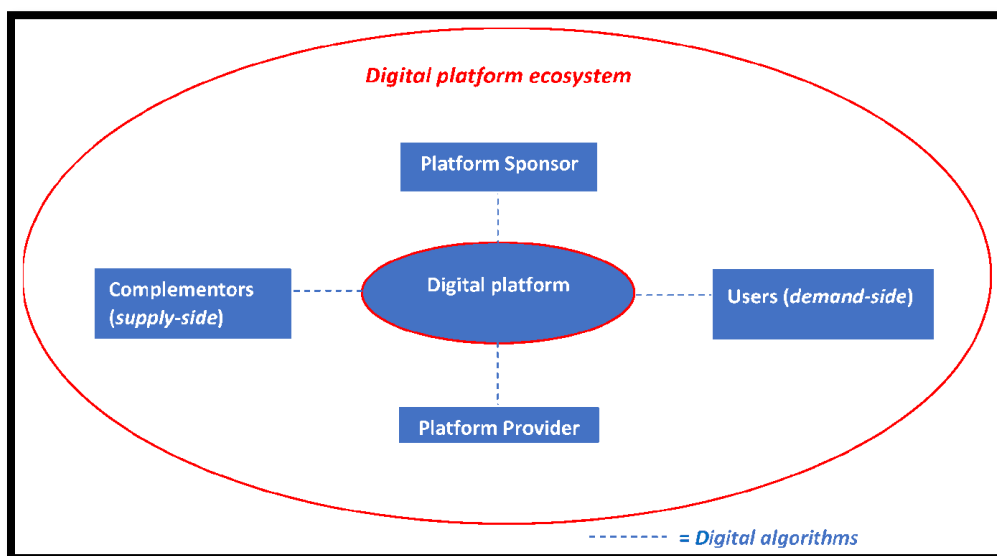


Figure 2. Digital Platforms and Ecosystems



## **Lean Production**

Womack, 2005 first introduced the term lean with the publication of the world-changing book based on Toyota production studies. Lean and Lean Manufacturing concepts pursue improvements in operational design or, as Marksby (2012) refers, competitive advantages including price, cost, delivery speed, consistency, innovation, and flexibility (faster, cheaper, more agile, better, etc.). This is made possible by the ongoing, methodical identification and removal of garbage (Cruz & Burbano, 2012 ). Lean Manufacturing is defined as “the pursuit of an improvement in the manufacturing system through the elimination of waste, understanding as waste all those actions that do not add value to the product and for which the customer is not willing to pay. “Lean manufacturing can be considered as a set of tools that were developed in Japan inspired in part by the principles of William Edwards Deming” (David, 2018 ). This production concept is called adaptive production because its goal is to reduce to a minimum all resources required for all aspects of the system, mainly in: manpower, production and storage space, tool investments , and production times. engineering spent on developing new products. On the other hand, the system assumes the ability to manage small batches of raw materials and components, which means a supply policy based on establishing stable relationships with suppliers. Defect levels are significantly reduced as WIP has greater visibility into the system, and the potential to produce a wider range of products increases as smaller batches are more easily fed into precise production planning (Kelly et al., 2021).

Consequently, the main objectives of lean production are very ambitious at the level of productivity, profitability of invested capital and product quality, The



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concept of lean production leads to shorter work cycles, standardized work methods, minimum number of workers, minimum material stocks, reduced or even eliminated intermediate storage, and reduced workshop space.

## **Current Trends**

One current trend in research on dynamic capabilities and digital platform-based ecosystems is the focus on how firms can effectively leverage these platforms to create value. This includes research on how firms can use digital platforms to facilitate open innovation (Nambisan,2021), as well as how they can effectively monetize their platform offerings. Another trend is the examination of the role that platform governance plays in shaping the behavior of platform participants and the outcomes of platform-based ecosystems (Gandal & Salinger, 2017). In the current business environment, companies are increasingly recognizing the importance of both dynamic capabilities and digital platform ecosystems (Hein, 2020). This is particularly true in the technology industry, where new technologies and business models are emerging at a rapid pace. Companies that are able to stay ahead of these trends and adapt quickly are more likely to succeed in the long term (Kumar & Subramaniam, 2021). In addition to these current trends, there is also a growing body of research on the future of dynamic capabilities and digital platform-based ecosystems. This includes research on the potential for these platforms to drive the development of new industries and business models, as well as the potential challenges and risks that firms may face as they seek to leverage these platforms to create value (Vial,2020).



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## **Future Trends**

One key aspect of the future of dynamic capabilities and digital platform-based ecosystems is the increasing importance of data and analytics (Redjeki & Affandi, 2018). With the proliferation of data-generating devices and the growth of the Internet of Things (IoT), firms are collecting vast amounts of data that can be used to inform decision-making and drive innovation. The ability to effectively leverage this data will be a key factor in the success of firms operating in the digital age. Another trend in the future of dynamic capabilities and digital platform-based ecosystems is the increasing importance of artificial intelligence (AI) and machine learning (Müller-Bloch & Kretzschmar, 2019). AI and machine learning technologies have the potential to significantly enhance the capabilities of firms, enabling them to process and analyze data more quickly and accurately, as well as to automate various business processes. However, the effective use of these technologies also requires firms to have strong dynamic capabilities, as they must be able to continuously adapt and renew their resources and competencies in order to effectively leverage these technologies (Zhao & Von, 2020). We can expect to see even more emphasis placed on dynamic capabilities and digital platform ecosystems. As new technologies like artificial intelligence and the Internet of things continue to evolve, companies will need to be even more agile and responsive in order to stay competitive. At the same time, the importance of digital platform ecosystems is likely to continue growing, as companies increasingly rely on networks of partners and customers to drive growth and innovation (Kumar & Subramaniam, 2021).

In summary, dynamic capabilities and digital platform-based ecosystems are increasingly important for firms in the digital age. Research on these topics is



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focused on understanding how firms can effectively leverage these platforms to create value, as well as the role of platform governance in shaping the behavior of platform participants and the outcomes of platform-based ecosystems. Looking to the future the increasing importance of data and analytics as well as AI and machine learning will also be key factors in the success of firms operating in the digital age. We can expect to see even more emphasis placed on dynamic capabilities and digital platform ecosystems. As new technologies companies will need to be even more agile and responsive in order to stay competitive, at the same time the importance of digital platform ecosystems is likely to continue growing, as companies increasingly rely on networks of partners and customers to drive growth and innovation.

## **Method**

This study used a systematic literature review method after previous review studies and structural analysis using a questionnaire as the main tool for collecting data. The study was applied to a sample of 55 university professors. The study model was formulated to include three variables: dynamic capabilities (DC) with dimensions (sensing (DC1), seizing (DC2), transform (DC3)), and digital platform-based ecosystems ( DPE), and lean production (LP ), as shown in Figure 3.



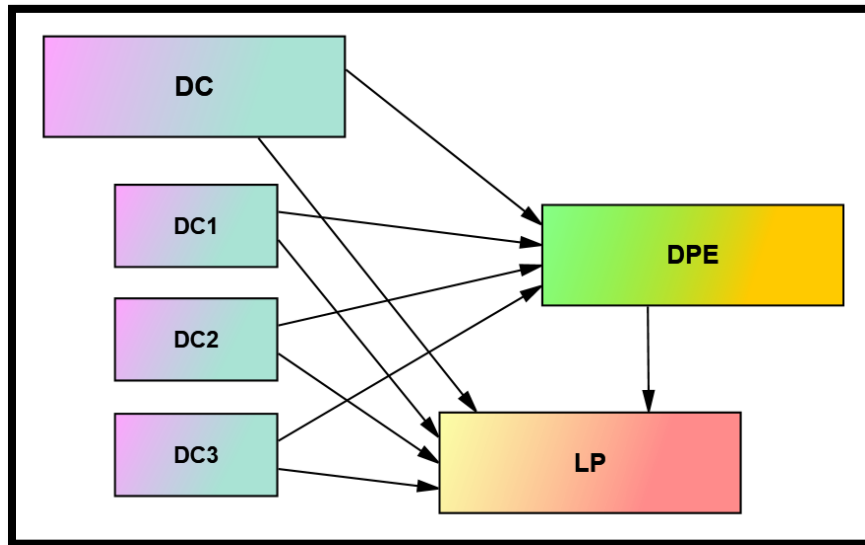


Figure 3 : Study Model

## Correlation Analysis

Table 1 indicate that there is a positive and significant correlation between DC and LP (764 \*\*), and at the sub-level there are positive relationships between the dimensions (DC1, DC2, DC3) and LP(671 \*\*, 683 \*\*, 710 \*\*) , all these values are significant at (0.05). which support H1. Also, there is a positive and significant correlation between DC and DPE (944 \*\*), and at the sub-level there are positive relationships between the dimensions (DC1, DC2, DC3) and DPE (895 \*\*, 848 \*\*, 861 \*\*) , all these values are significant at (0.05). which support H2. And there is a positive and significant correlation between DPE and LP (877 \*\*), this value are significant at (0.05). which support H3.



Table 1: Correlation Matrix

		Correlations					
		X1	X2	X3	X	M	Y
X1	Pearson Correlation	1	.853**	.849**	.942**	.895**	.671**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	86	86	86	86	86	86
X2	Pearson Correlation	.853**	1	.692**	.885**	.848**	.683**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	86	86	86	86	86	86
X3	Pearson Correlation	.849**	.692**	1	.895**	.861**	.710**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	86	86	86	86	86	86
X	Pearson Correlation	.942**	.885**	.895**	1	.944**	.764**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	86	86	86	86	86	86
M	Pearson Correlation	.895**	.848**	.861**	.944**	1	.877**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	86	86	86	86	86	86
Y	Pearson Correlation	.671**	.683**	.710**	.764**	.877**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	86	86	86	86	86	86

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Path Analysis

The results in Table 2 and Figure 4 indicate a positive effect between DC and LP (0.141), There is also a positive effect between DC and DPE (0.623), In addition, there is a positive effect between DPE and LP (0.431), However, the mediating effect of the DPE variable between DC and LP is (0.268), The mediating effect is greater than the direct effect, and this proves the existence of a mediating relationship and supports H4. The results indicate a positive effect between DC1 and LP (0.223), There is also a positive effect between DC1 and DPE (0.571), In



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addition, there is a positive effect between DPE and LP (0.431), However, the mediating effect of the DPE variable between DC1 and LP is (0.246), The mediating effect is greater than the direct effect, and this proves the existence of a mediating relationship and supports H4-1. The results indicate a positive effect between DC2 and LP (0.662), There is also a positive effect between DC2 and DPE (0.744), In addition, there is a positive effect between DPE and LP (0.431), However, the mediating effect of the DPE variable between DC2 and LP is (0.321), The mediating effect is greater than the direct effect, and this proves the existence of a mediating relationship and supports H4-2. The results indicate a positive effect between DC3 and LP (0.183), There is also a positive effect between DC3 and DPE (0.513), In addition, there is a positive effect between DPE and LP (0.431), However, the mediating effect of the DPE variable between DC3 and LP is (0.220), The mediating effect is greater than the direct effect, and this proves the existence of a mediating relationship and supports H4-3.

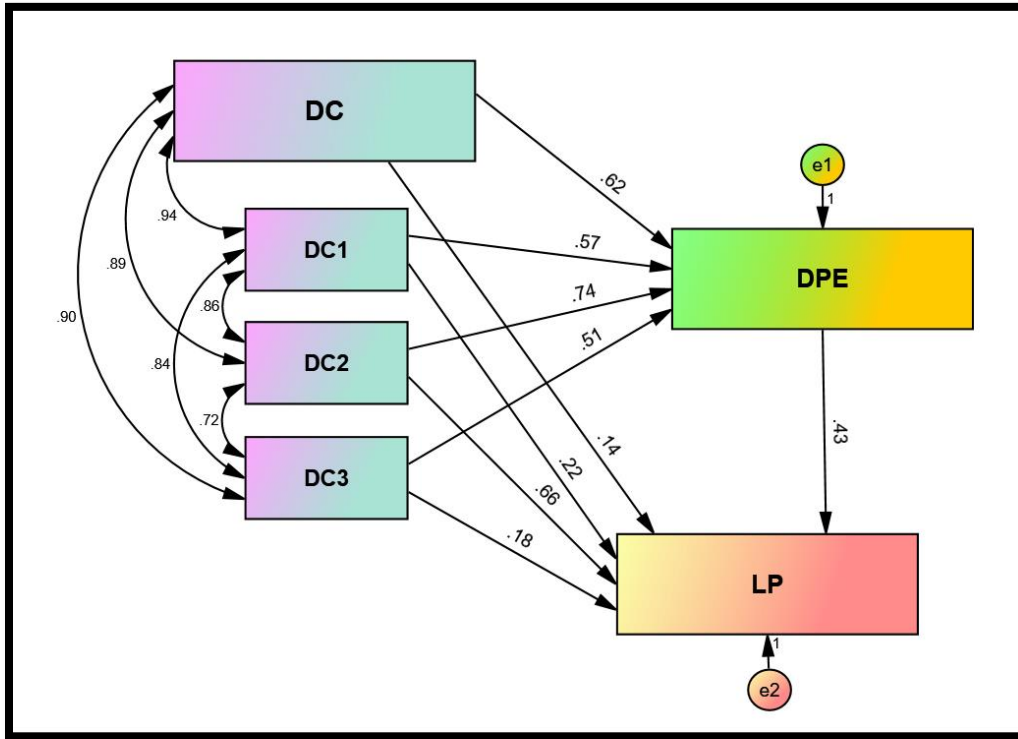


Figure 4: Structural Relationships

Table 2: Path Analysis Results

Path	Estimate	Sig.
DC...> LP	0.141	0.032
DC...> DPE	0.623	0.000
DPE...> LP	0.431	0.000
DC...> DPE ...> LP	0.269	0.011
DC1...> LP	0.223	0.018
DC1...> DPE	0.571	0.000
DPE...> LP	0.431	0.000
DC...> DPE ...> LP	0.246	0.012
DC2...> LP	0.662	0.000
DC2...> DPE	0.744	0.000
DPE...> LP	0.431	0.000
DC...> DPE ...> LP	0.321	0.000



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DC3...> LP	0.183	0.028
DC3...> DPE	0.513	0.000
DPE...> LP	0.431	0.000
DC...> DPE ...>	0.221	0.019

## Discussion and Conclusions

This article reviewed the literature on dynamic capabilities, ecosystems based on digital platforms, and lean production. Platforms and ecosystems are powerful tools that have enabled the creation of new products and services and facilitated the exchange of goods, services, and information. It has had a huge impact on the way we live and work. However, it is important to be aware of the potential for concentration of power and the potential for its abuse. The dynamic capabilities and ecosystems of digital platforms are two important trends in today's business world. These trends are closely related, as they involve a company's ability to adapt to changing market conditions and take advantage of new technologies. According to a study by McKinsey & Company, digital platforms and ecosystems account for a significant share of global economic activity, with the 30 largest platforms alone responsible for more than \$7 trillion in revenue in 2017. (Van et al., 2016) . In addition, digital platforms and ecosystems also play a crucial role in shaping competition and innovation in various industries, from retail and media to transportation and healthcare. (Evans, 2019). In addition to their economic impact, digital platforms and ecosystems also have significant impacts on society and individuals. (Kirchner and Karpinski, 2010) At the same time, the increasing dominance of a small number of large digital platforms has raised concerns about issues such as privacy, data security and competition. (Zuckerberg, 2018). As



digital platforms and ecosystems continue to evolve and expand, it is important for policymakers, businesses and individuals to understand the opportunities and challenges they present. This includes understanding the dynamics of platform-based business models, the role of network effects, and the effects of platform power on competition and innovation. Overall, digital platforms and ecosystems have become a vital part of the digital economy and society, and are expected to continue to play an important role in shaping the future.

In short, dynamic capabilities and ecosystems based on digital platforms are increasingly important for companies in the digital age. Research on these topics focuses on understanding how companies can effectively leverage these platforms to create value, as well as the role of platform governance in shaping the behavior of platform participants and the outcomes of platform-based ecosystems. Looking to the future, the increasing importance of data and analytics, as well as artificial intelligence and machine learning, will also be key factors in the success of companies operating in the digital age.

Accordingly, a set of conclusions can be presented as follows:

1. The dynamic capabilities and ecosystems of digital platforms are two important trends shaping the business world today and will continue to do so in the future. Companies that are able to effectively leverage these trends will be better positioned to succeed in this fast-paced and ever-changing business environment.
2. Although companies try to adapt to environmental changes, there is an impact level of their dynamic capabilities in the transition to lean production, but it is not at the desired level.





3. Dynamic capabilities, in their various dimensions, play an important and fundamental role in improving lean production, and adopting the environmental digital platform increases the chances of transitioning to lean production, through capabilities, skills, and activities that enable the organization to confront changes in the external environment.
4. Dynamic capabilities are usually part of organizational processes that allow organizations to adapt to changing circumstances to reshape their resources, enable transformation and adaptation, improve production and achieve competitive advantage.
5. The digital ecosystem focuses on providing added value to customers by improving customer data, workflow, and improving production
6. The value resulting from the interaction of multiple digital ecosystems helps improve production and move to lean production
7. The results proved that sensing has a positive effect on improving lean production when adopting environmental systems based on digital platforms, as sensing contributes to supporting the ability to scan the environment, explore and identify the opportunities and threats it creates with the aim of formulating the appropriate strategy for it and moving to lean production.
8. Appropriation positively affects lean production when adopting the environmental digital platform, as it supports the ability to seize opportunities and integrate new knowledge into operational capabilities.
9. Transformation and restructuring have a positive effect on lean production, as a clear value is generated for the ability that supports the feeling of the need to



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reshape the structure of the organization's assets, and complete the internal and external transformation.

## **Recommendations**

1. The rapid and serious changes and challenges that companies face require many transformations in future.
2. Look for new strategies to gain a competitive advantage so they can survive and achieve their goals. Given these challenges, weak companies that do not improve their capabilities and use their skills will not be able to survive.
3. Unifying new knowledge and incorporating it into the organization's operational capabilities by embodying patterns of joint interaction and collective logic.
4. Knowing the implicit capabilities of workers at different levels and encouraging innovation and demonstrating these capabilities
5. Work to adopt digital transformation and use digital environmental platforms to ensure access to lean production.
6. Establishing mechanisms that lead to exploring new opportunities in the environment surrounding the work of organizations through conducting environmental analysis operations.
7. Markets, technology, and best practices must be continuously monitored in order to facilitate both internal and external transformation.
8. Forming a department specialized in developing dynamic capabilities to develop the plans, strategies, and mechanisms necessary to develop dynamic capabilities to help solve organizational problems, adapt to environmental changes, and make appropriate decisions.



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