



The Impact of Internet Technology on Enterprises Achieving Economies of Scale and Economies of Scope, and Its Mechanism of Action

Juan Zhao¹ and Weiwei Deng^{2*}

¹Sichuan Post and Telecommunication College, Chengdu, People's Republic of China;

²School of Tourism and Culture Industry, Sichuan Tourism University, Chengdu, People's Republic of China;

*Weiwei Deng:181457527@qq.com

Abstract. To explore the impact and mechanism of Internet technology on enterprises achieving both economies of scale and economies of scope, based on a review of the literature, it was found that in traditional production processes, enterprises could only choose one of the economies, either scale or scope, as their profit pursuit goal. Although theoretically, enterprises can achieve both economies of scale and economies of scope, in practice, they are often influenced by various factors and find it difficult to do so. The continuous development of Internet technology will, to some extent, have an impact on and play a role in enabling enterprises to achieve both economies of scale and economies of scope. Therefore, this article discusses the impact and mechanism of Internet technology on enterprises achieving both economies of scale and economies of scope, in order to explore paths for enterprises to obtain better benefits.

Keywords: Internet technology, Enterprises economies of scale, Enterprises economies of scope.

1 Introduction

For an enterprise, whether it achieves economies of scale or economies of scope, it can lead to economic benefits. Of course, if an enterprise can achieve both economies of scale and economies of scope simultaneously, it reaches an ideal state, where the enterprise maximizes its profits. However, in the actual operation of enterprises, they often find it challenging to achieve both due to various factors. Factors such as production factors, production costs, and the ability to mitigate risks may limit them to achieving either economies of scale or economies of scope. This situation has drawn the interest of scholars, but in traditional economic development, this problem has been difficult to resolve. Technological advancement may be a crucial factor in improving or even solving this situation, especially with the development of Internet technology. Traditional production methods, processes, and production targets are undergoing certain changes, making it possible for enterprises to achieve both economies of scale

© The Author(s) 2024

F. Cao et al. (eds.), *Proceedings of the 2023 5th International Conference on Economic Management and Cultural Industry (ICEMCI 2023)*, Advances in Economics, Business and Management Research 276,

https://doi.org/10.2991/978-94-6463-368-9_45

and economies of scope. To discover the impact of Internet technology on this and its mechanisms of action, this paper engages in the following discussions and explorations.

2 Literature review

Economies of scale, first introduced by Adam Smith, are used to describe the phenomenon where enterprises reduce costs and increase profits by expanding the output scale of a particular product. Specifically, as enterprises continue to specialize and increase production scale, they can distribute production costs across more products, thereby reducing the average unit cost of each product. Economies of scope, on the other hand, describe the phenomenon where enterprises increase overall revenue by producing multiple products with interrelated characteristics. When enterprises produce related products, synergies are formed, enabling the efficient utilization of resources^[1]. From the definitions of these two concepts, economies of scale are associated with changes in the quantity of products, while economies of scope are associated with changes in the variety of products, and they are both related and distinct. For instance, Yu Shuyan^[2] views economies of scale and economies of scope as two separate concepts. Economies of scale emphasize the economic benefits gained through the scale of production, while economies of scope emphasize the economic benefits obtained by producing different types of products.

There is no direct link between the two. A company that produces diverse products may have economies of scope without economies of scale, while a company that produces only a single product may achieve economies of scale but may not have economies of scope. Furthermore, economies of scale and economies of scope reflect the cost-benefit relationship of a company in producing a certain product or a set of related products. As the scale or scope of products expands, costs decrease, resulting in a positive correlation between "scale," "scope," and "economy." Although expanding the scale of production may enable a company to achieve both economies of scale and economies of scope, not all actions to increase scale can yield such results. When a company's scale exceeds a certain limit, internal coordination costs may rise due to factors like management efficiency and excessive resource dispersion, weakening the effects of economies of scale and economies of scope. While it is advantageous for a company to achieve both economies of scale and economies of scope to maximize profits, can companies truly attain both? Based on existing literature, there are currently two prevailing viewpoints in academia:

2.1 Challenges in Achieving Economies of Scale and Economies of Scope Simultaneously

Prior to the 1980s, large Western enterprises placed significant emphasis on diversification within their industries. However, after the 1980s, they shifted their focus towards achieving economies of scale for their products. This transition was driven not only by enterprises' pursuit of economies of scale benefits and the desire to build core

competitiveness but also by a change in mindset. It was a consideration made by enterprises after recognizing the complexity and difficulties associated with diversified competition. This shift indirectly provides a basis for the challenge of enterprises in achieving both economies of scale and economies of scope^[3]. Montes^[4], from the perspective of changes in production methods, argues that as a result of the differentiation between manual and industrial systems, enterprises increasingly emphasize large-scale production through factory assembly lines while de-emphasizing personalized and diversified production. This shift makes it challenging for enterprises to achieve compatibility between scale and scope. In such a situation, enterprises encounter hindrances when expanding into new products, primarily because it becomes difficult to establish an affordable price while offering personalized and diversified goods. Meng Jiong^[5], from the perspective of product supply by enterprises, believes that supplying products on a large scale is difficult to align with individualized demands. Furthermore, the low cost of large-scale production may not be compatible with the efficiency required by individualized demands.

Consequently, conflicts arise between the economies of scale generated through large-scale production and the economies of scope required by individualized demands. Carvalho et al.^[6] argue that economies of scope primarily stem from resource sharing or bargaining capabilities. However, these capabilities may be insufficient to achieve economies of scope. Therefore, specialized production may be more advantageous for enterprise development. In such cases, diseconomies of scope exist, especially for large enterprises, as the complexity of the services they provide can lead to situations of scope diseconomies. In conclusion, considering factors such as production methods, cost factors, and limited resources, enterprises face obstacles in achieving both economies of scale and economies of scope simultaneously.

2.2 Achieving Economies of Scale and Economies of Scope Simultaneously

Zhou et al.^[7] in the context of mergers and acquisitions in the development process of enterprises, suggests that enterprises continually alternate between pursuing economies of scale and economies of scope. For example, the shift from horizontal mergers to vertical mergers represents a transition from pursuing economies of scale to economies of scope. Conversely, mixed mergers and large-scale mergers reflect enterprises' alternating pursuit of economies of scale and economies of scope. In general, enterprises continuously make choices between economies of scale and economies of scope at different levels. Weng^[8] argues that when enterprises expand through a single product, the marginal benefits derived from economies of scale exceed marginal costs, while the marginal benefits of economies of scope are much smaller than the marginal costs. This creates a challenging choice for enterprises in selecting between economies of scale and economies of scope. However, the degree of specialization upon which economies of scale depend is limited. When it reaches a certain level, the marginal costs associated with economies of scale increase while marginal benefits decrease. Thus, when the marginal benefits under economies of scale equal marginal costs, enterprises have already maximized economies of scale. In this situation, to continue increasing profits, enterprises can obtain economies of scope through the joint production of multiple

products. Market capacity available to enterprises is limited, and to fully utilize resources, enterprises need to allocate costs through diversification. However, the prerequisite for this diversification is that the core business must reach a certain scale; otherwise, limited resources may lead to diversification failure. Therefore, economies of scope represent a lateral extension and expansion of economies of scale, encompassing a broader scope within economies of scale. Consequently, enterprises can potentially achieve both economies of scale and economies of scope. Xiao et al.^[9] suggests that economies of scale and economies of scope are corresponding concepts, but they are not mutually exclusive. Economies of scale are the origin of economies of scope, and economies of scope represent a deepening of economies of scale. When enterprises reduce the transformation cost from single-operation to diversified operations through technological links, they can achieve both economies of scale and economies of scope. When enterprises engage in production and processing through integrated technological links, production technologies benefit from scale utilization, driving the scale utilization of machinery, equipment, raw materials, and more. This, in turn, creates economies of scope on the foundation of economies of scale. In summary, this perspective argues that it's difficult to separate enterprises' economies of scale and economies of scope, as they exhibit a certain level of interaction, making it possible for enterprises to achieve both.

In conclusion, while enterprises may be constrained by costs, resources, and other factors when attempting to achieve both economies of scale and economies of scope, theoretically, they have the potential to achieve both. Especially with the development of Internet technology, such as big data analytics and machine learning, breaking down traditional boundaries, enterprises are better equipped to navigate complex environments, influencing their ability to attain both economies of scale and economies of scope.

3 Investigating the Reasons for the Difficulty in Achieving Both Economies of Scale and Economies of Scope

Both economies of scale and economies of scope can bring economic value to enterprises. Naturally, if an enterprise can simultaneously achieve both, it means the enterprise can fully utilize its resources and has enough competitiveness to resist risks, thereby maximizing profits. However, in the actual operation of enterprises, it is often challenging to balance both economies of scale and economies of scope. Why does this result occur? This article mainly analyzes this from the following points.

3.1 Limited Production Factors

In traditional economic assumptions, resources are always limited. Therefore, enterprises need to make choices in resource allocation to maximize returns. When enterprises use production factors to produce a single product, production tends to be specialized, and enterprises can improve production efficiency and reduce costs. In other words, enterprises can pursue economies of scale. When enterprises produce diverse

products to achieve multiple functions of production factors, the efficient use of resources is favorable for enterprises to pursue economies of scope. For example, during the growth phase, enterprises usually face two choices: expanding product quantity to achieve economies of scale or expanding the variety of products to diversify operations, thus achieving economies of scope. If an enterprise chooses the first option, it can only strive for economies of scale. If it chooses the second option, it may achieve economies of scope, but due to the limited use of production factors, the dispersion of resources in production may have adverse effects on the enterprise. Furthermore, factors and products may interfere with each other, leading to marginal revenue being less than marginal cost. Therefore, the limited availability of production factors restricts enterprises from achieving both economies of scale and economies of scope to a certain extent.

3.2 Limited Market Space

The market space available to enterprises is not infinite but has limitations, similar to the limited production factors of enterprises. This determines that economies of scale also have limitations. Therefore, enterprises need to strike a balance between economies of scale and economies of scope. When the market potential facing an enterprise is small, continuing to expand scale not only fails to achieve economies of scale but may even result in negative economics. In such cases, enterprises can choose to expand their product range into other markets to pursue economies of scope, compensating for the inability to achieve economies of scale. When enterprises face significant market potential, pursuing diversification will weaken the core competitiveness of their primary products. It also demands higher resource utilization and management levels. In such cases, specialized production and economies of scale are more appropriate. Therefore, the size of the market space faced by enterprises to some extent influences the balance between economies of scale and economies of scope, determining the way enterprises pursue maximum economic value.

3.3 Enterprise Resource Utilization Capabilities

As enterprises expand their production scale, they accumulate certain production factors, making it relatively easy to expand production using the same production process. However, although the accumulation of resources to some extent mitigates the impact of limited production factors, enterprises may face new challenges. Specifically, enterprises may lack the technological capability to fully utilize these resources when applying new assets and technologies in production. Enterprises may require extensive learning and experience accumulation to realize the full utilization of resources in these situations. Developing such capabilities can sometimes be challenging. Therefore, even if enterprises make improvements in resource availability and market space, their ability to utilize resources remains a limiting factor in their pursuit of economies of scale or economies of scope.

3.4 The Difficulty of Enterprise Research and Development in New Products or Industries

Entering new industries or launching new products is not an easy task for enterprises; there are often significant barriers to entry. Generally, when enterprises enter new markets, they face varying degrees of market entry barriers. However, for enterprises to achieve economies of scope, they often need to involve new products or industries. When the barriers to entry in new product markets or industries are low, enterprises can relatively easily pursue both economies of scale and economies of scope. However, when the barriers are high, even if enterprises can achieve economies of scale, they will face significant obstacles when pursuing economies of scope.

In conclusion, although traditional enterprises are influenced by various factors and find it challenging to achieve both economies of scale and economies of scope, it is essential to note that this article does not view the pursuit of economies of scale and economies of scope as mutually exclusive. Especially with economic and technological advancements, most enterprises are not purely single-product producers, and more or less, they engage in the joint production of other products. Additionally, economies of scope can be considered as an extension of economies of scale on a broader scale, making it difficult to separate the two. Therefore, whether enterprises focus on economies of scale or economies of scope, the most beneficial state for enterprise development is achieving "Pareto Optimality" in both economies of scale and economies of scope, where further optimization is impossible.

4 The Impact of Internet Technology on Enterprises Achieving Economies of Scale And Economies of Scope, and its Mechanism

4.1 The Impact of Internet Technology on Enterprises Achieving Economies of Scale and Economies of Scope

In neoclassical economic theory, firms achieve economies of scale at the lowest point of average production cost, and technology determines this optimal point, thus influencing economies of scale^[10]. When aiming for economies of scale, new technologies drive the scaling and specialization of enterprises. However, the emergence of new technologies is costly and can only be profitable when a certain scale is achieved^[11]. Economies of scope are the result of the combination of industrialization and informatization, such as mass customization, which combines "customization" with large-scale industrial production methods, allowing for cost reduction while maintaining diversity, thereby achieving economies of scope^[12]. Both economies of scale and economies of scope require reducing enterprise costs to some extent to avoid resource wastage. Fortunately, the development of internet technology continuously improves automation levels while reducing various forms of waste, thereby enhancing this situation^[4].

Internet technology impacts production scale in several ways:

It enables faster and more accurate continuous production to increase efficiency.

It ensures outstanding operations through timely data supply and the combination of different technologies.

It guides better production processes by simulating future scenarios.

It links production with potential sales by predicting consumer demands more accurately and producing products that better suit market needs.

It improves equipment maintenance and performance while reducing raw material consumption for smooth operations.

Additionally, the development of internet technology allows businesses to achieve scale through network platforms, connecting people, organizations, resources, etc., into a multilateral ecosystem for exchange and value creation. Therefore, internet technology not only enables rapid scaling of enterprises but also facilitates product diversification through technologies like 3D printing, allowing enterprises to achieve economies of scope. For example, Nieto et al. [13] argue that businesses can gain valuable market information through internet technology, allowing them to discover points of demand in specific customer markets and better meet customer needs through customized products and services.

In summary, the development of internet technology represents a form of creative destruction, altering economic systems on various levels. It turns data into a primary production factor, making large-scale socialized collaborative production possible and providing pathways for enterprises to achieve both economies of scale and economies of scope [14].

4.2 Approaches for Enterprises to Achieve Economies of Scale and Economies of Scope Using Internet Technology

4.2.1 Mass Customization

The first and second industrial revolutions were primarily driven by economies of scale, but with the advent of the internet era and the widespread application of internet technology, mass customization became feasible. This shift toward mass customization is driven by the pursuit of economies of scale in the third industrial revolution. Consumer preferences and quality expectations have evolved, and consumers no longer settle for mass-produced, one-size-fits-all products; they increasingly seek personalized products. Consequently, enterprises have shifted toward producing customized products while maintaining low costs and high quality [15].

However, in traditional enterprise production processes, cost reduction was typically achieved through mass production, even when diversifying production. This approach was still based on economies of scale and couldn't meet the demands of personalization. Under the influence of internet technology, enterprises can now achieve "smart manufacturing," making large-scale customization possible. The cost structure of products under internet technology is different from traditional manufacturing. In traditional production, costs are primarily associated with the procurement of raw materials and processing during production. In contrast, under the influence of internet technology, enterprises primarily bear development costs upfront. In terms of supply and demand, the use of big data facilitates personalized customization, resolving the conflict be-

tween personalized demands and standardization. Through mass customization, enterprises can produce complementary product combinations, perfect product configurations, and meet individualized customer demands, thereby achieving economies of scope. Simultaneously, optimization can occur across different products, enhancing product standardization and achieving economies of scale.

4.2.2 Value Co-Creation and Collaborative Capabilities in the Internet Era.

Internet technology enhances interaction between consumers and enterprises through value co-creation and collaborative capabilities, thereby reconciling the conflicts between economies of scale and economies of scope. The development of internet technology is conducive to collaboration among enterprises, enabling them to achieve both economies of scope and economies of scale.

In traditional industrial production, assembly lines were the primary mode of production, and the pursuit of economies of scale was the main avenue for optimizing resources. For economies of scope, traditional enterprises typically offered various products to reduce total costs, primarily relying on interrelatedness between multiple products. For example, production factors with multiple functions were used to maximize the application of production factors, reducing production costs. However, under the influence of internet technology and the digitization of the economy, products do not necessarily have to be related. For instance, there may be no connection between different product placements, and there may be little or no relevance between the placements and the products themselves. Therefore, internet technology can significantly expand economies of scope, and this kind of economies of scope relies on the support of economies of scale. For example, if placement advertisements cannot achieve a certain scale, their value may not be realized. Through internet technology, economies of scale and economies of scope can be combined, enabling enterprises to profit differently from traditional enterprises ^[16].

Through internet technology, enterprises can reduce costs and improve efficiency by expanding network scale. The more people connected through internet technology, the greater the value obtained through these connections. Under the influence of internet technology, enterprises can develop and meet consumer's personalized needs through digital information, which allows for simultaneous development of internal production and external service. This diversification of revenue sources allows enterprises to achieve both economies of scale and economies of scope.

4.2.3 Platform Economics with Both Economies of Scale and Economies of Scope in the Internet Era.

The development of internet technology has made the world "borderless," weakening the impact of information asymmetry in traditional economic development processes. Platform economics, driven by internet technology, becomes the target of enterprise pursuit due to its combined economies of scale and economies of scope. Economies of scale, concerning the supply side of enterprises, exhibit a U-shaped relationship between efficiency and the scale of enterprise production. As enterprise production gradually expands, production costs decrease, representing economies of

scale. However, when enterprise production surpasses a certain limit, costs increase with further scaling, representing diseconomies of scale. In platform economics enabled by internet technology, such a situation does not occur. As user demand scales up, the demand contributes to the continuous growth of platform value, expanding the platform's scale accordingly. When the economies of scale of the supply side and the economies of scale of the demand side effectively combine, they have a significant positive effect on enterprise efficiency, promoting improvements in enterprise performance^[17].

5 Conclusion

This paper, through a review of the literature and case studies, has found that although in traditional production methods, it is challenging to simultaneously achieve economies of scale and economies of scope due to factors such as production elements and production costs, under the influence of internet technology, enterprises can still achieve both economies of scale and economies of scope through avenues like large-scale customization, value co-creation, and the pursuit of platform economics.

Therefore, there is significant potential for enterprises to achieve both economies of scale and economies of scope through the utilization of internet technology. It is reasonable to believe that with the continuous development and refinement of internet technology, enterprises will reap the economic benefits brought about by economies of scale and economies of scope, providing greater incentives for sustainable development.

While this paper has primarily focused on exploring the impact and mechanisms of internet technology on enterprises achieving both economies of scale and economies of scope, it lacks a systematic examination of the literature, and there may be shortcomings in addressing certain aspects of the issue. Additionally, this paper has not delved into the measurement of economies of scale and economies of scope for enterprises. Therefore, there is a need for future research to approach the application of internet technology in enterprises from a quantitative perspective, providing clearer and more reliable quantitative support for understanding how internet technology functions in the context of economies of scale and economies of scope.

References

1. Fan Jianqiang, You hao. Discussion on the essence of economies of scale and economies of scope[J]. *Management Engineer*, 2020, 25(03): 3-13.
2. Su Shuyan. Principles of economics[M]. China Railway Publishing House, 2019.
3. Thomas Standa. Will "economies of scope" replace "economies of scale"?[J]. *Manager World*, 2017, (09): 64-65.
4. Montes Jo, Olleros Fx. Microfactories and the new economies of scale and scope[J]. *Journal of Manufacturing Technology Management*, 2019.
5. Meng Jiong. Innovation of C2B democratic manufacturing mechanism empowered by big data[J]. *Study of Science*, 2021, 39(04): 725-737.

6. Carvalho P, Marques RC. Computing economies of vertical integration, economies of scope and economies of scale using partial frontier nonparametric methods[J]. *European Journal of Operational Research*, 2014, 234(1): 292-307.
7. Zhou Wenbin, Yan Yanming, Huang Chao, etc. Shanghai Construction of Offshore RMB Bond Market: International Experience and Development Suggestions [J]. *Shanghai Finance*, 2022(06):2-11.
8. Weng Aijun. A-FUZZY analysis model and empirical research on the integration strategy of financial and insurance groups [J]. *Financial Management Research*, 2022(04):84-93.
9. Xiao Yixuan, Yin Xiaoping. Scale economy or scope economy: the product strategy of multi-product export enterprises under uncertainty [J]. *Finance & Economics*, 2023(07):107-117.
10. Sun Zesheng. Economies of scale and scope of socialist production [J]. *Businesses Economic Review*, 2023,24(02):3-23.
11. De Roest K, Ferrari P, Knickel K. Specialisation and economies of scale or diversification and economies of scope? assessing different agricultural development pathways[J]. *Journal of Rural Studies*, 2018, 59: 222-231.
12. Liu Fang. A review of influencing factors of enterprise economies of scale[J]. *Journal of Capital University of Economics and Business*, 2014, 16(03): 123-128.
13. Nieto Mj, Fernández Z. The role of information technology in corporate strategy of small and medium enterprises[J]. *Journal of International Entrepreneurship*, 2005, 3(4): 251-262.
14. Hu beibei, Wang Shengguang, Duan Yuchang. Analysis of the new techno-economic paradigm triggered by the internet[J]. *Studies In Science of Science*, 2019, 37(04): 582-589.
15. Chen Lucheng, Lu Xiaoping, Sheng Guojun, etc. Summary of large-scale personalized customization research [J]. *The Journal of New Industrialization*, 2023,13(10):11-21.
16. Meng Zhipeng, Guo Xue, Xiao Jian. Research on the mechanism of digital economy to promote the improvement of education level - an intermediary effect test based on the level of traditional financial development [J]. *Investment and Entrepreneurship*, 2023, 34(07):37-39+43.
17. Lu yan. User scale, user categories, and internet platform competition[D]. Shan Dong University, 2019.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

