




The Model for the Development of Cost-Effectiveness Capabilities in Iran's Pharmaceutical Industry

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Abstract

This study, conducted in Iran's pharmaceutical industry, investigates the development of cost-effectiveness capabilities, a vital component of operational capabilities. It presents five essential hypotheses contributing to these capabilities. Capable human resources, especially in crisis management related to environmental obstacles like international sanctions, foster creativity and cost-effectiveness. Hardware and software infrastructure supports international collaborations, enhancing overall quality. Documentation, organizational knowledge, and capacity enhancement further contribute to cost-effectiveness capabilities. Effective operations management, standardized routines, and the emergence of new routines stimulate creativity and cost reduction. This research offers insights into the formation of cost-effectiveness capabilities and underscores the significance of internal resources, collaborations, and efficient management practices. While focused on Iran's pharmaceutical sector, the proposed model can serve as a valuable framework for studying influencing factors on cost-effectiveness capabilities in other industries and countries.

Keywords: Competitive advantages, Operations capability, Competencies, Quality capability, Multiple case studies.

1 | Introduction

The nature of strategy has evolved from being rooted in the essence of products and market structures to a focus on business processes. It has shifted from the question of "where a company should compete" to "how a company should compete." This transformation reflects significant advancements in the field of strategic management and a shift in emphasis from market selection and positioning to the optimization of internal operations, resource efficiency, the utilization of modern technologies, and the development of business processes. Consequently, strategy is now conceived as a more comprehensive concept, enabling companies to enhance their operational practices and engage in market competition with modern and efficient approaches. This redefinition of strategy underscores significant progress in strategic management and a contemporary perspective on businesses [1]. The objective of identifying and developing non-imitable or difficult-to-replicate competencies is to assist a company in maintaining its competitive position among its rivals. These competencies refer to operational capabilities within organizations that are identified based on



Computational Algorithms and Numerical Dimensions.

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sustainable competitive advantages for the organization. In other words, these are the distinctive operational abilities that set a company apart and enable it to withstand competition effectively [2]. Company processes, in order to attain a sustainable competitive advantage, must be valuable, rare, inimitable, and non-substitutable. This reflects a Resource-Based View (RBV) perspective [3]–[5]. In addition to resources, the set of decisions made at various organizational levels for the execution of processes can also contribute to the creation of operational capabilities. This perspective aligns with the organizational routines-based view [6]. Organizational routines emphasize standardized processes and the extraction of rules from these processes. In essence, capabilities are embedded within the heart of processes, routines, and organizational resources [7]. On the other hand, sometimes environmental conditions that have arisen within an organization, as well as the decisions or consequences resulting from these conditions, can lead to the creation of an operational capability within the organization [8]. Therefore, operational capabilities are often derived from internal factors, resources, and factors within the organization [9], [10] and, at times, influenced by external conditions [11]. The pharmaceutical industry is constantly undergoing transformation and evolution. The opportunities and threats within this industry encompass factors such as wars, various diseases, and technological advancements in the discovery of different drug molecules, resulting in the creation of a dynamic environment within the industry. Furthermore, the annual financial turnover of over a trillion dollars has transformed this industry into a highly competitive one, particularly in the areas of new drug production, quality-based products, and high efficiency [12].

Additionally, various influential factors within the industry include patients and physicians as customers, regulatory bodies, universities and research centers, and insurance organizations, each pursuing their motivations and interests within the industry. These factors have led to the development of unique strategies in the pharmaceutical industry, distinct from those of other sectors [9], [13]–[16].

Research in the field of operational capabilities has predominantly focused on examining the relationships between operational capabilities and other organizational capabilities [17]–[23]. This has been achieved through the distribution of questionnaires and the analysis of structural equations or regression, as well as through cumulative or reciprocal examinations of one or more operational capabilities [24], [25]. Research has also delved into exploring the relationships between operational capabilities and production strategies [26], [27]. However, there has been relatively less focus on research that aims to establish a systematic and theory-driven framework in this field.

The central question pertains to the attainment of operational capabilities and the impact of decisions and environmental factors on these capabilities, representing a significant gap in current research. Recent efforts have been made to develop a model for achieving dynamic capabilities through the creation of a theory [28], [29], but these studies have also primarily examined the historical context of companies as a key factor in the development of dynamic capabilities. Given that operational capabilities play a fundamental role in a company's performance and are considered one of the primary sources of sustainable competitive advantage according to the resource-based theory [2], the examination and identification of key factors in the development of operational capabilities are crucial.

Hence, considering one of the most vital aspects of operational capability, the cost-effectiveness capability, research in this area has predominantly focused on how this capability affects organizational performance [25], [30], [31]. Therefore, this research aims to present a framework for the formation of the cost-effectiveness capability through a multiple case study approach in several pharmaceutical companies in Iran.

The continuation of this research is categorized as follows. first, a review of the theoretical foundations of the research is provided. Subsequently, a review of previous studies on the patterns of achieving operational capabilities is discussed. The research method and the characteristics of the examined companies are then outlined. Following this, the results obtained from the multiple case studies are presented, and finally, a discussion, conclusion, and recommendations for future research are examined.

2 | Theoretical Foundations and Research Background

There are multiple definitions of operational capabilities in the literature of operations strategy and operations management, both in past research and recent studies. Sometimes, they are defined and categorized based on organizational processes, while other times, they are categorized based on resource-centric perspectives. Recent research has also introduced classifications based on cumulative and conflict-based models of operational strategy and dynamic capability models. In summary, different perspectives on operational capabilities are described as follows.

2.1 | Process-Centric Perspective

Organizational processes are seen as procedures that facilitate the execution of large or complex tasks by individuals. Organizational processes comprise a coordinated set of activities and assigned individuals aimed at achieving specific predefined goals. Organizational processes are tools for achieving coordination across organizational levels. In this view, operational capabilities are defined as a set of organizational processes that, by utilizing internal resources, lead to the creation of sustainable competitive advantages within an organization [32]–[34].

2.2 | Resource-Centric Perspective

The resource-centric perspective considers an organization's competitive position to be contingent on essential and unique resources and capabilities of the organization. In other words, it posits that companies conceptualize resources and capabilities that are distributed throughout the organization in a non-cohesive manner. According to this perspective, the resource-centric view describes resources and capabilities that can be transformed into a competitive advantage for a company [35].

2.3 | Competitive Strategy or Accumulative Strategy Perspective

The conflict or cumulative strategy model emphasizes the improvement of one capability over weakening another and has been analyzed extensively in various articles. Researchers have shown significant interest in this model, particularly the RBV framework, which emphasizes the simultaneous enhancement of the performance of all capabilities [36]. The RBV has received significant attention, proposing a model where the focus is on simultaneously enhancing the overall performance of all capabilities [37]–[39].

2.4 | Dynamic Capability Perspective

Dynamic capabilities refer to high-level processes and resources that are used within an organization for changing and adjusting operational capabilities. These are used to create new capabilities through modification of existing operational capabilities or the development of new processes and operational capabilities. This perspective describes the rate of change of normal company capabilities. They allow organizations to develop new capabilities by modifying existing operational capabilities or creating new operational processes and capabilities [12].

2.5 | Operational Capability Perspective

Swink and Hagerty [40] introduce production capabilities as operational capabilities related to a company's internal processes, which are unique and not easily transferable. Hayes and Wheelwright [41] identify them as the primary dimensions for competitiveness within an organization [42]. These four key dimensions of operational capability in production include quality, cost, flexibility, and delivery time.

2.6 | Cost-Effectiveness Capability

Operational capabilities defined in the literature and labeled as "cost-effectiveness" primarily encompass the following aspects:

- I. The ability to reduce manufacturing costs or the overall unit price of a product [43], [44].
- II. The capability to reduce prices and increase profits in a competitive market [45].
- III. The ability to achieve and maintain lower inventory levels [46].
- IV. It may also refer to the ability to increase efficiency and utilize the maximum capacity of a defined factory [47].

Therefore, in this article, "cost reducibility capability" refers to both aspects, including production costs and efficiency, as a competitive market factor. In all conducted case studies, evidence of each of these dimensions of cost reducibility capability has been discovered in the research findings. Research in the field of presenting models related to the formation of capabilities in the literature has attracted the attention of several researchers. These studies involve investigating how organizational capabilities are formed based on the foundation on which these capabilities are defined:

- I. Montealegre [48] presents a self-developing process model based on the definition of operational strategy. According to this model, operational capabilities are derived from the strategic pattern. This model provides a way to map the periods of strategy with the time of organizational formation and progress and introduces some of the primary influential resources of the organization in forming organizational capabilities. This model is implementable in organizations that have developed based on strategic business models from the beginning.
- II. Kaplan [49] provides an acquisition capability model based on business development models. It examines all possible business capability scenarios under various patterns in each business situation. The weakness of this model is its emphasis on organizational capabilities at a high level, neglecting many internal organizational processes and routines.
- III. Leung and Lee [37] present the operational capability model with an emphasis on priority production capabilities based on the cumulative strategy and the cone of experience model. The drawback of this model is the identification of capabilities based on the product life cycle framework. Therefore, with the end of the product life, capabilities also diminish, while operational capabilities need to be identified separately from the product.
- IV. Pan et al. [50] present a modular capability development model based on knowledge management literature. Their work method determines paths for creating capabilities through studying routines created from organizational knowledge. The drawback of this model is that its implementation is limited to knowledge-based organizations.
- V. present a capabilities investigation model based on small-scale organizational routines. This model identifies the roots of capabilities in individual interpretations of routines.

Therefore, as evident in previous research, most of the examined frameworks have focused on dynamic capabilities or organizational capabilities in general and have mainly described how these capabilities are created using common models such as business strategy. In this article, with an emphasis on operational capabilities, particularly cost-effectiveness capabilities, after investigating and discovering signs of the existence of these capabilities within an organization through a case study method, a multidimensional study based on theory discovery has been presented to extract a pattern for achieving these capabilities in the pharmaceutical industry of the country.

3 | Research Method

The main research design is based on an exploratory method due to the absence of a coherent theory in this field, with the primary focus being on answering the "how" questions to discover the features of cost-effectiveness capabilities as an operational capability and how they are formed in pharmaceutical companies. Therefore, the research strategy for such an inquiry is based on a case study approach. Since

the research method is based on discovering one or more patterns based on case studies, the statistical population in this study consists of pharmaceutical companies in Iran.

3.1 | Case Selection and Data Collection Method

This research is primarily focused on publicly traded pharmaceutical companies with strong financial backing from major holding companies in Iran. These companies, due to the support they receive from top-level organizations, can invest in projects and develop their structures, making it possible for researchers to investigate the formation of cost-effectiveness capabilities within them. Prior to conducting the main research, as recommended by, five experts in the field of pharmaceutical management, including two management consultants and experts in consulting for award-winning pharmaceutical companies, and three university professors who are members of the board of directors of two major pharmaceutical holdings, were interviewed. The results of these interviews were used to develop the initial framework and select suitable companies for the research.

The method of selecting experts follows the snowball sampling technique. Semi-structured face-to-face interviews were conducted with the four pharmaceutical experts during the preliminary study, as well as with representatives from all three selected companies. Over five months, 37 sessions were held, totaling 78 hours of recorded interviews. The interviews were retrospective and focused on the respondents' general experiences related to different organizational levels. The lead researcher's role as the head of one of the operational departments in Company A provided additional opportunities to gather information on the discovery of indicators and the formation of cost-effectiveness capabilities. Any observations made during this time were documented, and any secondary documents, correspondence, or records were collected to follow up on specific findings and enhance the research structure through triangulation. *Table 1* provides details of the case studies and the sampling method.

Table 1. Case study specifications and sampling method.

Research Stage	Code	Sample Selection Method	Number of Human Resources	Number of Interviews (Number of Sessions)	Hours of Conducted Interviews	Documents and Records Methods of Collecting					
						Secondary Data	Longitudinal Study	Site Visit Notetaking	Observational Engagement	Review of Published Websites and Reports	Documents Provided by the Company During the Visit
Preliminary Study		Snowball		(9)5	16	* ¹					
Case Studies	A	Multi-criteria Line diversity Number of human resources	900	(10)4	20	*	*	*	*	*	
	B	Accessibility	800	(6)5	20	*	*		*	*	
	C	Expert recommendations	850	(12)7	22	*	*		*	*	

¹ The number of two interviews from the raw data of interviews conducted in a

similar study by one of the Ph.D. students has been used.

3.2 | Data Sufficiency

Data sufficiency is a critical consideration in case study research. It refers to achieving the required threshold of interviews or collected documents in the execution phase of the research. Given the concurrent implementation of interviews in this study, data sufficiency was assessed for each case study and interview. The results of the data sufficiency assessment for the first case study (Company A) are presented in *Table 2*.

Table 2. Matrix of comparing initial interview codes for the first case study.

	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Total Number of Initial Codes
Interview 1	38	-	-	-	-	38
Interview 2	5	29	-	-	-	34
Interview 3	7	8	16	-	-	31
Interview 4	10	5	7	-	-	22
Interview 5	5	9	9	-	-	23

Table 2 displays the matrix for comparing the initial interview codes for the first case study (Company A). The numbers on the diagonal of the matrix represent the count of unique codes in each interview. The code comparisons were made in the order in which the interviews were conducted. As evident, interviews four and five did not contribute any unique codes to the research.

3.3 | Research Reliability and Validity

Three phases of research design were carried out based on in this study. Initially, a chain of documents was examined. These documents include theoretical frameworks developed in the field of operational capabilities and data collected from several case studies. This led to the structural validation of the study design. To minimize the potential bias in interpretation, the collected data were presented based on the obtained sources whenever possible. Additionally, direct quotations from interviewees in the study were included, which increased the study's internal validity. To ensure the research's external validity, three case studies were conducted, and logical and repeatable results were analyzed in each of them.

3.4 | Method of Analyzing Research Findings

To identify cost-effectiveness capability indicators, the study utilized content analysis as the result of the interviews conducted in case studies. After each interview, the text was transcribed, and the data were initially coded according to the initial framework classification developed for the study [51]. The coding process was repeated several times by the researcher and a doctoral student collaborator, during which emerging subcategories within the framework were established and completed. This process allowed the researcher to examine the framework in detail concerning the relevant content for each category of factors for each company under investigation. According to the recommended method Miles et al. [51], the results of this case study analysis were entered into extensive tables in the NVivo software. An example of the initial analysis of an interview is shown in *Table 3*. Subsequently, new tables with similar themes for all the studied companies were created to perform a multi-case analysis. The initial sources of the identified themes for the new tables were preserved. These analytical tables facilitated a comparison of the discovered data across all the studied companies, extracting similarities and differences in each factor for each company and preventing premature conclusions during the case study's execution [52]. Based on this, for each sentence or phrase recorded in the interviews or field notes, cost-effectiveness indicators were initially identified. Then, sub-concepts were created based on the reasons behind them. Sub-concepts with the highest frequency were selected to determine separate concepts, and one concept was assigned to one or more sub concepts based on their similar nature in all three case studies. The number of occurrences for each sub concept in each company is displayed in *Table 3*. Finally, based on the concepts generated in all the case studies, the main research themes were formulated.

Table 3. An example of initial coding for a section of an interview conducted.

Code ID	Key Point	Initial Coding	Sub Concept
A1-1	Multiple programs to address KAPAs affected by foreign inspections.	Audits conducted by countries or companies interested in collaboration in upgrading GMP.	Continuous inspections by foreign companies or health ministry officials from countries seeking drug imports from Iran and discrepancy resolution plans.
A1-2	Maintaining high-quality levels in the design phase due to foreign inspections of drug companies.	Audits conducted by countries or companies interested in collaboration in upgrading GMP.	Continuous inspections by foreign companies or health ministry officials from countries seeking drug imports from Iran and discrepancy resolution plans.
A1-3	Validating computer systems as the second pharmaceutical factory in Iran.	Validation of computer systems.	Mechanized quality management and assurance systems.
A1-4	Utilizing experienced pharmaceutical managers in middle management.	Highly experienced managers.	Adherence to company strategies and decision stability.
A1-5	Good fundamental quality conditions of the company.	Strong GMP basics and robust quality infrastructure.	Mechanized quality management and assurance systems.
A1-6	Maintaining quality at a European level.	Improving the company's quality at a European level.	Mechanized quality management and assurance systems.
A1-7	The role of top management in employee scholarships.	Top management's focus on employee skill development.	Attention from the board of directors to development and quality work.
A1-8	Patient and physician satisfaction with the company's drugs.	Patient and physician satisfaction with the factory's products.	Elevating the level of production and factory quality.

4 | Findings

In order to examine the research findings, first, a general overview of the studied companies is provided in *Table 4*. Then, the extracted concepts from the studies are presented in *Table 5*. Subsequently, an investigation into the case study evidence is conducted.

Table 4. An overview of the companies studied.

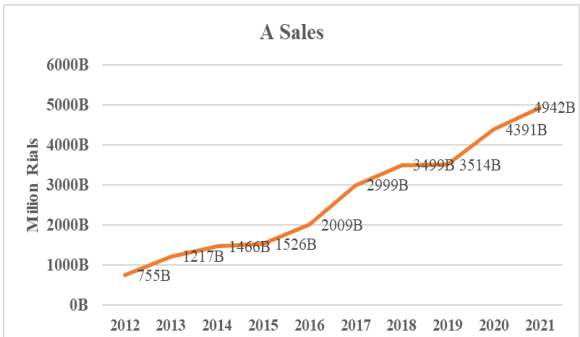
Code	Sales Trends Based on Food and Drug Statistics	Historical Data and Key Achievements Summary
A	 <p>A Sales</p>	<p>Established in 1993, this pharmaceutical company operates in four production divisions, producing a range of drugs, including cardiovascular, diabetes, antibiotics, and addiction treatment medications. With a foundation of experienced professionals and collaborations with foreign pharmaceutical companies, the company has earned recognition as a top pharmaceutical exporter to Middle Eastern and Eastern European countries, thanks to substantial investments in quality infrastructure.</p>

Table 4. Continued.



Code	Sales Trends Based on Food and Drug Statistics	Historical Data and Key Achievements Summary
B		<p>B-Daroo Company, established as a special joint-stock company in 1976, later became a public joint-stock company in 1996 and was listed on the Tehran Stock Exchange. It operates as a subsidiary of Pharmaceutical Group C and Company B Investment, with its headquarters in Tehran and a factory located in Qazvin. Over the years, the company has shown remarkable growth and development, obtaining quality certificates, including GMP, from the Iranian Ministry of Health for various sectors, reflecting its commitment to quality.</p>
C		<p>C Pharmaceuticals, a major Iranian pharmaceutical manufacturer established in 1964, has been a key player in advancing the country's pharmaceutical industry for over five decades. With a workforce of over 450 experienced professionals and operating on a vast 9800-square-meter site, the company is committed to meeting the nation's pharmaceutical needs with high-quality products that conform to international standards. It holds the top position in the production of hormone medications in the pharmaceutical industry.</p>

In Table 5, based on thematic analysis, the main research themes have been identified. For each theme and concept that had the most significant impact on a company, some points from the pre-study, evidence from interviews with that company, or information from documents reviewed during the analysis are presented.

Table 5. Final results from thematic analysis of research findings.

The Main Concepts	Concepts	Sub Concepts	The Number of Repetitions in Each Case Study			
			A	B	C	
Internal resources	Human resources	Employee creativity in changing methods and processes and repurposing machinery	10	-	8	
		Senior management	8	10	7	
		Strong relationships between senior management and foreign companies	6	10	7	
	Company history	Negotiating power in low-cost resource procurement	-	-	8	
		Commitment to company strategies and decision stability	-	-	10	
		Strong communications with banks for liquidity provision	-	-	10	
		Selection of senior managers from within the organization rather than external hires	-	-	10	
		Company history's impact on increasing contract production with domestic and foreign companies	-	-	8	
		Infrastructure and facilities	Spacious, well-equipped facilities for production line expansion	10	-	9
			Mechanized energy management systems	-	5	-
Strong financial infrastructure and strategies	-		-	10		

Table 5. Continued.

The Main Concepts	Concepts	Sub Concepts	The Number of Repetitions in Each Case Study		
			A	B	C
Operations management	Capacity and material supply	Capacity increase and production line expansion	8	-	10
		Capacity increase through contract production with other companies	-	12	11
		Maintenance and repair management	-	5	-
		Material procurement (sourcing and low-cost resource replacement)	-	7	10
	Processes and workflows	Integrated management systems (e.g., idea generation and creative problem-solving)	5	-	-
		Process improvement	-	6	-
		Quality excellence awards (idea and creative problem-solving task force)	-	-	5
		Product selection task force (product selection and production of top-selling products)	-	-	5
	Marketing and product portfolio	Replacement of products with high liquidity potential in the market		8	
		Use of the company's brand name in some medications instead of generic names			10
International collaborations	Collaboration methods	Procurement of raw materials and establishing production lines through foreign companies			
		Contract production with foreign companies	-	10	10
	Stringent strategies	Quality risk management and its impact on the increase of each product category and production cycle reduction		5	
	Negative effects of collaboration	Production line dependence on raw materials from foreign companies developing the line	10		
Environment	Inhibiting barriers	Reduced international collaborations for political and environmental reasons (e.g., inability to procure some production necessities from foreign companies)	10	10	
		Long-term repayment of debts to insurance and government hospitals	10	10	10
	Enablers	Redesign and optimization of production equipment due to the inability to source components from outside the country	6	5	
		The role of banks in resolving liquidity crises resulting from credit sales of medications to the government		5	8

4.1 | Internal Resources

The most significant identified factors of internal resources include senior management, human resources, and infrastructure and facilities. The examination of these factors in the studied companies is as follows:

- I. In terms of senior management, all three companies have expedited the process of obtaining new product licenses through their connections with regulatory authorities in the pharmaceutical industry.
- II. Company B has established relationships with managers of other pharmaceutical companies and banks, facilitating contract manufacturing and adjusting bank repayments, thus streamlining the loan process.
- III. The presence of influential senior managers in both Companies B and A has increased collaboration between these two entities.
- IV. The presence of well-trained human resources and a suggestion system in Company A has fostered creativity, increasing the skills and efficiency of its workforce.
- V. Company J has implemented a multi-skilling program to optimize human resources, enabling employees to excel in diverse production, quality, and technical responsibilities.

- VI. Both Companies A and C have predicted expansion spaces with comprehensive facilities in their initial development plans, ensuring sufficient infrastructure for future growth.
- VII. Company B, while having a longer history compared to the other two companies, has a more limited expansion space. Nevertheless, efforts have been made to optimize conditions for development within its existing facilities.

4.2 | Operations Management

Diversity in operational management decisions within each of the studied companies has led to varying and sometimes similar approaches. The most important elements of these approaches include capacity, material supply, and processes and workflows, which are elaborated below:

- I. Implementation of a comprehensive maintenance and repair management system in Company B has led to improved efficiency of production machinery, waste reduction, and enhanced product quality, particularly in the final packaging stage.
- II. Company C has successfully improved its relationships with material suppliers, allowing them to find multiple high-quality and cost-effective sources for each of its main active pharmaceutical ingredients. As one of Company C's managers explains, "We created a comprehensive database of various pharmaceutical material sources, which enabled us to acquire high-quality and reasonably priced resources. As a result, this has increased the efficiency of some of our products, as indicated in patient and physician satisfaction reports."
- III. Operational workflows created or enhanced over the lifespan of the three companies have played a significant role in establishing operational capabilities. All three companies have introduced various workflows at different organizational levels following their participation in organizational excellence awards, obtaining certificates like integrated management, and establishing creative task forces. One of the most crucial of these workflows is the suggestion system, through which staff members are rewarded for innovative ideas. This suggestion system ultimately fosters increased creativity among human resources and leads to the implementation of essential suggestions within the factory, as mentioned in relation to other factors.

4.3 | International Collaborations

All three companies, given the government's ownership stake in their shares, had more straightforward opportunities for collaboration with major global pharmaceutical companies. As previously mentioned in the internal resources section, the connections between senior managers and some managers of these global pharmaceutical companies, established through participation in international conferences or exhibitions, led to various collaborations. These collaborations involved the supply of pharmaceutical raw materials, certain packaging items, the establishment or expansion of production lines, and contractual production agreements with the brands of these companies.

These collaborations have been most effective in improving the quality standards of the companies. In some cases, they also resulted in cost reductions. For example, the strict strategies of foreign companies towards Company B, which involved creating a comprehensive quality risk management system at the factory level, led to optimizing more cost-effective production methods with shorter timelines while maintaining product quality. As one of Company B's managers expressed, "our production capacity used to be very low, but with certain changes in our manufacturing processes, this capacity tripled. However, the quality management system established due to our contractual production with a foreign company allowed us to accept this increased capacity risk easily."

4.4 | Environment

In Companies A and C, due to unforeseen political conditions and a lack of necessary preparations to find solutions to mitigate the effects of disruptions caused by these circumstances, they faced significant challenges, such as prolonged production line halts due to the unavailability of required parts, resulting

from reduced or discontinued international collaborations. However, later, opportunities arose through the creativity of personnel to overcome these issues. Company A, in particular, benefited from established procedures regarding suggestion systems that stimulated employee creativity during these adverse conditions and enabled the repair and reactivation of some equipment within the factory.

5 | Discussion

Based on the evidence from the case studies and thematic analysis conducted, several research hypotheses have been formulated and are presented as follows. In the subsequent proposed framework for achieving cost-effectiveness capability in the three studied companies, these assumptions will be elucidated.

Hypothesis 1. Senior management and internal and external organizational support in creating international collaborations and, consequently, increasing the organization's quality level and reducing the adverse effects of environmental barriers.

Strong communication between senior management and government organizations, as well as other companies, such as expediting licenses (all three companies) and obtaining loans (Company C), mitigated liquidity crises caused by delays in payments by insurance organizations (environmental barriers for all four companies). Senior management plays a crucial role in cost management and pursuing cost reduction strategies within the organization. Adherence to strategies and management stability is one of the fundamental roles of the board in organizational decision-making [53]. The role of strong management communications in attracting international collaborations is one of the internal resources with resource-based theory characteristics [54].

Hypothesis 2. Capable human resources and entrepreneurship role in reducing crises arising from environmental barriers such as international sanctions, leading to creativity and operational capability development.

Having well-trained human resources and a suggestion system in Company A has fostered creativity in the human resources in all three companies, resulting in increased skills and efficiency. Human resources are considered one of the internal resources with resource-based theory [55], [56]. Empowering employees play a crucial role in sustaining organizational competitive advantages and, consequently, creating operational capabilities [57]. Human capital plays an essential role in achieving organizational capabilities [58].

Hypothesis 3. Hardware and software infrastructure in the development of international collaborations and increasing the quality level.

In the initial development plan, Companies A and C have considered additional spaces with full facilities for future expansion, which is the main driver for the managers' interest in increasing international collaborations. Decision-making at the infrastructure level, which includes facilities, technology infrastructure, and management infrastructure, is among the factors that create capabilities within organizations. Some sources consider infrastructure to be a capability-creator [59], while others see it as a capability-creating factor [60].

Hypothesis 4. International collaborations, documentation, increased organizational knowledge level, capacity building, and their essential role in developing operational capabilities.

The primary means of collaboration with prominent pharmaceutical companies worldwide is through the establishment of production lines, which have been implemented in all three companies. Some companies, such as B and C, have utilized their excess capacity during certain months of the year to allocate that capacity optimally to produce for other foreign companies. Moreover, the existence of a comprehensive management system in all three companies has led to the creation of a suggestion system. The effects of

this have been seen in enhancing employee creativity. Besides, having a level of effective collaboration in supply chains is considered to be an effective way of reducing costs and, consequently, enhancing cost-effectiveness. According to the findings of this study, contractual production for foreign companies has resulted in the creation of certain procedures. In some of these decisions, such as the implementation of a risk management system, which has been developed as a result of contractual production, the impact of reducing the production period of a product line was noticeable. The creation of such procedures naturally results from shared information by foreign companies. One of the advantages of increased collaboration mentioned in the study is the enhancement of organizational knowledge. Furthermore, the primary cause of this collaboration has been the effective communications of senior management and the history of the companies that increased their collaboration level through decisions made during participation in seminars or international exhibitions and personal contacts.

Hypothesis 5. Operational management, processes, and multiple standardized processes and their role in creativity and operational capability.

All three companies have standard procedures for sourcing the right materials at low costs and high quality, given the requirements of the efficient production of drugs GMP. Companies B and C, by having excess capacity during certain months of the year, optimally allocated this capacity for contractual production for other companies. Moreover, having an integrated management system in all three companies led to the establishment of the suggestion system, which was effective in improving employees [61]. Decision-making in operations strategy includes infrastructure elements, such as capacity, process technology, supply networks, and organization. This research, in addition to observing the two categories mentioned in the literature (capacity and materials supply, processes and procedures), considered decision-making in marketing and product portfolio as impactful in shaping cost capabilities. Furthermore, according to the RBV, processes and procedures are valuable organizational resources in developing operational capabilities [62]. Based on these assumptions, the framework for achieving operational capabilities in the studied companies is presented in *Fig. 2*.

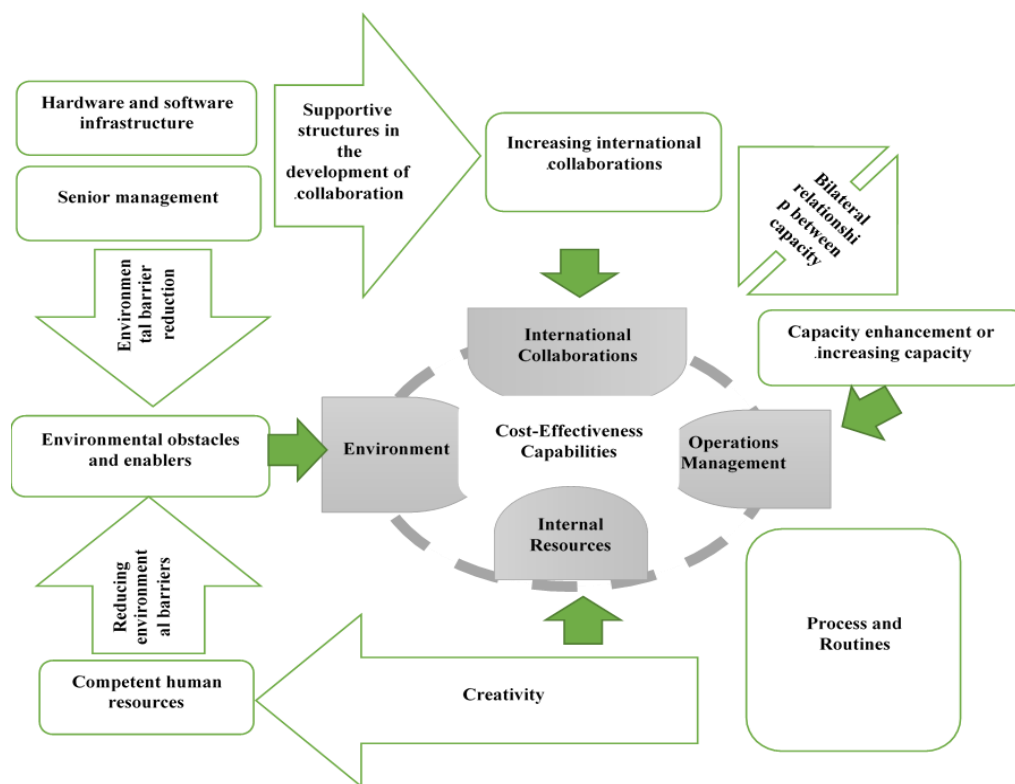


Fig. 2. Proposed framework for achieving cost-effectiveness capabilities in the studied companies.

6 | Conclusion

In this article, a multiple case study was conducted to examine how the development of cost-effectiveness capabilities is realized as one of the main dimensions of operational capabilities. Since the formation of capabilities can vary depending on the country and industry type, the case studies in this article were conducted in three pharmaceutical companies in Iran. The research findings suggest five fundamental hypotheses in the development of cost-effectiveness capabilities in these companies. Capable human resources have led to role-playing in reducing crises arising from environmental obstacles, such as international sanctions, and, consequently, creativity and cost-effectiveness capability development. The presence of hardware and software infrastructure in the studied companies has led to the development of international collaborations and an increase in the company's quality level. Documentation, increased organizational knowledge, capacity enhancement, and, consequently, cost-effectiveness capability development. The existence of operations management, routines, and processes and the emergence of multiple standardized routines have led to increased creativity and cost reduction and, consequently, cost-effectiveness capability development.

The research results contribute to the development of research in the field of operational capabilities in operations management in two aspects. First, an empirical discussion about discovering the pattern of cost-effectiveness capability formation within a specific period, including the pharmaceutical industries in developing countries (Iran), has been established. In the second aspect, a model for identifying the influencing factors on cost-effectiveness capability has been presented. In comparison with previous research, this research has distinctive results, including the role of international collaborations and how internal resources affect the achievement of operational capabilities.

According to the research findings, the most important aspect for pharmaceutical companies to achieve and develop cost-effectiveness capability emphasizes internal resources. Therefore, in this regard, defining routines for increasing employees' creativity to utilize this capability, especially in challenging environmental conditions such as sanctions, is highly effective. On the other hand, the choice of top managers with a history from within the organization (managers who have previously served in other managerial positions within the organization) leads to the alignment of macro-level management decisions with the organization's strategies. Furthermore, one of the most valuable resources for a pharmaceutical plant is having physical spaces with sufficient infrastructure (mechanical facilities, etc.). These spaces facilitate the development of production lines and, as a result, improve the quality of the company.

Moreover, this research has some limitations, including the location of the study, which only pertains to Iran and its pharmaceutical industry, as it has paid special attention to cost management due to its developmental nature and severe financial constraints. Therefore, as previously mentioned, this model cannot be generalized to other countries and industries. Therefore, the suggestion from this research is to use the presented approach for studying the cost-effectiveness capability framework in other industries in Iran, such as food and beverage or printing and packaging. The second limitation is the implementation of the research only in three case studies due to the inability to access information from other companies. Future research can increase the validity of this research through further studies.

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