MEASURING CREATIVE PROBLEM-SOLVING IN SOUTH AFRICAN SME OWNERS: IMPLICATIONS FOR BUSINESS LONGEVITY

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Abstract

South Africa has one of the highest failure rates of new SMEs in the world, as many prospective entrepreneurs want to start a new business but do not focus on acquiring the essential basic business skills to ensure long-term success and sustainability. As survival challenges arise, small and medium enterprises (SMEs) would need business skills to build and grow their enterprises. One of the skills that could be of help is creative problem-solving (CPS). CPS could enable SME owners to take on any challenge and quickly find a solution without disrupting business operations. CPS is therefore one of the managerial cognitive abilities that help navigate the complexities of running a successful establishment. SMEs need to have a good understanding of how to manage and run a business effectively. Managerial cognitive competencies become vital in handling, managing, and running a business effectively. Creative problem-solving is an important cognitive competency that impacts the expansion and survival of SMEs. Very few studies in South Africa investigated the longevity of SME where creative problem-solving skill was considered a factor. Therefore, the study aimed to assess the level of creative problem skill among SME owners in South Africa's construction and manufacturing industries and explore its impact on SME longevity. This was a descriptive quantitative study among 204 SME owners who were selected using quota sampling from the construction and manufacturing sectors. Data were collected using a self-administered, anonymous online questionnaire. Data was collected through an anonymous online questionnaire, which assessed the participants' levels of creative problem-solving skills. The analysis, conducted using Python 3.12.4 software, aimed to determine the prevalence of CPS skill and their implications for the longevity of SMEs. The results indicated that SME owners in both the construction and manufacturing sectors exhibited moderate levels of creative problem-solving skill. This suggests that while creative problem solving is present, there is potential for further development to enhance SMEs' competitive edge and long-term viability. The study found that the overall creative problem-solving skill of SME owners was moderate in both the manufacturing and construction sectors in South Africa. Therefore, the study recommends that for SMEs to optimize their competitive advantage and sustainability, they should employ their creative problem-solving skills. SME owners, therefore, need to embed creative problem-solving skill in their management skills to address complex problems.

Keywords

Managerial Cognitive ability, Creative Problem Solving, SME Management, Longevity, Competency, Entrepreneurial skills, Management

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Introduction

One of the most important skills for any business manager to possess is creative problem solving. This is because changes become a constant element of the daily lives of most managers and business owners. The ability to think strategically and solve problems is vital for managing smaller businesses. Managerial cognitive competencies describe a set of skills that allow an individual to understand the knowledge and abilities necessary for performing a specific task or activity within a specific function or job [1]. These skills are important for the success and survival of small businesses. The problem is that very few studies in South Africa have investigated the longevity of SME where creative problem-solving skill was considered a factor. Therefore, the reviewed literature revealed that creative problem-solving skill is a cognitive competency that is likely to be one of the factors needed by SME owners to effectively manage their businesses.

Literature review

Managerial cognitive ability

"Managerial cognitive capability," as defined by [2], emphasizes that capabilities encompass the ability to do both mental and physical tasks. A manager's ability to engage in one or more of the mental processes that make up cognition is known as their managerial cognitive [2]. Management can take advantage of opportunities and react to new dangers with the help of these competencies. Furthermore, supervisors possessing cognitive abilities can gather precise data that influences forecasts and output [3]; [4]. [5] suggest that cognitive capacity can aid entrepreneurs in organizing their ideas and plans and enhancing the effectiveness of their companies.

Managerial cognitive ability: Creative Problem Solving

Cognitive ability is defined as a general mental capability involving reasoning, problem-solving, planning, abstract thinking, complex idea comprehension, and learning from experience [6]. [7] stated that cognitive abilities were among the most critical cognitive skills employed in problem-solving. Furthermore, according to cognitive views of creativity, creative problem solving can be defined as producing a novel method of solving a new problem [8]. According to entrepreneurs identify opportunities for new business projects using human cognitive frameworks gained through preparation and practice to interpret associations between apparently unrelated events or developments in the outside world to develop new ideas for new products or services [9]. As a result, the staff’s training and experience from the organization’s basis allow companies to reach leadership positions in the sector they operate. And so creative problem solving can seem like an ability to solve problems by producing a novel method of solving a problem. Therefore, as SMEs are faced with a complex problem, this research assumes that creative problem-solving business owners need this skill. The next section discusses CPS.

Creative Problem solving (CPS)

CPS was originally developed in the 1940s by Alex Osborn, founder of the Creative Education Foundation. Osborn’s method entailed separating divergent and convergent thinking styles. The first half of the process focuses on generating ideas, while the second half evaluates their feasibility [1]. The Osborn Parnes creative problem-solving process is a structured way to generate creative and innovative ways to address problems. Osborn and Parnes started working on creative problem-solving approaches in the 1950s. Since then, the process has evolved, but the focus on using creativity remains relevant. More recent modifications group the activities into four categories: clarify, ideate, develop and implement. Each category contains the steps for carrying out the problem-solving process as depicted in Figure 1.

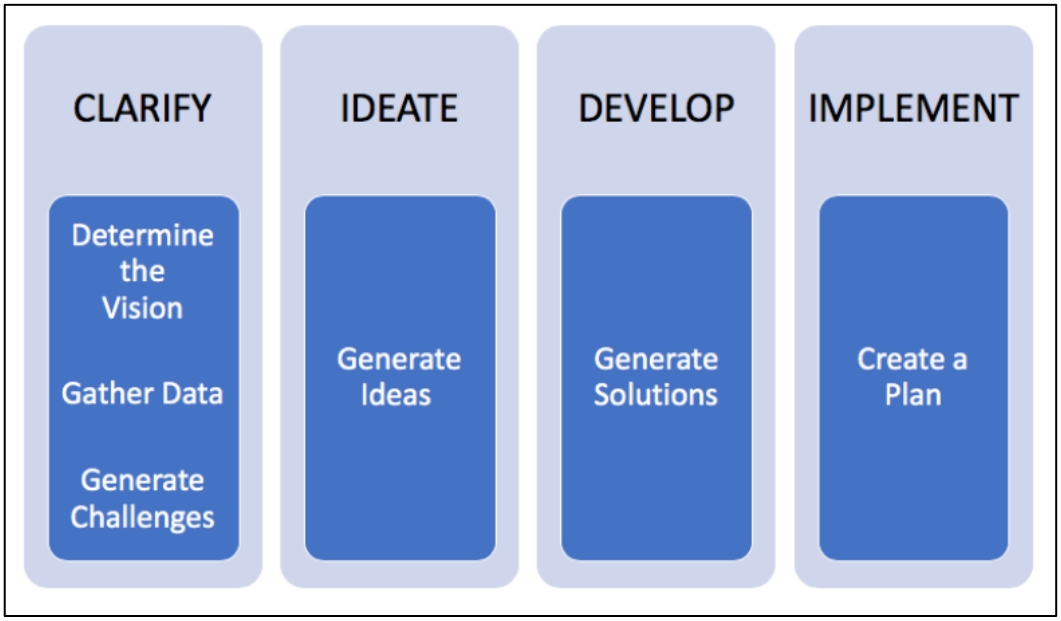

Figure 1: Problem-solving process [11]

The Osborn Parnes model is a structured approach to help individuals and groups apply creativity to problem-solving. The Osborn Parnes creative problem-solving process uses divergent thinking and convergent thinking. There are six steps to the Osborn Parnes creative problem-solving process:

- **Objective finding:** Determining the goal of the problem-solving process.
- **Fact finding:** Gathering enough data to fully understand the problem.
- **Problem finding**: Digging deeper into the problem to find the root or real problem requiring focus and reframing the problem to generate creative and valuable solutions.
- **Idea finding:** Allows the team to generate many options for addressing the problem.
- **Solution finding**: Choosing the best options from the ideas generated in the idea-finding phase.
- **Creative problem-solving begins with two assumptions:** everyone is creative in some way and creative skills can be learned and enhanced [11]. According to Creative Education Foundation, the core principles of CPS are:
- **Divergent and convergent thinking must be balanced:** The keys to creativity are learning ways to identify and balance expanding and contracting thinking (done separately) and knowing when to practice them.
- **Ask problems as questions:** Solutions are more readily invited and developed when challenges and problems are rephrased as open-ended questions with multiple possibilities. Such questions generate rich information, while closed-ended questions tend to elicit confirmation or denial. Statements tend to generate limited or no response at all.
- **Defer or suspend judgement:** As Osborn learned in his early work on brainstorming, hasty judgement in response to an idea inhibits the generation of ideas. There is an appropriate and necessary time to apply judgement when converging.
- **Focus on "Yes, and" rather than "No/yes, but**": When generating information and ideas, language matters. "Yes, and" allows continuation and expansion, which is necessary in certain stages of CPS. The use of the word "but" – preceded by "yes" or "no" – closes conversation, negating everything that has come before it.

Authors maintained that creativity can be an essential trait of an entrepreneur or business owner [12]. The intent of becoming an entrepreneur means breaking away from practical norms and using one's imagination to embrace quick and effective solutions to an existing problem. Training oneself to think like an entrepreneur means learning how to evaluate a challenge: clarify, ideate, develop, implement and assess, as depicted in Figure 2.

Figure 0 : Creative problem-solving process [12]

Step 1 – Clarify: This is a critical step in recognizing the gap between the current and desired states. It can be viewed as the need for awareness, which occurs when the entrepreneur notes a gap between societal or customer needs and actual circumstances. Clarifying the problem by speaking with clients and developing a detailed description brings the specifics of an issue to light. Failure to identify the specifics leaves the entrepreneur with the frustrating task of solving an entirely unknown or unseen problem. To establish and maintain credibility, an entrepreneur must clarify the problem by focusing on solving the problem itself rather than solving a symptom of the problem [12].

Step 2 – Ideate: After collecting all information relevant to the problem, the entrepreneur lists as many causes as possible and generates and details ideas. This is the step during which the widest variety of ideas is suggested. Each idea must be evaluated for feasibility and cost as a solution to the problem [12].

Step 3 – Develop: The entrepreneur takes the list of ideas generated and tests each solution for feasibility. The entrepreneur must consider the cost of each proposed solution and the obstacles to implementation and, if necessary, identify and assess alternative solutions that are the most cost-effective and feasible [12].

Step 4 – Implement: This is the step in which the solution to the problem is tested and evaluated. The entrepreneur walks through the planned implementation with the client and tests each part of the solution. The entrepreneur implements the solution and goes through a structured follow-up system to ensure it remains effective and viable [12].

Step 5 – Evaluate: The assessment of the final solution is a significant step that entrepreneurs often overlook. Any deficiencies in the product or service are reassessed and new solutions implemented. Ongoing testing may be needed to find the final solution [12].

In addition, contemporary CPS process models, rooted in Osborn-Parnes CPS research, offer an organizing framework coupled with thinking tools and alternating modes of divergent and convergent thinking to produce creative insights and solutions [12]. Organizing frameworks support individuals and teams in analyzing problems, generating and refining ideas, and implementing action plans and solutions [13]; [14]. The literature on creative studies has identified cognitive diversity as an essential variable when individuals and teams are involved in CPS [15]; [16]; [17]. Furthermore, a fundamental aspect of CPS theory is the divergent and convergent heartbeats of the CPS process found in each defined stage [17]. The next section discusses the role of divergent and convergent thinking in creative problem-solving process.

CPS and Management

One function of CPS is to improve people's thought processes so that they can better resolve predicaments or pursue opportunities that bring about effective change. It also prompts people to practice the thinking skills they need to resolve complex problems and can illuminate the teaching of thinking itself. CPS process functions can manage the chaos of creativity and guide the thinking and acting of creative people; its content functions have the potential to help people clarify opportunities or predicaments, transform ideas into solutions, and implement change. Other authors referred to creative people as the 'creative capital' that can make things happen in today's organizations [19]. In essence, CPS is a creativity currency that, with a little effort, can be used to promote thinking skills, maximize creativity and increase the bottom line.

Management problems arise as different or unknown situations present themselves and often require a novel solution [20]. It is frequently difficult to see solutions to problems by thinking conventionally. The need for creative problem-solving has arisen because of the inadequacies of logical thinking. Logical thinking takes existing knowledge and uses the rules of inference to produce a new experience. However, because logical thinking progresses in a series of steps, each one depends on the last. New knowledge is merely an extension of what people already know rather than what is genuinely new. Logical thinking has a limited role in helping managers to be creative, thus supporting the need for creative problem-solving [20]. CPS uses imagination and techniques using analogies, associations, and other mechanisms to help produce insights into problems [21]. According to [3], CPS focuses on nurturing creative thinking in problem-solving and includes critical thinking. Creative problem-solving operates as a macro process for thinking [22]. A macro process thinking skill is identified within the CPS model framework to provide rubrics that guide people in knowing and choosing the kinds of thinking that will help them operate more effectively. Macro-thinkers are creative and bring fresh ideas and suggestions to the group. They focus on long-term objectives and outcomes and the end results of behaviors and actions. In this research, the macro (external) environment surrounds businesses. CPS entails developing skills that enable people to understand the macro-environment in which the company is operating.

The steps of the thinking skills model of CPS involve assessing the situation, assessing the vision, formulating challenges, exploring ideas and formulating a plan [3]. In the workplace, the impact of CPS can reflect in three areas: an individual's attitudes, an individual's behavior and its effect on groups [23].Several studies concerned with CPS's impact on organizational effectiveness revealed benefits such as cost reductions, high revenue solutions, and a culture that inspired innovative design concepts [23]. Therefore, it is imperative to examine how creative problem-solving can help SMEs in South Africa solve their problems.

CPS styles in an organization

This section contains four studies relating to CPS styles at different organizational levels [24]; [25]; [26]. These studies suggest that varying organizational levels, from low-level management to higher level and senior management, reflect different creative problem-solving styles. As peoples' roles increase in seniority, there appears to be increased adoption of implementation, ideation and conceptualization styles. From a sample of 7 280 participants across the private and public sectors, [25]reported a higher proportion of implementers and ideators across more senior leadership positions. Significant differences were found for implementer ($p < .001$) and ideator ($p = .001$) styles, but not for clarifier ($p > .05$) or developer styles ($p > .05$) among the higher levels of management [25]. When comparing higher-level management (director, vice president and executive) and lower-level management (non-management, supervisor, and middle management), implementers and ideators remained the most significant creative problem-solving styles ($p < .001$). The implementers preferred risk-taking, and the ideators were visionary, both characteristics of higher-level management.

Similarly, [4] found that upper management and professional/technical staff fell under the conceptualizer styles (35.9%). They were seen as managers who “lead in giving sound structure to fledgling ideas and underdeveloped opportunities” ([27], p. 34). Conceptualizers showed a preference for the apprehension of knowledge by thinking and ideation [27]. Individuals at the highest levels of senior management and professional/technical positions preferred thinking and ideation, rather than experiencing and evaluating [24].This is possibly due to the nature of the demands in upper management roles to better structure challenges and develop ideas and projects more clearly.

In contrast, generators were the least represented in management positions, with 17.9% in upper management and 19.9% in supervisor/team leader roles [24].Implementers, who prefer to put solutions into action, and conceptualizers, who prefer to develop solutions, were the highest populations for middle management positions. An author reported that uncategorized managers with a high propensity for adaption preferred handling situations within the confines of the challenge while being specific and direct [26]. This may be indicative of the tasks assigned to managers to conduct handling, interactions, and short-term problem-solving [25]; [26]. These results are contrary to the higher-level management results reported by [4] and [25]. However, [25] found higher levels of clarifiers, those who prefer fact-finding to problem-solving, in the higher management levels in the private sector. These studies consistently pointed to the stratification of creative problem-solving styles within upper and lower management. The next section will describe the creative problem-solving measure for this research.

CPS measure

The Basadur 14-item ideation-evaluation preference scale is the only type of instrument found that measures divergent thinking attitudes [28] . This instrument supported answering the research question about creative problem-solving for the study. The researcher was granted permission to the Basadur scale, which is a valid and reliable instrument [28]. Inter-item reliability for this scale ranges from Cronbach’s alphas of .68 to .83 [29].

Research Design

This was a cross-sectional study conducted among all the SMEs from manufacturing and construction sector. This study uses Basadur 14-item ideation-evaluation preference scale to measure the participants’ levels of creative problem-solving skills. The Basadur 14-item ideation-evaluation preference scale is the only type of instrument found that measures divergent thinking attitudes. This instrument supported answering the research question about creative problem-solving for the study [28]. Inter-item reliability for this scale ranges from Cronbach’s alphas of .68 to .83 [29]. The sampling unit was a person chosen to complete the survey within the SMEs. The strength of the research approach lay in comparing the creative problem solving across the best performing (manufacturing) and worst performing (construction) sectors in the South African economy. Primary data collection was conducted through both the self-administered structured questionnaires to research participants. The research questionnaires were distributed via e-mail.

Results

The quantitative data captured from the questionnaire was assessed using Python 3.12.4 statistical tool to calculate the mean scores of the level of creative problem-solving skill for both manufacturing and construction sectors. Data analysis results of the instrument consist of 14 creative problem-solving items. All these items were rated on a 5-point scale, with higher scores indicating higher level of creative problem solving. First, we determined the characteristics of the participants using descriptive statistics. Second, calculation of mean scores using mean and standard deviation to test the level of creative problem-solving skills for SME business owners. The mean scores were calculated with segregated data for the construction and manufacturing sectors. The level of creative

problem-solving skills of SME business owners was obtained from the excel document and imported to Python 3.12.4 software in the form of quantitative data. The scores obtained were then processed into values categorized according to the creative problem-solving skills categories in Table 1 below.

Table 1 SME business Owners Creative Problem Solving.

Category	Total	Percentage
Excellent	Between 63 and 70	>94
Moderate	Between 52 and 63	75
Poor	Below 34.5	<50

The survey was sent to 3 000 recipients, of whom 842 (28%) opened it. Of those who opened the email, 216 completed the surveys in full, representing a response rate of 7.2%. Out of 216 completed surveys only 206 were considered valid for data analysis. The results showed that the construction sector (108.14) exerted higher creative problem-solving skills than the manufacturing sector (97.18). And the overall creative problem-solving score was 109.61 for both sectors combined.

A comparison of creative problem solving (CPS) skills was done between two sectors. Of the 206 participants, 99 (49%) were from construction sector and 105 (51%) from the manufacturing sector. As depicted in Table 2, the mean years in operation 21.4 years, mean headcount 106.55 and mean yearly gross turnover of R65 816 041.72. The respondents' designations, owners represented the highest number, followed by managing directors, directors, and CEOs. The research shows that the respondents were at a strategic level of the organization and, therefore, competent to comment on the various measures addressed by the questionnaire, with longevity, headcount, and turnover showing the desired stages of longevity of the organizations.

Table 2 Descriptive statistics (longevity, turnover, headcount)

		Current estimated yearly gross turnover (Rands)	Number of employees in the organization	Longevity (months)
	Valid	204	204	204
Mean		65 816 041.72	106.55	257.25

Table 3 summarizes the CPS item values and their frequencies. The results show the frequencies of pertaining the data of manufacturing and construction sector set of information. The item that has highest agreement is: "I feel that people at work ought to be encouraged to share all their ideas, because you never know when a crazy sounding one might turn out to be the best", for both construction and manufacturing sectors, followed by "Quality is a lot more important than quantity in generating ideas" item.

Table 3 Frequency distribution of statement related to Creative Problem Solving

CPS	Statements	SD	D	N	A	SA
1	I should do some prejudgement of my ideas before telling them to others.	6	16	51	73	60
2	We should cut off ideas when they get ridiculous and get on with it.	15	21	56	63	51
3	I feel that people at work ought to be encouraged to share all their ideas, because you never know when a crazy-sounding one might turn out to be the best.	1	1	22	80	102
4	One new idea is worth 10 old ones.	1	13	39	67	85
5	Quality is a lot more important than quantity in generating ideas.	3	9	29	69	96
6	A group must be focused and on track to produce worthwhile ideas.	5	10	34	82	75
7	Lots of time can be wasted on wild ideas.	18	21	57	43	67
8	I think everyone should say whatever pops into their head whenever possible.	15	40	58	50	43
9	I like to listen to other people's crazy ideas since even the wackiest often leads to the best solution.	5	18	54	73	56
10	Judgement is necessary during idea generation to ensure that only quality ideas are developed.	10	25	43	76	52
11	You need to be able to recognize and eliminate wild ideas during idea generation.	5	22	51	75	55
12	I feel that all ideas should be given equal time and listened to with an open mind regardless of how zany they seem to be.	9	17	47	71	62
13	The best way to generate new ideas is to listen to others then tailgate or add on.	11	17	73	56	56
14	I wish people would think about whether or not an idea is practical before they open their mouth.	30	28	47	46	55

The Basadur 14-item ideation-evaluation preference scale [30] was used in the reviewed studies and measured the key divergent thinking principles, preference for ideation, and preference for evaluation, specifically, deferring judgement and avoiding premature evaluation. This same measure was used to determine the level of CPS within South African SMEs. So, this section talks about how creatively SMEs in the manufacturing and construction sectors of the South African economy solve problems. The overall results of CPS capability were as follows:

- Ranked last amongst five CPS variables (mean value 3.90) in South Africa for construction sector (Table 4)
- Ranked last amongst five CPS variables (mean value 3.75) in South Africa for the manufacturing sector (Table 4)
- Ranked last amongst five CPS variables (mean value 3.82) in South Africa for combined sectors (Table 4).

Table 4 Descriptive Statistics CPS

	N statistic	Minimum statistic	Maximum statistic	Mean		Std deviation statistic	Skewness statistic	Kurtosis statistic
				Statistic	Std error			
Construction Sector								
CPS	99	2	5	3.90	.075	.749	.019	-.857
Manufacturing Sector								
	105	3	5	3.75	.060	.617	.208	–.555
Both Sectors								
	204	2	5	3.82	.048	.686	.150	-.695

Conclusion and discussion

Measures such as the mean, median, and standard deviation provided insight into the overall level of creative problem solving. The calculation of creative problem skills levels in SME managers provided valuable insights into their managerial cognitive abilities and approaches to business problem-solving. The respondents' designations, owners, represented the highest number, followed by managing directors, directors, and CEOs, and therefore, the respondents were at a strategic level of the organization, and that made them competent to comment on the various measures addressed in the questionnaire, with longevity, headcount, and turnover showing the desired stages of longevity of the organizations.

In the results, the average score on the creative problem solving was calculated, revealing whether SMEs owners generally exhibited high or low levels of this skill, and the construction sector exerted higher creative problem-solving thinking skills than the manufacturing sector in South Africa. In addition, for both sectors combined, the average score for the overall creative problem-solving skills was found to be 3.82, indicating the score was "moderate." Additionally, the frequency distribution highlighted patterns, for example, the frequencies of pertaining the data of the manufacturing and construction sector set of information. The item that has the highest agreement is: ***"I feel that people at work ought to be encouraged to share all their ideas, because you never know when a crazy sounding one might turn out to be the best."*** for both construction and manufacturing sectors, followed by ***"Quality is a lot more important than quantity in generating ideas."***. This suggests that participants pay attention to quality when generating ideas towards solving complex problems for both sectors.

This article focused on a managerial cognitive competency that can be used to solve complex problems. The primary objective was to determine the level of creative problem-solving skills of SME business owners in South Africa. The results showed that the construction sector (78%) exerted higher creative problem-solving skills than the manufacturing sector (75%). And the overall creative problem-solving score was 76.4 % for both sectors combined. This shows that the managerial cognitive competencies are vital for addressing the challenges common to most SMEs and are a critical factor contributing to the performance and survival of small-scale businesses. This research found out that creative problem solving (CPS) skill is one of the cognitive competencies required for problem solving. And based on the results, it showed that CPS is crucial for SME business owners as they perceive themselves to be creative problem solvers. And this CPS utilizes divergent and convergent thinking this suggests that SME managers access creativity is learning ways to identify and balance expanding and contracting thinking. And therefore, testing the CPS level simulated creative problem-solving skills level

of SMEs. This can assist the SMEs to incorporate CPS skill as a key strategic resource that can be incorporated in the management skill.

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