Journal of Business Theory and Practice
ISSN 2372-9759 (Print) ISSN 2329-2644 (Online)
Vol. 12, No. 3, 2024
www.scholink.org/ojs/index.php/jbtp

Original Paper

Research on the Path of Total Factor Productivity Improvement in Multinational Enterprises: Based on fsQCA Methodology and TOE Framework

Yuansheng Chen[1]

[1] College of Finance and Economics, Sichuan International Studies University, Chongqing, China

Received: June 3, 2024 Accepted: June 21, 2024 Online Published: June 25, 2024

doi:10.22158/jbtp.v12n3p1 URL: http://dx.doi.org/10.22158/jbtp.v12n3p1

Abstract

Promoting the improvement of Total Factor Productivity (TFP) in multinational enterprises (MNEs) is a crucial practical concern in light of global resource mobility. In this study, based on a sample of Chinese listed multinational enterprises in 2021, the multifaceted paths of MNEs to improve total factor productivity are explained based on the theoretical framework of TOE and empirically examined using the fsQCA method. This study finds that, on the one hand, MNEs can achieve high TFP through the technology-environment path, where innovation performance and government subsidies play a central role. On the other hand, MNEs can achieve development through the synergistic path of "technology-organization-environment", in which innovation performance, firm size, and government subsidies are the key elements. This study elucidates the impact of technology, organizational structure, and environmental factors on the total factor productivity improvement of multinational enterprises. Practical insights are provided for optimizing the operations and management of MNEs.

Keywords

multinational enterprises, total factor productivity, fsQCA, TOE framework

1. Introduction

Against the backdrop of growing economic globalization, multinational enterprises (MNEs) have become a vital factor in enhancing the high-quality development of the global economy. As micro-entrepreneurs of global economic development, they play a crucial role in realizing this objective. Objective evaluations are preferred while avoiding emotive or figurative language. Sentences and paragraphs will be structured to create a logical flow of information with causal links between statements. Technical term abbreviations will be explained when first used to enhance comprehension. Common academic sections will be included while maintaining regular author and institutional formatting. Consistent technical terminology will be used with grammatically correct, precise vocabulary and standard language. Passive tone and impersonal construction will be preferred, avoiding first-person perspectives unless necessary. The text will be free of grammatical and punctuation errors with clear citation styles adhering to the style guide. Finally, biases will be avoided through clear positions and hedging language when necessary. Although high-quality development has become a critical approach for multinational enterprises seeking resources and creating sustainable

competitive advantages in both domestic and foreign markets, they encounter significant difficulties achieving it due to the high costs of coordination and governance in both markets, the limited technological capacities of their own enterprises, and environmental drawbacks. Ramachandran and Pant (2010) argued that emerging economies typically have imperfect market mechanisms, weak intellectual property protection, and other institutional deficiencies compared to developed countries. These shortcomings make it challenging for enterprises in emerging economies to develop the technical or managerial capabilities necessary to satisfy the demands of international expansion. As a result, such enterprises are at a disadvantage in international competition. Therefore, delving deeper into the driving path of total factor productivity improvement of multinational enterprises holds practical significance.

With regard to the factors influencing the total factor productivity of firms, existing studies also provide some empirical evidence. First, at the technology level, Huang et al. (2023) and Li et al. (2023), using firms' digital patents as evidence, found that firms' digital technology innovation provides an enabling driver for their high-quality development. Li et al. (2022) and Zhang & Dong (2023) also found and verified from the perspective of firms' digital transformation that it has an enabling driver for the driving utility of enterprise total factor productivity improvement. Second, at the organizational level, many studies have explored the effect of the characteristics of the executive team or the board of directors on the high-quality development of enterprises based on the high-ranking echelon theory, e.g., Zhu et al. (2022) investigated that the rich experience of the CEO helps to enhance the total factor productivity of the enterprise. In addition, some scholars have also explained the impact of financing constraints on firms' total factor productivity from the perspective of financing constraints (Ren & Lv, 2014). Third, at the environmental level, there have been studies that have found the significant impact effect of government subsidies on the total factor productivity of enterprises (Yan & Yu, 2017; Zheng et al., 2022), but they hold different views on the impact effect thrown by government subsidies. On the one hand, government subsidies may be a convenient channel for enterprises to obtain financing, which provides a boost to enterprise development (Zheng et al., 2022). On the other hand, government subsidies may also make enterprises form policy dependence, which is not conducive to enterprise productivity enhancement (Yan & Yu, 2017). In addition, Shao (2021) and Zhou et al. (2022) concluded that the business environment is also an important factor affecting the high-quality development of enterprises, and the improvement of the business environment will significantly promote the total factor productivity of enterprises. Taken together, the influencing factors of enterprise total factor productivity improvement can originate from multiple levels, such as technology, organization, environment and other levels, which requires a holistic perspective to analyze the more complex antecedent relationships. The current research on the grouping of enterprises for high-quality development has only focused on the categories of specialized, special and new enterprises (Mao & Dun, 2023) and meta-universe enterprises (Li et al., 2023), with few studies expanding to the category of MNEs. What are the group paths for MNEs to realize high-quality development in the context of building a new development pattern of double-cycle and promoting high-quality economic development? How should MNEs further realize high-quality development? These questions need to be answered urgently.

Based on the above premise, this paper initially utilizes the TOE (Technology-Organization-Environment) framework to establish a theoretical model from the technology, organization, and environment dimensions. Subsequently, the paper analyzes the factors

that influence the total factor productivity improvement of multinational enterprises. Secondly, management researchers analyze the relationship between factor histograms and outcome variables through a holistic approach known as histogram research. This approach emphasizes the complexity of causality (Du et al., 2017). Therefore, this study utilizes the fsQCA method to examine antecedent groupings and causality of total factor productivity improvement in multinational enterprises, while also identifying factors that drive enterprise internationalization and linkage effects between said factors. Technical term abbreviations will be explained when first used in order to ensure clear comprehension throughout the research. Furthermore, the study will adhere to standard citation and footnote formatting as well as grammatical correctness to maintain a formal register and objective language. Biased language, filler words, and informal expressions will be avoided in favor of precise vocabulary and a logical progression of information. Finally, this study conducts a group path analysis using theoretical and empirical models, which enriches our comprehension of total factor productivity enhancement in multinational enterprises. Moreover, it also furnishes practical guidance for enterprises to optimize their operation and management and advance total factor productivity.

2. Theoretical Framework and Analysis

Figure 1 illustrates the research framework of this paper. The TOE framework is extensively used in management studies as a highly generalized model. T, O, and E stand for technical, organizational, and environmental variables, respectively. Technological factors concentrate on the pertinent features of an enterprise's technological capabilities, particularly in regards to innovative technology that is intimately associated with the company's specific behavior. Conversely, organizational factors primarily focus on the organization's internal structure, systems, and available resources, which have a greater influence on the enterprise's strategic behavior. Environmental factors typically stem from exogenous shocks or external drivers that impact the enterprise's external conditions and subsequent behavior.

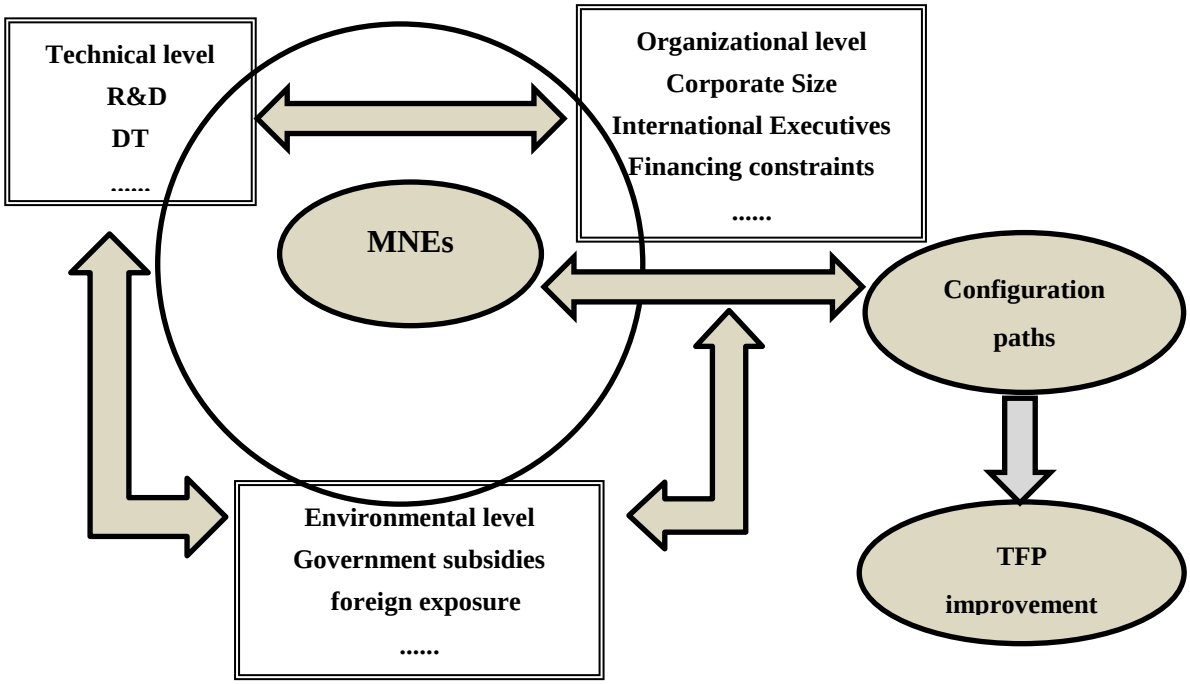

Figure 1. Theoretical Analysis Model

2.1 Technical Level Analysis

Innovation output and digital transformation serve as essential requirements for multinational enterprises to attain high-quality growth. A significant aspect of competitiveness in the global marketplace arises from the challenge of imitating a firm's resources and capabilities. One the other hand, the ability of firms to acquire and leverage worldwide technological knowledge plays a pivotal role in enhancing their international competitiveness. Technology patents are valuable and exclusive resources that are scarce. By accumulating technology patents, enterprises can boost their market value, promoting high-quality development. Technological innovation further enhances performance and operational efficiency, and translates technological knowledge into tangible productivity. In the international business sphere, technological advancements serve as a key competitive edge for firms. Multinational enterprises (MNEs) depend on consistent technological innovation to minimize production expenses. They also rely on a robust research team to enhance Total Factor Productivity (TFP). This holds true for both domestic and foreign markets. On the other hand, the continuous development of the global digital economy and the extensive penetration of new business models in the economic field have presented an opportunity for enterprises to achieve high-quality development. Digital transformation is a key factor for MNEs to adapt to the new economic development trend. Upgrading the level of digitalization is a crucial priority for MNEs, playing a significant role in enhancing their total factor productivity. However, digital transformation has a dual impact. Successful digital transformation can enable enterprises to rely on digital technology to achieve cost reduction and improve efficiency, thereby enhancing competitiveness in the international market. However, the process of digital transformation demands extensive investment of both human and material resources from enterprises. In the short term, they may encounter risks such as process re-engineering and losses

arising from technological instability. These risks can lead to the failure of digital transformation, resulting in no subsequent benefits.

2.2 Organizational Level Analysis

The internal structure and control of organizations are critical factors in the global progress of businesses. In recent years, Chinese enterprises have faced growing environmental uncertainties and risks amid continuous turbulence in the global economic and political environment, a rising tide of anti-economic globalization, and the emergence of anti-globalization behaviors. These challenges have severely tested the internal endurance and resilience of the enterprise.

First of all, the size of the organization will affect the development of MNEs. For large MNEs, due to the higher level of assets and manpower, they are more capable of realizing the scale effect and establishing advantages. However, larger MNEs also face more complex management systems and a variety of external risks, and if MNEs fail to realize higher-quality internal controls and fail to reasonably respond to external changes, it will also hinder the quality development of the enterprise. For small-scale MNEs, there are both advantages and disadvantages. MNEs may not be able to realize diversified development and weak market share due to size constraints, but if they are able to specialize in one field, they can also obtain comparative advantages and realize high-quality development.

Secondly, financing constraints play an important role in limiting the high quality development of MNEs. Generally speaking, financing constraints refer to the high cost of exogenous financing caused by market imperfections, which prevents enterprises from obtaining sufficient financial support for their investment opportunities (Fazzari et al., 1987; Ren & Lv, 2014). At present, MNEs need to face two domestic and foreign markets, the continuous demand for funds has generally increased, and they are also facing three “mountains”, namely the iceberg of the market, the high mountain of financing, and the volcano of transformation, and the ability to obtain funds has become an important factor influencing the high-quality development of MNEs. On the one hand, compared with the domestic market, MNEs often need more funds and longer terms to invest in the international market, which puts forward higher requirements for the financing ability of enterprises (Luo & Zhang, 2017). On the other hand, the inability of external investors to fully access information about the international market has led to a more serious information asymmetry problem, which may lead to a higher risk premium and a significant increase in the external financing cost of MNEs. Therefore, if MNEs cannot show their proper market value and the risk is higher in the international market, the more difficult it may be for the enterprises to obtain financial support, which in turn affects the sustainable development of the enterprises.

Finally, based on the high-ranking ladder theory, the characteristics of the executive team affect the strategic decisions of the enterprise, which in turn affects the behavior of the enterprise (Peng & Chen, 2024). For MNEs, executives with overseas experience have a significant impact on the high-quality development of the firm (Hambrick & Mason, 1984). On the one hand, from the perspective of decision-making, returnee executives tend to have a more international outlook and are good at identifying opportunities in the international market, which promotes the resource allocation efficiency of MNEs. At the same time, due to the richer international knowledge and resource reserves of returnee executives, it is conducive to improving the quality of enterprises’ internationalization decisions (Giannetti et al., 2015). On the other hand, from the perspective of technological level, the high-quality development of enterprises is often reflected in the total factor productivity of enterprises, and the overseas experience of executives can often obtain a certain amount of overseas experience, promote

the improvement of business processes and technological updating and upgrading of enterprises, further keep up with the trend of international development, and improve the internal mechanism of the organization through the acquisition of external spillover knowledge, thus promoting the total factor productivity of enterprises. This will improve the total factor productivity of the enterprise.

2.3 Environmental Level Analysis

Based on the resource dependence perspective, enterprises conduct business activities within both internal and external environments, and uncertainty in the environment reduces an organization's ability to control environmental factors, thereby increasing the risks faced by enterprises. For multinational enterprises (MNEs), the domestic market and foreign environment in which they operate will have a significant impact.

Domestic government subsidies have both positive and negative effects on the high-quality development of MNEs. On the positive side, subsidies can improve enterprise productivity, particularly R&D-related ones, that enhance innovation efficiency and promote high-quality development (Bai et al., 2011). However, government subsidies also have negative consequences for the same development of enterprises. The government's subsidy policy may encourage rent-seeking behavior among enterprises, and the extent of subsidies received by such enterprises varies depending on their relationship with the government. This effect is more prominent in regions with weak institutional constraints (Yu et al., 2010; Yan & Yu, 2017). Moreover, government subsidies may cause enterprises to receive funds that are blindly used to expand production scale rather than improving production process and efficiency. This may result in low-end enterprise development and hinder their high-quality development (Wang & Liu, 2013). Government subsidies have a multifaceted impact on the high-quality development of MNEs, and their mechanism can be disrupted by various factors.

On the other hand, MNEs' Outward Foreign Direct Investment (OFDI) activities take place within the host country environment, and host country risks will more obviously affect the firm's own development performance. Contemporary decision-making theory defines risk as the uncertainty of loss during business operations. Therefore, host country risk can lead to a reduction in MNEs' earnings. For instance, when the host government faces political volatility, internal or external conflicts, or even war, the fate of the enterprise's earnings can depend on the will of the government. There is also the possibility of direct expropriation and confiscation of overseas assets and earnings, which can result in MNEs only receiving a portion of overseas earnings. In fact, higher risks in host countries may also offer better potential for economic returns. Multinational enterprises (MNEs) can match their investment projects with countries that have a close "institutional distance". Although these countries may pose economic and financial risks, MNEs can enter markets to play to their specific comparative advantage. Furthermore, China's sustained efforts to establish multilateral trade partnerships in order to promote economic development in underdeveloped countries is a crucial aspect to consider in the facilitation of China's OFDI. In addition to evaluating the risks associated with the host nation, enterprises must also take into account other relevant factors.

3. Research Design

3.1 Research Methodology and Sample Selection

Qualitative analysis is a useful way to solve complex problems caused by multiple factors. Fuzzy set qualitative comparative analysis (fsQCA) is often used to handle problems related to changes in degree or partial affiliation. Therefore, this paper chooses fsQCA as the research method. This paper focuses on studying MNEs in 2021. MNEs are businesses that establish branches or subsidiaries globally through foreign direct investment and carry out international production and operations. The information for this research was sourced from the CSMAR and WIND databases and then sorted and analyzed manually. We excluded any data from financial industries, ST and PT sectors, companies in insolvency, missing data, and non-multinational enterprises. As a result, we have left with 1,829 observations, which consist of samples of various companies.

3.2 Variable Selection and Measurement

3.2.1 Outcome Variable

Total factor productivity (LP). Total factor productivity takes into account the combined effectiveness of multiple factors of production and is a measure of the efficiency of the combined use of various factors within an economy. Refer to Levinsohn & Petrin (2003) and Lu & Lian (2012), this paper adopts the Levinsohn-Petrin method to measure the total factor productivity of multinational enterprises, which is denoted by LP.

3.2.2 Conditional Variable

(1) R&D output (PT). Since a firm's innovation output is mostly embodied in patents, this paper measures the natural logarithm of the number of patents finally granted to the firm in the year.

(2) Digital transformation (DIG). Referring to the enterprise digital transformation indicators of Wu et al. (2021) and Peng & Jia (2023), text analysis is used to construct enterprise digital transformation indicators (DIG). Keywords are extracted from the annual reports of listed companies based on Python, and the corresponding word frequencies are extracted from five categories, including artificial intelligence technology, cloud computing technology, big data technology, blockchain technology, and digital technology application, and the word frequencies of each category are summed up and logarithmized.

(3) Size of multinational enterprises (SIZE). This study measures firm size as the natural logarithm of the firm's total assets.

(4) International Executives (GB). This paper measures the degree of internationalization of the executive team by the number of executives with overseas background in the firm, where overseas background is defined as the background of studying, working and living abroad.

(5) Financing constraints (SA). This study refers to Hadlock & Pierce (2010) to measure the degree of financing constraints faced by firms with the SA index, which is calculated as $SA=-0.737*Size+0.043*Size^2-0.04*Age$. Since the SA index is negative and the larger the absolute value indicates that the degree of financing constraints is larger, this paper treats it negatively to make it consistent with the numerical direction. It is consistent with the numerical direction.

(6) Level of marketization (MKT). Drawing on Yu et al. (2010), the marketization environment is measured using a sub-provincial marketization index.

(7) Government subsidies (SUB). This paper uses the amount of current government subsidies disclosed in the company's annual report to measure the scale of government subsidies received by the company to reflect the government's support for the development of multinational enterprises.

(8) Foreign-related risk (CRR). Referring to Peng et al., (2021), this paper chooses the most commonly used international country risk index (ICRG), including three types of risk, political risk (PR), financial risk (FR) and economic risk (ER), with higher scores indicating lower risks for the country (region). This study sets the Comprehensive Risks Abroad (CRR) indicator to measure country risks more comprehensively. Specifically, this paper sums up the political, economic and financial risk scores of a country (region) and divides them by two, i.e., CR=0.5×(PR+ER+FR) to calculate the comprehensive risk level of each country (region). Weighted according to the establishment of overseas subsidiaries of the enterprise, the following formula is used to measure the enterprise's foreign risk level.

$$CRR_{i,t} = 1 - \frac{\sum w_{i,j,t} CR_{i,j,t}}{100}$$

Where $CRR_{i,t}$ is the level of firm's consolidated overseas risk in year t;$w_{i,j,t}$ is the ratio of the number of firm i's subsidiaries in country (region) j to the total number of firm's overseas subsidiaries in year t as weights; $CR_{i,j,t}$ is the comprehensive risk score of country (region) j involved in year t of enterprise i; the larger the CRR, the higher the degree of enterprise's foreign risk. **Table 1** includes explanations of all the variables in this paper.

Table 1. Variable Definitions

Variable type	Variable name (symbol)	Measurement
outcome variable	Total factor productivity (LP)	Measured using the Levinsohn-Petrin method
	Level of R&D output (PT)	Number of patents eventually granted to the firm, in natural logarithms
	Coporate digital transformation (DIG)	Crawling word frequency counts in company annual reports using Python, taking natural logarithms
conditional variables	Level of internationalization of executives (GB)	Number of executives with overseas background
	Size of multinational enterprises (SIZE)	Natural logarithm of total enterprise assets
	Financing constraints (SA)	SA index for negative treatment
	Level of marketization (MKT)	Measuring the institutional environment using a sub-provincial marketization index
	Government subsidies (SUB)	Amount of government grants, in natural logarithms
	Foreign-related risk level (CRR)	Combined risk of the host country (region) involved in the enterprise's overseas subsidiaries

4. Empirical Analysis

4.1 Descriptive Statistics and Calibration

Table 2 presents the descriptive statistics and calibration results of the outcome variables and conditional variables. Since cross-border national enterprise development under the TOE integration framework is a relatively new topic, this paper refers to Mao & Dun (2023) and Li et al. (2023), and taking into account the conditions and characteristics of the sample data in this study, the calibration anchors (critical values) are set to 0.75, 0.50 and 0.25 quartiles, which denote the full affiliation, crossover point and full non-affiliation, respectively. At the same time, considering the case where the affiliation score is exactly 0.5, this paper also uses an adjustment by adding 0.001 to the affiliation score equal to 0.50.

Table 2. Descriptive Statistics of Variables and Calibration Results

outcome variable	**calibration threshold**			**descriptive statistics**			
	Full affiliation	intersection point	Totally unaffiliated	Mean	SD	Min	Max
LP	9.398	8.656	8.087	8.801	1.054	5.94	13.18
conditional variables	**calibration threshold**			**descriptive statistics**			
	Full affiliation	intersection point	Totally unaffiliated	Mean	SD	Min	Max
PT	4.419	3.555	2.639	3.475	1.520	0.00	8.96
DIG	2.996	1.946	0.693	2.009	1.425	0.00	6.30
SA	4.067	3.913	3.751	3.903	0.265	2.11	5.32
SIZE	23.319	22.390	21.661	22.622	1.351	19.30	28.50
GB	1	0	0	0.680	1.066	0.00	8.00
MKT	12.014	11.456	10.123	11.069	1.241	5.40	12.39
SUB	17.842	16.938	15.990	16.734	2.439	0.00	22.31
CRR	0.216	0.232	0.273	0.270	0.093	0.13	0.89

4.2 Necessity Analysis

In group analysis, necessity analysis is an important analytical step, and this study uses fsQCA 4.1 software to analyze the necessity conditions for MNEs' total factor productivity improvement. The results of the necessity analysis are presented in **Table 3**, which shows that the consistency levels of the antecedent conditions are all less than the threshold 0.9, indicating that none of these factors are necessary for MNEs to achieve high-quality development.

Table 3. Results of the Necessity Analysis

conditional variables	consistency		coverage	
	High TFP	Non-High TFP	High TFP	Non-High TFP
PT	0.664708	0.426856	0.664284	0.429602
~PT	0.429239	0.666427	0.426494	0.666851
DIG	0.584224	0.535117	0.570556	0.526296
~DIG	0.514946	0.563354	0.523789	0.577082
SIZE	0.832081	0.302542	0.831452	0.304452
~SIZE	0.303926	0.832509	0.302018	0.833136
SA	0.555956	0.539259	0.553899	0.541066
~SA	0.539362	0.555387	0.537555	0.557442
GB	0.531818	0.77373	0.509717	0.561045
~GB	0.554951	0.387246	0.575845	0.630829
MKT	0.72577	0.594107	0.727736	0.573445
~MKT	0.381137	0.492051	0.377447	0.514189
SUB	0.664708	0.375776	0.563802	0.37946
~SUB	0.429239	0.730377	0.551521	0.728424
CRR	0.673333	0.638041	0.664284	0.538031
~CRR	0.448275	0.48271	0.426494	0.59809

4.3 Grouping Analysis

Combining the existing studies and the data characteristics of this paper, the original consistency threshold is set to 0.8. In addition, usually the case frequency threshold should be adjusted according to the sample size, but generally at least 75% of the observed cases should be retained, so this paper sets the case frequency threshold to 6, and the PRI consistency threshold is set to 0.75. Also referring to the existing studies, using the intermediate solution as the main reference, combined with the simple solution, we analyze the core conditions and edge conditions of the high-quality development of multinational enterprises. The threshold of PRI consistency (proportional reduction in inconsistency) is set at 0.75. Also referring to the existing studies, we take the intermediate solution as the main reference, and combine it with the simple solution to analyze the core and edge conditions of the high-quality development of multinational enterprises.

Table 4. Results of the Group Analysis

antecedents	High-TFP of multinational enterprises		
	Configuration 1	Configuration 2	Configuration 3
Level of R&D output (PT)	●	●	●
Level of digital transformation (DIG)	●	●	●
Size of multinational enterprises (SIZE)		●	●
International Executives (GB)	●	●	●
Financing constraints (SA)		⊗	
Government subsidies (SUB)	●	●	●
Level of marketization (MKT)			●
Foreign-related risks (CRR)		●	●
consistency	0.902367	0.919	0.92407
original coverage	0.412643	0.169513	0.167596
Unique coverage	0.232547	0.0124717	0.0153632
Overall consistency		0.901273	
Overall coverage	0.459178		

Note. ●indicates that the core condition is present, ●indicates that the edge condition is present, ⊗ indicates that the core condition is missing, and a space indicates that the condition variable can be present or absent.

As seen in **Table 4**, there are three grouping paths for MNEs' total factor productivity improvement, and the overall consistency of these three groupings is 0.901, and the consistency values of each of the three grouping paths (0.902367, 0.919, and 0.92407) are all greater than the consistency threshold of 0.8, in addition to which the coverage of the overall grouping solution reaches 0.459. In configuration 1, R&D output, digitalization transformation, and government subsidies play a central driving role, and international executives play a supporting role with a unique coverage of 0.23; in configuration 2, R&D output, digital transformation, MNEs' size, and non-financing constraints play a central role, and international executives and foreign-related risks play a supporting role with a unique coverage of 0.012; in configuration 3, R&D output, digital transformation, MNEs' size, government subsidies, and marketization level play a central role, and international executives and foreign-related risks still play a supporting role, with a unique coverage of 0.015. It can be seen that there are three or more core conditions in each configuration, which indicates that the TOE framework is more suitable for analyzing MNEs' paths to total factor productivity improvement.

To further expand the analysis, firstly, at the technology level, R&D output is the core condition present in each configuration, indicating that technology R&D has an irreplaceable role for MNEs to realize high-quality development. The importance of digital transformation is also higher as a core condition in configuration 2. Secondly, at the organizational level, the scale of MNEs is a core condition in all three groupings, indicating that MNEs need to continuously expand their scale to cope with a wider market environment, not only to face the uncertainty of the domestic market, but also to face the risk of foreign markets. And international executives play a non-negligible auxiliary role in the improvement of MNEs' total factor productivity. Finally, at the environmental level, domestic government subsidies exist as a core condition in both groupings, indicating that government subsidies have a greater correlation with the high quality of MNEs, and that government subsidies play a positive role in driving them. In addition, foreign risk and marketization level are only auxiliary conditions for MNEs' development, which do not directly affect the success or failure of their high-quality development.

Based on the above analysis, MNEs can realize high-quality development mainly through the following two paths: The first is the technology-environment-driven path, which is highlighted in configuration 1. MNEs achieve technological innovation through the output of R&D patents, supplemented by the support of digital transformation, and then achieve performance improvement and scale growth to promote their own high-quality development; the second is the technology-organization-environment synergy-driven path, which is in line with the path of both configuration 2 and configuration 3. MNEs should focus on the coordinated development of technology, organization and environment, and grasp the core conditions of R&D output, enterprise scale and government subsidies to achieve high-quality development.

4.4 Robustness Tests

In order to enhance the credibility of the findings of this study, this paper conducted a robustness test by adjusting the case frequency threshold as well as the PRI consistency threshold. Specifically, the case frequency threshold was adjusted from 6 to 7, and the PRI heterogeneity threshold was adjusted from 0.75 to 0.76, thereby re-conducting the cohort analysis. The results of the robustness test are presented in **Table 5**, and upon comparison, it is found that there is a clear affiliation with the previous grouping, indicating that the findings of this paper are robust.

Table 5. Robustness Test

antecedents	High-TFP of multinational enterprises		
	Configuration 1	Configuration 2	Configuration 3
Level of R&D output (PT)	●	●	
Level of digital transformation (DIG)	●		●
Size of multinational enterprises (SIZE)	●	●	●
International Executives (GB)	●		●
Financing constraints (SA)	⊗	⊗	
Government subsidies (SUB)		●	●
Level of marketization (MKT)			
Foreign-related risks (CRR)		●	●
consistency	0.907326	0.903806	0.904782
original coverage	0.260802	0.237789	0.241643
Unique coverage	0.0127306	0.00716	0.0124717
Overall consistency		0.902648	
Overall coverage		0.450421	

5. Conclusions and Implications

In the era of economic globalization, global resource flows and strategic cooperation have changed the traditional business logic, and the total factor productivity improvement of MNEs is in line with today's economic trends and real needs. This study analyzes the driving paths of MNEs' total factor productivity improvement through fsQCA and comes to the following conclusions: On the one hand, MNEs can achieve growth and development through technology-environment driving paths, where technology is mainly reflected in the output of patents and environmental factors are mainly reflected in government subsidies. On the other hand, MNEs can also achieve growth through the technology-organization-environment synergistic driving path. This path is a rational interpretation of the TOE framework and a realistic way to comprehensively enhance the development capability of enterprises.

On the one hand, MNEs should strengthen their innovation capability, and the core driver of total factor productivity is technological innovation. MNEs need to build international competitive advantages with innovation capability to better control both domestic and foreign markets and realize long-term

development. Under the trend of continuous development of digital economy, enterprises should follow the trend and realize successful digital transformation to improve their production process, management tools and productivity improvement. At the organizational level, MNEs should pay attention to the importance of international management experience and strengthen the introduction of returnee executives to help them identify international market opportunities and cope with international market problems. At the same time, MNEs have to face a broader and more complex market environment, which requires them to continuously expand the scale of their assets and improve their ability to withstand risks in order to cope with the uncertainties of domestic and foreign markets. At the environmental level, MNEs should make reasonable use of government subsidies, not become politically dependent, and use the funding received to achieve the goal of total factor productivity improvement. MNEs' foreign-related risks must be under their own control, and a certain risky environment is also accompanied by corresponding benefits. MNEs must seize the opportunity to realize development, but also maintain a good attitude toward risk. On the other hand, for the government, relevant government departments must continue to create a good business environment, formulate policies and measures conducive to improving enterprises' total factor productivity, and provide enterprises with better institutional safeguards and policy support, such as government subsidies to ease enterprises' financing difficulties, etc. In addition, relevant government departments should make every effort to improve the business environment and improve the total factor productivity of enterprises. In addition, all relevant government departments should do their best to coordinate all domestic and foreign market resources, maintain an open and mutually beneficial attitude to encourage MNEs to go out better, and at the same time encourage MNEs to better promote the high-quality development of China's economy.

As this paper is an exploratory study, there are inevitably some limitations. This paper explains the path of total factor productivity improvement of MNEs through the TOE framework, and does not comprehensively cover other dimensions. Second, the variables in the research design of this paper cannot be precisely categorized into organizational, technological, and environmental dimensions. These details need to be further explored in subsequent studies.

References

Bai, J. H. (2011). Is government R&D funding effective in China? Empirical evidence from large and medium-sized industrial enterprises. *Economics (Quarterly)*, (04), 1375-1400.

Du, Y. Z., & Jia, L. D. (2017). Group perspective and Qualitative Comparative Analysis (QCA): A new path for management research. *Management World*, (06), 155-167.

Fazzari, S., Hubbard, R. G., & Petersen, B. C. (1987). *Financing constraints and corporate investment*. https://doi.org/10.3386/w2387

Giannetti, M., Liao, G., & Yu, X. (2015). The brain gain of corporate boards: Evidence from China. *The Journal of Finance*, *70*(4), 1629-1682. https://doi.org/10.1111/jofi.12198

Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *The review of financial studies*, *23*(5), 1909-1940. https://doi.org/10.1093/rfs/hhq009

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of management review*, *9*(2), 193-206. https://doi.org/10.2307/258434

Huang, B., Li, H. T., Liu, J. Q., & Lei, J. H. (2023). Digital technology innovation and high-quality development of Chinese firms—Evidence from firms' digital patents. *Economic Research*, (03), 97-115.

Kai, L. L., Zhang, J. J., & Xia, F. (2023). Does digital technology innovation work better for industrial upgrading? An empirical analysis of listed Chinese manufacturing firms. *Applied Economics Letters*, *30*(18), 2504-2509. https://doi.org/10.1080/13504851.2022.2098238

Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *The review of economic studies*, *70*(2), 317-341. https://doi.org/10.1111/1467-937X.00246

Li, D. Y., Liu, X. L., Liu, L. et al. (2023). Multi-grouping paths for high-quality development of meta-universe firms—Based on the TOE framework. *Foreign Economics and Management*, (07), 3-17.

Li, N., Wang, X., Wang, Z., & Luan, X. (2022). The impact of digital transformation on corporate total factor productivity. *Front. psychol.*, *13*, 1071986. https://doi.org/10.3389/fpsyg.2022.1071986

Lu, X. D., & Lian, Y. J. (2012). Total factor productivity estimation of Chinese industrial enterprises: 1999-2007. *Economics (Quarterly)*, (02), 541-558.

Mao, J. Q., & Dun, S. (2023). Driving Paths for High-Quality Development of "Specialized, Specialized and New" SMEs: A Qualitative Comparative Analysis Based on TOE Framework. *Fudan Journal (Social Science Edition)*, (01), 150-160.

Peng, C., & Chen, Y. (2024). Informal board hierarchy and corporate ESG performance. *Corporate Social Responsibility and Environmental Management*, 1-13. https://doi.org/10.1002/csr.2834

Peng, C., & Jia, X. (2023). Influence of top management team faultlines on corporate digitalization. *Journal of Enterprise Information Management*. https://doi.org/10.1108/JEIM-09-2022-0302

Peng, C., Jiang, H., & Zhang, T. (2022). Does the national risk of overseas investment affect the strategic innovation behavior of enterprises? Evidence from China. *Managerial and Decision Economics*, *43*(5), 1548-1565. https://doi.org/10.1002/mde.3473

Ramachandran, J., & Pant, A. (2010). The liabilities of origin: An emerging economy perspective on the costs of doing business abroad. In D. Timothy, P. Torben, & T. Laszlo (Eds.), *The Past, Present and Future of International Business & Management (Advances in International Management* (Vol. 23, pp. 231-265), Emerald Group Publishing Limited, Bingley. https://doi.org/10.1108/S1571-5027(2010)00000230017

Ren, Y. M., & Lv, B. (2014). Financing Constraints, Government Subsidies and Total Factor Productivity: An Empirical Study from Chinese Equipment Manufacturing Enterprises. *Management World*, *11*, 10-23.

Shao, C. L. (2021). Regional business environment and high-quality development of private enterprises: Empirical evidence from China. *Economic and Management Research*, (09), 42-61.

Wang, Y., & Liu, Z. B. (2013). Subsidy approach and balanced development: Growth of strategic emerging industries and adjustment of traditional industries. *China Industrial Economics*, (08), 57-69.

Wu, F., Hu, H. Z., Lin, H. Y. et al. (2011). A new species of the genus Pseudopodus (Hymenoptera, Braconidae) from China. Corporate digital transformation and capital market performance—Empirical evidence from stock liquidity. *Management World*, (07), 130-144, 10.

Yan, Z. J., & Yu, Z. P. (2017). Government Subsidies and Firms' Total Factor Productivity—A Comparative Analysis Based on Emerging Industries and Traditional Manufacturing Industries. *Industrial Economics Research*, (1), 1-13.

Yu, H. H., Xu, L. B., & Chen, B. S. (2010). Ultimate controlling shareholder control and free cash flow overinvestment. *Economic Research*, (08), 103-114.

Yu, M. G., Hui, Y. F., & Pan, H. B. (2010). Political connections, rent-seeking and the effectiveness of local government fiscal subsidies. *Economic Research*, (03), 65-77.

Zhang, H., & Dong, S. (2023). Digital transformation and firms' total factor productivity: The role of internal control quality. *Finance Research Letters*, *57*, 104231. https://doi.org/10.1016/j.frl.2023.104231

Zheng, F., Li, T., & Liu, H. (2011). A new species of the genus Pseudococcus (Coleoptera, Staphylinidae) from China. Research on the Impact of Government Subsidies on the High Quality Development of Enterprises. *Economic Survey*, (05), 140-150.

Zhou, Z., Lei, L., & Kuan, Z. (2022). Business Environment and High Quality Development of Enterprises—A Mechanism Analysis Based on Corporate Governance Perspective. *Finance Research*, (05), 111-129.

Zhu, C., Wu, M., & Xiong, J. (2022). Experienced CEO and Factor Productivity Improvement: Re-Examination of Experience Trap. *Complexity*, *2022*(01), 1-13. https://doi.org/10.1155/2022/1014224