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Problem Solving and Budget Allocation of SMEs: Application of NCA Approach

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Abstract: In order to achieve a specific result, a firm's problem-solving activities can be thought of as a process that combines physical and cognitive actions. Its internal organization determines how information inputs are distributed among different task units and, as a result, how the cognitive workload is distributed. We tested a case study related to Iranian small and medium enterprises (SMEs). We used NCA analysis as a creative and state-of-the-art method with the help of R software to evaluate data. According to the findings, six prerequisites must be met in order to achieve a 50% level of efficient performance: innovation at a minimum of 22.7%, CSR at a minimum of 30.4%, IT investment at a minimum of 56.7%, SMM at a minimum of 38.3%, product differentiation at a minimum of 11.7%, and CRM at a minimum of 38.3%.

Keywords: problem solving; resource allocation; SMEs; NCA approach

1. Introduction

Small and medium enterprises (SMEs) play an important role in most economies around the world, particularly those in emerging and developing countries [1–3]. They are a notable driver of economic growth. The significance of SMEs is primarily attributable to the tasks that they can complete in relation to economic and other facets of public activity. SME competition is increased, and they provide most jobs, even during times of crisis, allow citizens to realize their potential, and are adaptable enough to respond to rapidly changing demand, facilitating the development of the middle class and contributing to social stability. Small and medium enterprises (SMEs) participate in exports and draw in investment while also establishing private property, creating and implementing innovations, and developing new technologies. This determines the sector's practical importance and how it will affect the socioeconomic progress of various nations and regions [4].

A fundamental management skill that helps small and medium business owners and managers run their companies by efficiently allocating resources to the achievement of organizational goals is the capacity to recognize, assess, and resolve organizational problems as they arise [5–7].

The ability of SMEs to adapt to rapidly shifting market demand, technological change, and capacity constraints related to knowledge, innovation, and creativity are among the challenges they must overcome. But for many SMEs, issues related to their small scale frequently prevent their potential from being fully realized. Lack of resources (finance, technology, skilled labor, market access, and market information) is one of these factors [8]. Due to the challenge of limited resources, all SMEs must implement budgetary management procedures to identify the resources the government needs and has access to, allocate

them, and ensure that their use or deployment is cost-effective [9]. The allocation of resources, coordination of the planning process, and management vis-à-vis alignment of employee behavior with corporate objectives are just a few of the many functions that budgets perform [10]. Due to the widespread use of budgets within organizations, management accounting researchers have long been fascinated by a variety of aspects of budget development and use [11–13].

Most organizations use budget allocation as a tool to manage resources within the organization and throughout its operations. The responsibility for using designated financial resources to accomplish their assigned operational objectives is easily delegated to managers in an organization with a well-formed budget allocation plan [14].

Considering the importance of SMEs, as mentioned above, it can be said that this importance is twofold in Iran due to the current economic conditions of and sanctions effecting Iran. SMEs in Iran are considered as one of the most important ways to deal with these sanctions, and they are considered the great saviors of the economy during the sanctions era. In terms of agility and maneuverability, these small industries can help Iran's economy pass the current critical stage. Of course, the implementation of this solution will only happen if the SMEs are prepared for implementation through a scheduled and coherent program, and if they implement their plans in the minimum time and with the best budget allocation.

Therefore, based on these assertions and clarifying the importance of problems related to the allocation of budget and resources, the present study was conducted to solve the problem related to resource and budget allocation for SMEs.

2. Problem Statement

Many researchers have reiterated the eminent effect that budgetary management practices have on the performance of SMEs [15,16]. Kpedor [17] show the effects of budgetary control on performance in the Allterrain Service group in Kenya. The absence of proper budgeting in SMEs has been the cause of the reduced service delivery that has been demonstrated by increasing low quality standards, customer dissatisfaction, low growth prospects, and closure of some of the young and newly incorporated firms [18]. Improving the performance of SMEs from the financial aspect is not always resolved by assisting in the form of loans. Instead, it requires the ability of SMEs to manage and use them effectively [19].

SMEs in Iran face many challenges in their activities, and when they want to enter global markets, these problems increase significantly. Statistics show that 20% of SMEs that enter the market leave after one year, and 50% are forced to leave the market after five years [20]. The inappropriate and unsuccessful performance of SMEs at the level of international and domestic trade is not only due to sanctions, business obstacles, and cumbersome government laws; other factors, such as the inappropriate and unsuccessful performance of budgeting, have caused Iranian SMEs not be able to effectively continue their business.

3. Literature Review

3.1. SMEs

Because of their role in advancing technological innovation, expanding employment opportunities, and supporting export promotion, SMEs are one of the "driving forces" of the modern economy [21]. The ability of SMEs to innovate is crucial because it can give businesses, industries, and the economy a competitive edge [22]. According to the Organization for Economic Co-operation and Development (OECD) [23], SMEs are non-subsidiary independent enterprises, whose key characteristics are the number of employees and size of financial assets. The "reactive, firefighting mentality, resource limitations, informal strategies, and flexible structures" are what set SMEs apart from larger businesses [24].

Since they differ from nation to nation, there is no single definition for SMEs. The standard method for classifying SMEs is based on their turnover, total asset value, or number of employees. There isn't a consensus among all nations regarding how to classify sizes, so classifications vary. Each country has its own definition of small and medium-

sized businesses. Due to the differences in the social and economic structures of each country, as well as the differences in the criteria used to determine the fundamentals of the enterprises, such as the statistical data used in the definition, it is simple to describe SMEs but challenging to give them a unified definition that is acceptable at an international or even regional level. The definition of SME will remain ambiguous due to a lack of data [25]. Horngren et al. [26] define a budget as a "quantitative expression of a proposed plan of actions by management for a future time period and an aid to the coordination and implementation of the plan".

The benefits of SMEs can be summed up as follows: SMEs are typically founded by a single person or group of people primarily to support their livelihood; they are flexible in deciding the price and product in response to market changes; they incur lower overhead costs, thus reducing the cost of production up to a certain volume; they are able to meet the requirements of niche markets and also export their products in small quantities; they account for 80% of jobs; and they are found to be labor intensive compared to larger firms. Policy at the national and regional levels has been focused on the dispersed location of SMEs [27].

Small and medium enterprises (SMEs) are much more adaptable than large corporations, showing greater adaptability to technological changes, higher promotion of income distribution, and better adaptability to changes in the market and new customer requirements, while their organizational structure enables quicker decision-making [28]. To realize this potential, however, SMEs need a steady source of long-term funding in order to invest in expansion possibilities [29].

3.2. Problem Solving

The firm's problem-solving activities can be thought of as a process that combines physical and mental actions in order to achieve a specific result. Its internal structure determines how informational inputs are distributed among different task units and, as a result, how the cognitive workload is distributed. Firms have organizational capabilities, or operational competencies, connected to their own problem-solving processes [30].

A path-breaking source of inspiration for modelling problem-solving procedures goes back to H. Simon's work [31]. As paradoxical as it might sound nowadays, our main objection to Simon's contributions to 'bounded rationality is that it generally continued to involve some assumption of procedural coherence in both problem-solving protocols and the underlying selection among them. More recent contributions implying much less "procedural rationality' borrow some formal instruments from both distributed computation and evolutionary biology, including those by Kauffman [32].

In the footsteps of Simon [31], Marengo and Dosi [33] concentrate on methods for reducing problem complexity through a division of labor in problem solving. This results in the breakdown of large and complex problems into smaller sub-problems that can be solved independently.

In light of Simon's work [34,35], it is important to note that problem formulation and problem solving are skills that people require when dealing with uncertainty. "If a firm is to develop unique knowledge or a unique new capability through any method other than luck, it must identify a valuable problem and conduct an efficient solution search", claimed Nickerson and Zenger [36]. The PSP is especially helpful in providing theoretical guidance on how to organize and govern a firm's new issue search by asking specific questions on what problems a firm ought to solve and in what ways [36].

When thinking about problem solving, the significance of the problem's attributes emerged as a key consideration [37]. According to recent research, the method used to solve problems depends on the interdependencies between tasks and the necessary knowledge [38]. The solution to an overarching problem can be advanced by breaking down the focal problem (technical problem) into more manageable sub-problems in a situation where problem solving is less complex. Given the lack of attention, doing so makes it much simpler for managers to address the main technical issue [34]. Problem-solving tasks can also be assigned to other businesses or people [35]. A more recent emphasis

on the problem-finding and problem-solving argument focuses on how firms seek to develop innovative capabilities through engagement with a larger network of firms and external resources, for instance [39–41]. The growing phenomenon of open and distributed knowledge networks (e.g., [42–44]) also indicates that the best strategy for problem solving, when problems have high levels of decomposition, is to implement various forms of open sourcing initiatives [45,46].

By using "problem" as the unit of analysis, the PSP aims to deepen our comprehension of the behavioral process that supports the development of capabilities by concentrating on how managers typically approach problem-solving in order to produce combinations of useful resources [36,47].

3.3. Resource and Budget Allocation

As scholars looked for more accurate representations of investment decision-making than what had been abstracted in capital budgeting finance models, research on the resource allocation process began to emerge in the late 1960s. In order to enable a firm to make the best decisions, the finance models concentrated on quantitative assessments of the predefined investment opportunities available to a firm. The models did not account for organizational or human behavior. Management researchers conducted field studies that examined how actual investments were made. Based on those observations, they developed descriptive process models to close this gap and place financial evaluation in an organizational context (e.g., [48–50]).

The resource allocation process is depicted in Bower's [48] well-known model as a complex, multistage process in which managers at various organizational levels play various roles and have access to various types of information. The first stage, called "definition", is cognitive in nature and starts with some kind of trigger, such as a performance gap or a perceived opportunity, that prompts operating managers to launch an investment project and describe it in technical and financial terms. The second stage, known as the impetus, follows this stage. During this time, middle managers must consider social and political factors when deciding whether to support a proposal and how to move it along the organization's evaluation and approval process. Senior managers' primary responsibility is to establish the structural context in which definition and impetus interact. Behaviorally influencing organizational and administrative systems, such as performance measurement, evaluation, and incentives, are included in the model's final component. Therefore, not only are investment projects not predefined and waiting to be chosen, but political, social, and cognitive factors also influence which projects receive funding [51].

When resource allocation decisions are considered in the context of the evolutionary process of asset accumulation, a theoretical mechanism, that is complementary to the way resource allocation scholars have traditionally viewed realized strategy, is presented. In the asset accumulation model, selecting time paths for resource allocations to build capability stocks is referred to as "strategy" [52]. The allocations are made to advance the firm along the capability accumulation path or possibly change that path and modify the intended strategy within the strategic context [53] provided by those decisions. The characteristics of the asset accumulation process will influence the resource allocation process, which in turn will affect movement along the path and changes in trajectory [54].

The core of strategic management is allocating the resources required to implement strategies [55–57]. However, a firm's resource allocation process is intricate. It is affected by social, political and economic factors and involves a variety of activities carried out by managers from various organizational functions, levels, and units [54].

One of the helpful tools for tracking the execution of a properly projected operational plan for an entity is a budget. In the past, budgets were created to monitor and control projected income as well as how funds were being used by organizations [58]. Budgets are crucial for SMEs because they offer information that can be used to monitor and manage the performance of the company's operations [59]. They accomplish this by emphasizing areas where actual performance differs from budgeted (planned) performance, allowing for

the implementation of the necessary corrective measures [60]. Budgets help management by exception because they enable decision-makers to identify problem areas that require immediate attention, a strategy that leads to effective problem solving [61].

A review of the literature on public financial management reform reveals that, while there is agreement on the general phases of a budget cycle, there is no universally accepted definition of budget allocation [62]. Budget allocation is limited by the strictest definition to the post-budget execution, control, accounting, reporting, monitoring, and evaluation activities [63]. As an alternative definition, Rosen (2002) defines budget allocation as the management of the government's taxes, spending, and debt, which affects the distribution of resources and income [64]. A public budget is a statement of how a public entity allocates its financial resources to achieve particular public goals [65]. It is a listing of the financial requirements for achieving an entity's goals. It is an activity plan that has been expressed in monetary terms [66].

The purpose of the budget allocation process is to guarantee that the financial aspects of the budget are met. The financial tasks include ensuring that the funds are used for the intended purposes, reducing savings, and avoiding lapses or a rush of spending near the end of the fiscal year [67]. The budget allocation system emphasizes the connections between different stakeholders in the various components, creating the possibility for good governance with an emphasis on the capability, accountability, and responsiveness of public financial management [68]. It offers comparisons between the budget plan and the actual results. Departures from the budget can then be examined, and the causes of the differences can be classified as controllable and non-controllable factors. This is crucial for reducing inefficiencies and poor budget practices, which will lead to an efficient distribution of scarce resources [69].

In order to accommodate multiple role players and manage relationships, a robust budget allocation system is essential to achieving the strategic goals and objectives of the government. This system calls for several practical steps or platforms. Each platform is defined in terms of better results and serves as the foundation for the introduction of the next stage. The budget cycle is covered by the spending portion, that also includes budget preparation, internal controls, accounting, internal and external audits, procurement, and monitoring and reporting frameworks [70].

Successful budgeting is influenced by a number of factors, such as [9]:

- The thorough coverage of revenues and outlays, that guarantees that decision-makers can set fiscal policies and establish priorities for all activities;
- The accuracy of revenue and expense projections for the budget year and subsequent years;
- The level of analytical support to ensure that policy and financing are tightly integrated and to help with budget decision-making;
- The check-and-balance procedures that makes sure spending is in line with budgetary decisions;
- Regular performance monitoring and evaluation, ensuring that budgetary procedures support performance;
- Stable procedures that guarantee those in positions of authority are answerable to the company.

The outcome of the budget allocation process is a credible budget that reflects the company's policies and priorities, is comprehensive in that it covers all company activities, and is completely transparent in terms of both budget processes and information. The internal control system should guarantee that the budgeted amounts are not exceeded, that funds are used for the intended purposes, and that accurate information is generated. The systems of external scrutiny by the legislature and external audit, which hold political executives and management accountable, should help keep the budget on track and improve performance. Accounting systems, on the other hand, provide for timely and reliable reporting at all levels of decision-making [14,63].

There are many factors in SMEs that should be budgeted for. The following are some important factors for budget allocation based on past research.

The allocation of resources to innovation, according to Beharry and Pun [71], may be a sign that a company views innovation as a strategic priority. They assert that SMEs should keep innovation as their top strategic priority. To ensure the success of innovation initiatives, capital investments are required. To ensure a reasonable and justifiable return on investment, it is also necessary to review such strategies and outcomes. A formal, structured innovation policy may be advantageous to businesses to gauge the success of their innovations. While organizational structure and human resource development are important, more emphasis should be put on product differentiation and production process optimization, which are affected by the process of technology transfer.

Azevedo [72], Alshawi et al. [73], and Chwelos et al. [74] believe that financial commitment is an inhibitor for the customer relationship management (CRM) adoption. They explain that firms with a comfortable budget are the least likely to adopt CRM; contrarily the firms with a reduced budget are the most likely to adopt this tool. In their respect, there is a concern that companies need more financial resources to implement CRM. However, they believe the financial commitment can be a good predictor to explain IT adoption.

According to Quinton and Fennemore [75], all UK charities, regardless of size, should think about how social media can complement and be integrated with other forms of marketing. They would need a strategic digital marketing plan that is fully integrated with the larger communications plan, has an appropriate budget allocation for the time needed to participate in and monitor online social network interactions, and includes an explicit set of metrics to evaluate specific objectives.

According to Suki et al. [76] and Shim [77], marketing managers should maximize the budget allocation for resources in community relations, consumerism, and corporate social responsibility activities, as well as participate in voluntary programs, for a positive return on investment through increased business profitability and long-term business sustainability.

Wilson and Makau [78] demonstrate that the majority of small businesses do not fully utilize the potential of these platforms because they typically lack the funds to invest in IT, are unable to hire IT staff, do not have access to IT-built infrastructures, some are unsure of whether or not there are customers online, and most SMEs encounter problems when going online with regard to the legality of online payments and registrations.

Table 1 is a summary of the factors that should be considered in allocating resources and budget.

Table 1. Factors affecting resource, budget allocation, and performance.

Factor	Reference
F1: Innovation	Beharry and Pun [71]
	Suki et al. [76]
F2: Corporate Social Responsibility activities	Shim [77]
	Soleimani et al. [79]
F3: IT investment	Wilson and Makau [78]
	Quinton and Fennemore [75]
F4: Social Media Marketing	Janavi et al. [80]
	Bouzari et al. [81]
F5: Product Differentiation	Beharry and Pun [71]
	Azevedo [72]
F6: Customer relationship management (CRM)	Alshawi, et al. [73]
	Chwelos, et al. [74]

4. Method and Result

NCA, created by Dul [82] is a generally new methodology and information examination technique used for grouping important conditions in informational indexes [82,83]. NCA displays regions in dissipated plots of dependent and autonomous factors that could point to the presence of an important condition, rather than focusing on the normal connections between dependent and free factors. Our information depends on genuine information from 125 Iranian SMEs, gathered between 2018 and 2019. The data were collected

through a questionnaire from the first of August 2019 to the end of October 2019. The SMEs were selected from the seven industries that are the most important and popular in Iran: food, tobacco, textile, wood and paper, chemical, industrial tools, and electronic equipment industries. We communicated with SMEs by sending electronic questionnaire forms. Since it was difficult to communicate with the managers of some important enterprises, we had to visit these enterprises in person and hand the questionnaire to the manager. Data were validated using the preprocessing method [84]. Meanwhile, content validity was used (for variables) based on expert opinions [85–88].

This study attempt to ascertain whether six factors were a necessary condition for resource and budget allocation (to surge performance) or not. The NCA's results (see Table 2) specify that all six factors are significant ($p < 0.05$) necessary conditions for resource and budget allocation. For instance, Table 2 shows that, to reach a 50% level of efficient performance, six necessary conditions are required: innovation at no less than 22.7%, CSR at no less than 30.4%, IT investment at no less than 56.7%, SMM at no less than 38.3%, product differentiation at no less than 11.7%, and CRM at no less than 38.3%.

Table 2. Bottleneck table and NCA effect sizes.

Bottleneck Efficient Performance	F1	F2	F3	F4	F5	F6
0	NN	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN	NN
30	10.3	NN	18.3	10.4	NN	NN
40	19.4	25.0	36.7	28.3	6.7	18.3
50	22.7	30.4	56.7	38.3	11.7	38.3
60	35.6	31.7	60.0	38.3	20.0	38.3
70	42.6	45.0	60.0	40.7	20.0	40.2
80	44.7	49.0	60.0	40.7	20.0	41.1
90	45.2	49.0	60.0	48.3	30.0	42.5
100	45.2	49.0	60.0	53.3	30.0	42.5

5. Conclusions

Problem solving plays an ever-increasing role, and will continue to do so in years to come. Many companies try to find the best solutions to surge their performance and efficiency. One of the best ways to hone this aptitude is through NCA analysis in different industrial companies. We recognized that six necessary factors can effect on the performance of Iranian SMEs. The result of a case study in Iranian SMEs shown that IT investment is the most important factor that need to increase resource allocation and budget, in comparison with other factors, to reach 50% efficiency and productivity.

There is currently a broad understanding in regard to the presence of a positive connection between IT investment and efficiency. It has been demonstrated that enormous firms obtain a positive result from their IT speculations. Nonetheless, this positive result has all the hallmarks of being dependent upon hierarchical changes (complimentary, decentralized, less progressive designs with enabled laborers). However, organizations that allocate resources to IT while holding onto the outdated system could be worse off, by obtaining a negative effect from their IT speculation. The primary concern is that most of the expense related to IT speculation do not occur during the acquisition of equipment and programming, but in the expenses related to changing and adjusting the business to use this new hardware. Without a doubt, the serious level of inactivity showed by large businesses when implementing these authoritative IT improvements can be exorbitant, tedious, and hazardous.

SMM and CRM are two other important aspects. Now, more than ever before, all companies should pay significant attention to these important factors when attempting to surge their performance. A larger audience can be reached with the aid of social media. Nearly 90% of marketers claim that their use of social media has increased traffic and

exposure for their company. It is the best way to spread brand awareness and keep in touch with your clients.

Using CRM applications has a positive impact on results related to customers, particularly on customer satisfaction. Business performance was found to be positively impacted by the customer-related outcomes (customer retention, satisfaction, and loyalty).

There are also some limitations in the present study. Results obtained during the sanctions applied to Iran was one of the most important challenges and limitations of this research. So, to extrapolate the findings of this study, researchers must keep in mind that the respondents in this study answered the questionnaire in relation to the various economies problems faced in Iran, and that outcomes may be different in other economies. As this study used a questionnaire, another limitation of the research was the effect of managers' personal opinion in answering the questions, which can affect the results obtained.

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