

# An exploratory model of interventionist research to calculate costs and prices in small Brazilian manufacturers, combining training and intervention phases

Research to  
calculate costs  
and prices

315

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## Abstract

**Purpose** – This paper aims to propose an interventionist research model for cost measurement in small manufacturing companies.

**Design/methodology/approach** – The study was based on an interventionist model that consisted of two phases – training and intervention. The innovative model used in the study combined Labro and Tuomela's (2003) framework with the socialization, externalization, combination and internalization model developed by Nonaka *et al.* (2001), and it was subsequently applied to two Brazilian manufacturing companies.

**Findings** – The main findings were as follows: the training phase is the one that generated the greatest impact on the cost calculation; competitors should not be invited to participate in the same program; it is necessary for the researchers to have professional experience of the subject being investigated and to have experience of micro and small enterprises; the training phase must be presented using appropriate language; and a better understanding of the costs can increase entrepreneurs' confidence when negotiating prices with clients.

**Research limitations/implications** – The main limitation was the small number of companies that were included in the study. Future research could involve longitudinal studies to evaluate the long-term results of interventionist studies.

**Practical implications** – The study showed that even small business owners can implement costing techniques, but that this requires the development of an environment of knowledge creation, followed by an implementation phase. The model can be replicated on a large scale, with affordable costs.



**Social implications** – Improving the performance of small and medium-sized enterprises, which are high employers, with low implementation cost is a demand of society.

**Originality/value** – The model proved to be valid, and it could easily be replicated on a larger scale; the study therefore helps to demonstrate the benefits of interventionist research.

**Keywords** Small business, Cost calculation, Interventionist research

**Paper type** Research paper

## 1. Introduction

According to the resources-based view, a management control system is understood as a resource that, along with other resources, can improve company performance (Henri, 2006). One of the techniques covered within this broad scope is cost control (Bedford and Malmi, 2015), as it is assumed that information about products' costs can influence better decisions about process improvement, cost reduction, price and product mix (Garrison *et al.*, 2010). Confirming that some research shows that if managers perceive benefits of the cost control system, they use the cost system more intensively (Mahama and Cheng, 2013).

As a result of their prevalence, small and medium-sized enterprises (SMEs) are considered very important for the economic growth of countries (Robson and Bennett, 2000). However, there is increasing concern about the survival of these companies, which are characterized by a high mortality rate, especially in Brazil (Sebrae, 2013). Among the reasons identified is the absence of cost measurement. Although cost measurement is considered a traditional technique in the literature, it has not yet been widely adopted, especially by SMEs. This is probably because these companies have few resources and need specific approaches to address their demands (Garengo *et al.*, 2005).

Despite being a traditional tool that is discussed in many textbooks (Garrison *et al.*, 2010) and taught in the curriculum of various undergraduate courses, the adequate calculation of costs is still not practiced widely in small businesses. This phenomenon can be characterized as a problem of knowledge transfer (Van de Ven, 2007).

To mitigate the mortality of those companies, research aimed at SMEs has been carried out, and government agencies internationally have used the results to implement policies to support entrepreneurs (Robson and Bennett, 2000). However, these studies are not considered sufficient to change reality, pointing to a gap between research and practitioner interests. Although this phenomenon does not relate exclusively to SMEs' reality, some researchers have warned of a lack of research relevance to the practitioners (Malmi and Granlund, 2009; Baldvinsdottir *et al.*, 2010).

To mitigate this problem, interventionist research has been widely recommended as a technique that can produce significant results, but this requires academics to accept that objects of study may be affected by the research (Jönsson, 2010). Baard (2010, p. 16) states that:

[...] the aim of this form of research is therefore to improve community life [...] (including the organizational context) through the development of interventions [...], resulting in the generation of knowledge for researchers and practitioners.

Recently, Suomala *et al.* (2014) also argue that interventionist research (should be “not only practically relevant but also theoretically significant.”)

However, to impact the organizational reality of SMEs that have the same problems, it is necessary to create a model that can be applied on a large scale and at an affordable cost. A small number of studies have been carried out using the training and intervention approach, including the award-winning interventional study of Anderson-Macdonald (2013) with

micro-entrepreneurs in South Africa, which showed that micro-entrepreneurs who were subject to training programs on marketing and finance had the perception of increased happiness. [Julienmaa and Puolamäki \(2008\)](#) used the same approach (training and intervention), and [Malmi\(2016\)](#) reported a study from Jönsson and Solli in 1993, but in that case, they used just training and monitoring of meetings.

Unlike in Finland, where companies customarily engage in research ([Suomala and Lyly-Yrjänäinen, 2012](#)), research in Brazil is far removed from the interests of business, and the collaboration between companies and universities is still in its infancy, although there is a great need for companies to improve efficiency.

The literature has pointed out some findings. First, managers who perceive benefits of the cost control system, use it more intensively ([Mahama and Cheng, 2013](#)). Second, interventionist research is an approach that can change community life, resulting in the generation of knowledge for researchers and practitioners ([Baardi, 2010](#)). Third, the interventionist model is built in two stages such as training and intervention, and researchers like [Julienmaa and Puolamäki \(2008\)](#) and [Anderson-Macdonald\(2013\)](#) have worked with it, but this line of research still represents an open issue in the literature. Given that, this paper posed the following research question:

*RQ1.* What are the contributions to the theory by using the interventionist model, which combines training and intervention on the calculation of cost and selling price in small manufacturing companies?

The present paper aims to test a model of interventionist research consisting of training and intervention through the application of cost measurement and price setting in SMEs. This model is a combination of [Labro and Tuomela's \(2003\)](#) framework and the socialization, externalization, combination and internalization (SECI) model developed by [Nonaka et al. \(2001\)](#). [Nonaka et al.'s \(2001\)](#) framework was specifically applied during the training phase, as this model deals with the creation and sharing of knowledge, which can be considered as the final goal of interventionist research. The model was applied in three companies, with the support of SINA FER, an association of metal and iron manufacturers in São Paulo State, Brazil.

## 2. Literature review

### 2.1 Importance of cost measurement for decisions

An increasingly aggressive economic environment shaped by a growing number of competitors requires better business planning and high-quality information provided by controlling productive factors, cost and revenue ([Machado and Souza, 2006](#)). SMEs in Brazil are under constant pressure, especially from two of Porter's five forces, namely, the bargaining power of suppliers and customers. To maintain competitiveness with some profitability, SMEs have an option to ensure efficiency through cost control.

According to contingency theory, SMEs do not need advanced cost techniques such as strategic management accounting ([Cadez and Guilding, 2008](#)), but rather, traditional cost techniques such as variable cost, full cost and prices setting, as found in many management accounting textbooks ([Garrison et al., 2010](#)). This information enables managers to take strategic decisions about effort allocation in a certain sector or product, about product mix and about discontinued products ([Garrison et al., 2010](#)). Empirical papers such as [Mahana and Cheng \(2013\)](#) have shown that there is a positive relationship between managers' managerial perceptions and the intensity of the costing system. Although the respondents for this paper are managers of large companies, we expect to confirm the similar results in SMEs.

### 2.2 Small and medium-sized enterprises in Brazil

According to [Sebrae \(2014\)](#), SMEs in Brazil account for 95 per cent of manufacturers in the country and 28 per cent of the revenues of private companies, and they generate 42 per cent of formal work posts. Even with significant social and economic participation, these companies face enormous difficulties. Research conducted by [Sebrae \(2013\)](#) found that 25 per cent of state SMEs end their activities one year after opening.

Among the reasons identified for this high level of mortality, such as a lack of access to credit and poor advanced planning by the entrepreneur, the lack of business management deserves mention: there is a need for investment in training of members and monitoring of revenues, costs, and expenses. It should also be remembered that these companies are often created as an alternative to unemployment, creating an enormous deficiency regarding the strategic vision of the business ([Miranda et al., 2008](#)).

Another finding is that entrepreneurs, who have a very busy schedule, do not seem to be concerned with daily controls and management of the company. This short-term vision can lead to failure in the medium or long term ([Julenmaa and Puolamäki, 2008](#)).

Thus, it is clear that micro and small enterprises require high-quality management information that supports competitiveness. According to [Miranda et al. \(2008\)](#), this need could be met with good business plans and the implementation of managerial controls, designed according to the characteristics of these companies.

Some authors such as [Julenmaa and Puolamäki \(2008\)](#) identify a need for improvement of the knowledge of these managing partners and have suggested the implementation of learning processes to contribute to the improved performance of small businesses. However, it should be noted that the direct participation of these managers is key to achieving the desired results of innovation (technological or management), competitiveness and survival.

Owner-managers have shown greater interest in learning processes that are content-oriented and taught by professionals with sound knowledge in the subjects ([Julenmaa and Puolamäki, 2008](#)). Such training courses, workshops and meetings seem to generate knowledge and practical solutions in a short time.

### 2.3 Knowledge creation framework

The literature shows that among the factors that can promote the sharing and creation of knowledge is the formation of teams to develop projects. This is considered crucial for knowledge creation because in this context, professionals can interact, and through dialogue and consideration of opposing ideas can identify new viewpoints ([Nonaka, 1991](#)).

Nonaka and Takeuchi's (1995) model is endorsed as the most useful for various fields of knowledge management, and for integrating, creating and sharing ([Choi and Lee, 2002](#)). It is based on [Nonaka's \(1991\)](#) model, which classifies knowledge into explicit and tacit. Explicit knowledge is used by people in their activities and is the result of experience gained during the implementation of activities that are the basis for the development of capacity to make intuitive judgments about the performance of an activity ([Choo, 2006](#)).

In another paper, [Nonaka et al. \(2001\)](#) extend the SECI model, which was used in the design of the present model.

Owners of SMEs are not normally trained in finance or accounting, and they can adopt an innovation if they are confronted with a shock stimulated by an external agent ([Berry et al., 2006](#)).

### 2.4 Interventionist research

The interventionist approach was launched in management accounting nearly 20 years ago by Professor Sten Jönsson and his doctoral students in Sweden. It is now well known,

having gained relevance at a time when it is recognized that practice and theory need to converge (Westin and Roberts, 2010). Thus, the goal of interventionist research is to join theory and practice, with the possibility of studying the object in practice and identifying how and why certain techniques are used, to generate relevant theoretical contributions (Westin and Roberts, 2010).

The most important aspect that distinguishes interventionist research from other research is the construction of a field experiment (Jönsson and Lukka, 2007), with the opportunity to collect material that would not be accessible through traditional research methods. An example of this can be found in the work of Suomala *et al.* (2010), where accounting books would not have been opened without the intervention of the researchers, i.e. the research was crucial to create the research environment itself. Therefore, the interventionist approach can be useful for creating the research environment by providing an opportunity to implement contemporary management control techniques in companies (Suomala *et al.*, 2010).

Labro and Tuomela (2003) developed a framework divided into a field phase and a theoretical phase. The field phase consists of:

- finding a relevant problem in practice that is theoretically interesting;
- examining the possibility of undertaking long-term cooperation term; and
- having knowledge of the topic.

The theoretical phase consists of:

- creating a construct;
- implementing and testing the construct;
- examining the scope and applicability; and
- showing the theoretical contributions.

This method is very similar to the educational research method (Sunding and Odenrick, 2010).

Previous interventionist research has studied strategic management accounting techniques: target costing (Nicolini *et al.*, 2000), activity-based costing (Arnaboldi and Azzone, 2004; Liu and Pan, 2007; Varila *et al.*, 2007), quality cost (Cheah *et al.*, 2011), theory of constraint (Ifandoudas and Gurd, 2010) and open book accounting (Suomala *et al.*, 2010).

Associations have developed their own research internally, such as the Chartered Institute of Management Accountants in the UK, and there are also traditional professional research institutes such as the Tavistock Institute. This movement of professional and business associations can be seen as a first indication of the recommendation made by McNiff and Whitehead (2000) that, if universities do not meet the interests of practitioners, practitioners should develop their own research.

### 3. Method

Several authors have proposed interventional research processes. Gronhaug and Olson (1999) suggested the following procedure for performing interventional research:

- select and use observable data;
- interpret and judge the observations, which requires concepts and theory;
- plan and execute appropriate actions; and
- plan, collect, analyze and interpret the data to examine the results of the actions.

The authors note that the most common mistake in this kind of research is not to mention the step-by-step process by which certain conclusions were reached.

The research approach is interventionist because is intended to understand in greater depth the difficulties faced by small businesses in cost measurement and setting product price. The model was designed according to [Figure 1](#).

*3.1 Survey to identify gaps in management control techniques*

In this survey, of 65 responding companies, 57 (88 per cent) declared that having competitive costs was important or very important for their activities, while 37 (57 per cent) said that they did not know their costs precisely. Furthermore, 48 per cent of respondents said they did not know which products generated profit and which did not. The cash flow management technique was also highlighted in this survey and covered in the comprehensive research project; however, it is not reported in this paper.

*3.2 Sample*

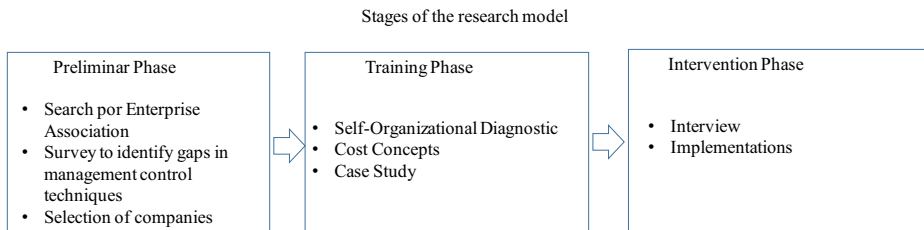
Five companies agreed to take part in the research project. This was made possible through an agreement between the university and SINAFER. SINAFER represents a significant portion of the Brazilian metallurgical industry, a sector that accounts for 305,500 jobs across the country, with a membership base of 2,380 firms in São Paulo (mostly small) with 31,012 employees.

*3.3 Selection of companies*

We selected five companies, according to their size and availability. We were told informally that companies that withdrew during the design part of the project had done so because of a lack of time. However, it is believed that if companies had been charged a fee, as recommended by [Lindholm \(2008\)](#), the number of withdrawals could have been reduced.

Manufacturing companies were required to send two representatives, one partner and his/her assistant, but in the end, only two companies completed all stages of the interventionist program. Thus, we are presenting just the findings on these two companies ([Table I](#)).

**Figure 1.**  
Stages of the research model



**Table I.**  
Characteristics of participating manufacturers

Company	Annual revenues	Employees	Life time	Participants
A	Equivalent to 1.2 million euros	28	19 years	Owners
B	Equivalent to 1.0 million euros	15	5 years	Owners

### 3.4 Knowledge creation and sharing – training phase

Participants were invited to attend classes, where researchers from the project taught the main concepts of costs, expenses, cost–volume–profit techniques and setting product price using mark-up. We used the case study method to develop the content in class and also for “homework”, for participants to apply the concepts and techniques in their companies.

We stimulated the sharing of knowledge through interaction between participants. This followed the SECI model developed by Nonaka *et al.* (2001). In these sessions, participants were also encouraged to make an organizational self-diagnosis, which was based on Porter’s (1991) five forces model.

### 3.5 Interviews

The penultimate stage of Labro and Tuomela’s (2003) model indicates whether the format of the research and its applicability has been, or is, adequate. To evaluate adequacy, a semi-structured interview was carried out based on the literature review and classroom observations.

The interviews were conducted at the companies’ headquarters, on the dates indicated in Table II with the representatives who participated in earlier meetings. All interviews were recorded and subsequently transcribed.

In the opinion of the participants, the following were the key aspects of the way the research project was designed:

- the opportunity to share experiences with other entrepreneurs;
- the language used by teachers; and
- the establishment of knowledge through practical exercises.

These points can be identified in the speech of Owner B1:

We shared the same difficulties with who was on our side. Then you start to speak the same language, right? There we could speak the same language and found that the difficulties we had that to me were huge, were not huge and were the same from my colleague’s side. The difficulty of managing personnel, production [...] so this format was pretty cool. And besides the theory, it was the practice exercise. Another very important thing was the language addressed. Simple language, objective [...] for us to assimilate [...] and didactics.

### 3.6 Intervention phase

The final step of this research design consisted of visits to the companies, to identify areas for improvement in costs and product price setting.

## 4. Results

In this section, we present the findings of the two manufacturers, from now on referred to as Company A and Company B.

Company	Date	Duration	Table II. Interview dates and durations
A	10/08/2012	43 min	
B	10/11/2012	62 min	



#### 4.1 Company A

Company A is 19 years old and operates in the metallurgical sector, producing industrial tools that are installed in packing machines. The company has 28 employees working in a single shift, with 25 employees working in production and only three working in business and finance/administration.

Organizational responsibilities are shared by two partners, who act as managers. Owner A1 is responsible for the commercial and industrial area, while the other manager (A2) is responsible for the administrative and financial area and also plays the main role in driving the company in terms of key decisions for growth.

Against our expectations, we found that Owner A2 considered accounting information as fundamental: "I would not be able to manage the company without the financial information received from the [accounting] office".

Once again, we were surprised because Owner A2 used financial language: "We use [financial reports] as an important tool to [analyze] the performance of the company, [...] that includes EBITDA [EBITDA is an acronym that stands for operational cash generation [...]".

A2's perception is that competitors make decisions regardless of accounting information, which increases competition for low prices. In Company A, the production system is made to order, and the manufacturing process lasts about 25 days, operating at almost 100 per cent of its capacity. About 90 per cent of Company A's customers are large companies, several of them multinationals. The largest customer represents approximately 30 per cent of revenue, something that worries managers, confirming Porter's proposition (Porter's, 1991). Owner A2 states: "This relationship is a vulnerability of the company, because we're in the middle of the 'sandwich.' Providers on one side and clients on the other. This is the problem".

In addition to this problem, Company A had its sale taxes increased, and these factors contributed to their participation in the research project. According to the administrative and financial manager (A2), one of the reasons that led the company to participate in the study was the need to know which products are profitable and which are not:

We were looking for this information, knowledge of costs, price setting. I said we should participate [because] I believe we will be able to absorb knowledge, an appropriate tool to help us.

*4.1.1 Analysis of training phase in Company A.* Before the training, Company A had already reviewed product costs, measuring the cost of direct materials, and estimating production time by cost center, thus enabling them to allocate indirect costs to products. The setting of product price consisted of applying a factor of 1.40 over those costs, which was somehow meant to incorporate expenses and a desired profit margin.

During the training, researchers suggested allocating indirect costs and expenses to products, using the consumption of equipment hours. The managers of Company A considered that this proposed method could improve the setting of product prices. Based on this suggestion, the company changed its previous method and started to include operational expenses in setting product price. This criterion was important, as Owner A2 declared:

When trying to set the price, it is important to consider not only the direct cost of product, but also operational costs. The percentage of administrative and selling expenses must also be incorporated. [These] were situations to which we were not giving adequate importance.

Company A did not consider machinery depreciation costs. The researchers argued that when depreciation is caused by effective use of the equipment or even obsolescence over time, and especially when the values are significant, it is necessary to consider this amount



in the setting of product prices. As it was difficult to obtain historical costs of equipment, the researchers suggested adopting the replacement cost to calculate the depreciation cost. A1 said: “before that we did not give importance to the depreciation factor. It was not taken into account”.

With regard to the training, A1 stressed its importance by stating that meetings guided the company in ascertaining the cost of each department:

Let's say that the meetings helped us a lot to know exactly the cost of each cost center. It took us some time to obtain this information, because we had to make a lot of arrangements in the information system. [. . .] So, for example, I had estimated the cost of an equipment center in a R\$X by [hour]. I calculated raw materials, which is easy, then you spend an hour here, two hours there and three hours there, then I had these estimated values. Today, we already know how much it is.

Homework acted as a means of continuous improvement because participants were motivated to obtain certain information that several times was not available. It took managers to a new understanding of the situation, which prepared them for the intervention phase.

Owner A2 emphasized that the meetings took them out of their comfort zone, encouraging them to change their behavior:

It is a lot of work, [. . .], but I am fully in favor of going through things, otherwise you just keep going the same way. So I love this idea of 'hold on now we'll have to calculate all the numbers.' At this time you identify so much that can be improved. So I'm very much in favor of it. We need to change [. . .].

*4.1.2 Analysis of intervention phase in Company A.* Interventions were made on two occasions. On the first occasion, it was found that the composition of the time-rate of the turning cost center had not been calculated correctly, as machines with different features and different time-rates were classified in the same cost center. Computer numerical control (CNC) and conventional lathes, despite being in different stages of production, were grouped in the same cost center, with the complication that not all goods produced passed through CNC and conventional lathes.

It was suggested that this composition be changed, demonstrating the consequences of the situation and the benefits of proper departmentalization of machinery; this was accepted by the members of the company.

Another result was identified: managers were not considering any percentage losses during the production process in the cost, although there were losses. It was suggested that a loss percentage for each product family should be considered, as the loss rate is different for each of them.

Because the company was certified by the quality system, it had adequate internal control, but lacked tools for setting product prices. To address this problem, a spreadsheet was designed to allow the company to calculate the price. It was also suggested that the company should compare forecasted costs with real costs. The strong and healthy separation of managers' responsibilities – with one operating exclusively in the commercial and production area (A1) and the other focusing on finance and administration – was noted. However, we noticed influential leadership from A2 in all sectors of the company, and this contributed to the success of the intervention.

#### *4.2 Company B*

Established in the state capital for five years, Company B manufactures stainless steel products for automotive companies, refrigeration and electrical resistance equipment. It has

15 employees (12 in the factory, one commercial and two administrative), as well as two owners, one dedicated to production and the other to sales.

The company's operations are managed by the partner responsible for the commercial area (B1) and also by Owner B2, who is responsible for administrative and financial areas. Owner B1 has acquired industry knowledge through working for another company in the same sector. Owner B2 has a degree in business administration and gained experience in other companies before working with her husband (B1).

The accounting information is provided by an accounting firm, but this information is not used for any decision-making.

The production system is made to order, and the process takes about 15 days. In the 20 products, different are produced, which serve as raw material for its customers. About 80 per cent of the customers are SMEs, and there is no revenue concentration. Unlike Company A, Company B's strategies favor selling to SMEs to avoid a price war. As B1 said:

He [the customer] says he wants to pay  $X-1$  but my price is  $X$ . Then how far is it worth selling for  $X-1$ ? So I'd rather have the small [customer] that will pay  $X$  than to attend to the large [customer].

With its production capacity full, the company seeks to track the price charged by competitors, without sacrificing a desired profit margin calculated on the gross selling price.

*4.2.1 Analysis of training phase in Company B.* During the training, researchers explained that it was important to have a certain level of accuracy in the calculation of costs, and it was suggested that recoverable taxes were taken off the price of direct materials. Company B declared that instead of taking recoverable taxes into account, it included sales taxes in the price using the net sales taxes percentage. Following the guidelines given by the researchers, B1 confirmed that after the meetings, one of the changes made by the company was to "consider the cost of materials net of recoverable taxes". B2 said that the changes resulted in increased confidence in the determination of costs and product price: "We were given a different view. So you have the true cost and that is your starting point".

Employee costs were not being calculated correctly by the company, given that it considered 50 per cent as burdens (13th salary, vacation and others) on nominal wages. In the training, we presented the importance of having the correct cost of payroll and showed an example. One important moment of knowledge sharing was when a participant provided other participants with a spreadsheet used in his company. In the researchers' view, the spreadsheet was correct and could thus be used by all participants.

As a result of the training, Company B started to classify expenses with personnel in costs and expenses, and also to consider social charges correctly, increasing the rate from 50 to 72 per cent.

However, the company did not change the product price in the light of the new numbers, but gained a better understand of the reality of their costs, as it gave "other views to see how much real profit we had" (B1).

The company improved its production controls to measure costs by each order of production (OP), allowing comparison with the forecast. Previously, the measurement was only on the total amount of cost in aggregated view, which did not enable an individual analysis, and did not allow OPs that had costs above those forecasted. As B1 commented, "today I detail the OS; previously I used the total [...]".

After this procedure, B1 was able to use the tool diagnostic, allowing interaction with the production staff and asking them about the variance analysis. He explained in more detail

the control of production orders and procedures adopted by the company when losses exceed the forecasts:

Previously the amount of loss was considered globally. Not today. We now take the individual Production Order 'this material was OK and this material was not.' If we are above 3% [of losses] I talk to the production staff and ask what happened. 'It happened that there was a power outage [...]'. When there is a power outage the machine stops. So we can understand what happened, and whether it was a technical problem or a problem with the raw materials. (B1)

One important change in Company B was that increased knowledge about costs led to greater confidence in the process of negotiating prices because, as B1 stated, "we now have a different view, closer to reality". Another change was in orientation, from sales-oriented to profit-oriented. According to B2, "Before, I used to pay attention only to the cash. Today we have an emphasis on generating profit". In the managers' opinion, the research design was satisfactory mainly in terms of the following:

- the opportunity to share experiences with other owners;
- the language used by researchers; and
- good assimilation of knowledge through practical exercises.

These points can be identified in the speech of B1:

We shared the same difficulties [...] We could speak the same language, and found that the difficulties we had that to me were huge, were not huge and were the same from my colleague's side. The difficulty of managing personnel, production [...] so this format was very cool. And besides the theory, it was the practice exercise. Another very important thing was the language addressed. Simple language, objective [...] for us to assimilate [...] and didactics.

Two other points were identified by the interviewees:

- (1) having a different company in the group; and
- (2) not having competitors within the project:

It was good [having a company reference] because at no time did the company refuse to share information. [...] We learned from their experience. (B1)

My concern was about sharing information with a competitor right by my side. That was good [not having competitors].

*4.2.2 Analysis of intervention phase in Company B.* Interventions in Company B were made on two occasions and had a total duration of 7 h.

It was found that the company used the same average time cost rate for the two machines installed, which was considered not appropriate because each machine operates on a different product line, and one demands more direct labor than the other. Owner B1 had already considered the need to separate the time cost rate of the machines, saying in an interview that "in reality it is the next step for us to have more clear information. So we want to get to this point".

The intervention consisted of preparing a spreadsheet that calculated the rate-hour of each machine, allocating indirect costs following the criterion of 50 per cent for each machine, according to data submitted by the company, with administrative expenses apportioned as machine-hours available. This tool also calculates the product price using a mark-up factor consisting of desired profit margin for the company for each trade.

This spreadsheet was delivered and explained on the second visit, which lasted 3 h. It allowed the company to identify two products that were being sold at 16.40 per cent below the desired price. The owners decided that these should be discontinued.

As identified in Company A, in Company B, there was also a clear separation of organizational responsibilities. The owner responsible for the administrative and financial department (B2) has been endorsed by the owners for all tasks relevant to her department. There is no interference from them in her work routine. She has a strong leadership role and participates with great influence in all business decisions, both strategic and tactical. This behavior was shown to be important for the company's active participation in all stages of the research project.

## 5. Discussion of results

### 5.1 Results of the training phase

The training phase proved to be of great importance for this research, as could be demonstrated through evidence obtained in the classroom and in the interviews at the headquarters of each company. The fact that there were no competitors in the classroom contributed to mutual trust, which allowed greater sharing of knowledge. Another point was that having a company participant who was from a higher management level and who was willing to share knowledge and experience enriched the group.

With regard to the composition, it is essential that at least two representatives per company participate, at least one being the partner responsible for the financial area. In terms of the methodology, it appears that the use of case studies and "homework" for participants gave the meetings momentum and prepared the company for the intervention phase. The use of suitable language by researchers who have experience with the subject was also seen as important. The value of participation from experienced researchers is in accordance with the findings of [Varila et al. \(2007\)](#) and [Arnaboldi and Azzone \(2004\)](#).

This interaction facilitated the creation of a climate of trust between researchers and practitioners involved in the intervention process. This is necessary because intervention in the field requires the participation of practitioners, and especially authorization for the intervention ([Suomala et al., 2014](#)), although in this study the intervention was more in the form of counseling and developing models and spreadsheets.

In Company A, reflections of the learning were more pronounced, as the owners themselves have implemented several changes that resulted in improved knowledge of their costs: first, they have considered depreciation costs, and second, they have started to include operational expenses in setting the product price. In our view, Company A has characteristics that differentiate it from others: good internal controls, a philosophy of continuous improvement, good human resources practices, staff autonomy and a partner and financial manager with a good level of education. The existence of such features is in line with the results of [Baird et al. \(2004\)](#). Company B was able to implement improvements in its cost controls, in particular for individual controls by Production Order. The company benefited from the sharing of a spreadsheet that calculates burdens. It has also developed improved accuracy in the calculation of sales taxes and was able to identify that its total payroll cost is 15 per cent higher than it thought.

Although Company B had the limitation of price being set by competitors, its owners said they had a better understand of the real costs, which brought more confidence in the process of negotiating prices with customers.

### 5.2 Results of the intervention phase

The intervention phase was able to change the reality, specifically in the method of calculating costs and setting prices, thus meeting the aims of this study.

In Company A, as it already had good internal controls, the intervention can be classified as moderate according to [Jönsson and Lukka \(2005\)](#) model, even though an inadequate composition of cost centers was identified. The intervention allowed the implementation of a tool for calculating the product price using mark-up, which up to then was absent in the company. The suggestion of taking into consideration the normal process losses in the composition of costs also arose during the intervention phase.

In Company B, the intervention occurred through the implementation of a spreadsheet that sets product prices taking account the production process and sets the selling price by the mark-up factor. Following the use of this tool, the company decided to discontinue two products, as it was discovered that the profit was lower than expected. One of the products was part of a mix in which Owner B1 believed that the low price on one item was compensated by the price of the others. However, this was not proved to be the case when the sale price was calculated using the spreadsheet. Given that the company already had reasonable controls and that no change in company processes was necessary, such intervention can also be classified as moderate.

One factor of concern is that in Company B, management by numbers is based on internal and financial controls and not on accounting information. This might be possible owing to its lower level of complexity, which confirms the lack of relevance of accounting information provided by accounting firms for management purposes ([Miranda et al., 2008](#)). Another finding reveals that even without enterprise resource planning (ERP) software, the numbers should be available to manage this small business.

An interventionist research project can be considered as a change management research project, as described in the change management literature. The presence of sponsors ([Burke, 2011](#); [Liu and Pan, 2007](#)) was essential for the intervention in both companies studied. It was identified that the owners A2 and B2, who are wives of members of the companies, exert leadership roles that are not restricted to administrative and financial departments, but apply to all strategic decisions, thus facilitating the process of change.

Sometime later, another meeting with all participants was held at which they sought to evaluate the effectiveness of the project. The results of this meeting were not formally documented, but the evaluation of the participants was that the project was successful. Another important result is that at the end of the project, Company A hired a business manager to take care of financial activities.

### 5.3 Current situation

We visited the two companies in September 2016 to find out how the situation had evolved. During this period, Company A had achieved a significant growth in sales and moved to a larger building, while Company B remained the same size. It is important to mention that in this period the Brazilian economy underwent a major crisis, with a cumulative decline in gross domestic product of more than 7 per cent over the past two years.

Company A achieved greater efficiency, as revenue increased by 36 per cent in the period, while the number of employees decreased by 14 per cent. This may reflect improved practices in the organization's monthly cash flow and income statement. According to the owners, "What matters is the last line (bottom line)".

Company B has moved, renting a larger space at a higher cost, but the cost of rent per ton produced is lower: "This concept of the importance of fixed cost dilution we acquired during

the workshop we did with you in 2012". The company has decided not to outsource a turning-shop operation:

From the knowledge, we acquired in those meetings, we began to analyze whether it was really worthwhile to continue outsourcing some operations (for example, lathing services). We concluded that it was not, because the service did not give priority, which directly affected our production schedule. So we opted to increase this fixed cost, but observed that the benefits outweigh these costs.

## 6. Final comments

This interventionist research is based on a combination of the model proposed by [Labro and Tuomela \(2003\)](#) and the one developed by [Nonaka et al. \(2001\)](#). We follow the goal proposed by [Berry et al. \(2009\)](#) in the sense of seeking to reduce the gap between academia and practitioners, and follow [Malmi \(2010, p. 121\)](#), who notes that the academic elite is reluctant to sponsor, or even accept, research based on alternative paradigms.

However, it is important to note that in emerging countries like Brazil, resources to finance research are scarce and come mostly from government sources, and therefore from society. Thus, it is necessary that researchers also conduct studies that meet the demands of practitioners and result in benefits for society as a whole.

This research sought to find contributions to the theory by testing an interventionist research model in cost measurement and price setting for small businesses.

Our results show that the training stage is crucial to the success of the intervention since in this stage the participants learn the benefits of cost control. Thus, the intervention phase is facilitated because the resistances to changes are minimized, and many of the tasks of the intervention stage that should be done by the researchers, are done by the participants themselves. These confirm the results of [Mahama and Cheng \(2013\)](#), for whom when managers perceive the benefits, they use cost controls more intensively.

Another important result of the study is that despite the fact that these were small companies without the power to fix prices for their products, a better understanding of costs increased their confidence in the negotiation process with clients and even the decision to remove products with low contribution margins.

The proposed model has advantages in terms of time and cost, and can thus be used to spread knowledge about management accounting techniques on a large scale through an intense training program followed by an intervention phase, which is less intensive in terms of time. It can be useful for government agencies that support small business as well as for professional associations of accountants, small business entrepreneurs' associations, etc.

This research can be classified as action research according to the typology proposed by [Malmi \(2016\)](#), which classifies in this category studies that included the participation of researchers in the change process, but that have as their purpose the building of a new theoretical construct. This research may also be useful for increasing the relevance of accounting research for practitioners, directing them to their interests and thereby reducing the much-criticized gap between academia and professional practice, as discussed in [Hopwood \(1983\)](#), [Scapens \(2006, 2010\)](#), [Ahrens and Chapman \(2007\)](#), [Malmi and Granlund \(2009\)](#), [Baldvinsdottir et al. \(2010\)](#) and [Malmi \(2010\)](#).

However, replication of this model requires some important precautions:



- It is necessary to avoid having direct competitors participating in the same training group and in the intervention.
- It is necessary that the researchers have practical and professional experience with the subject and with the reality of SMEs.
- It is necessary to develop the training in an appropriate language that is understandable to the managers/owners of this type of business.
- It is extremely important to involve the owners at all stages of the process.
- It is important to have the support of a business association to give credibility to the process. This support does not necessarily involve financial resources and may be limited to the dissemination of the process to its members and the assignment of a physical space in the association's headquarters.
- Having a company in the group as a benchmark works as social control, which encourages the behavior of other participants and contributes to the sharing of knowledge.

The main limitation of this research was the small number of companies in the study. Future research could expand the number of firms as well as analyze other industries. Another limitation was the small period in which the study was performed. Therefore, longitudinal studies, with more depth, could be useful to evaluate the long-term results of the interventionist research.

A number of points can be improved in future research, one of which is the time interval between the training and the intervention. In this study, it was approximately three months, which we consider to be quite long. There is a need to balance two demands. The interval needs to be long enough because it requires time for the manager to provide the information necessary to implement the changes, but not so long that the motivation decreases. Thus, future research may benefit from this experience and reduce the time interval to maintain motivation and an even better use of knowledge assimilated in the training.

Another suggestion is to apply the model with the support of accounting advisors who have experience in SME. We understand that accountants working in accounting advisory services could be agents of change for this reality (lack of financial controls) of small businesses and important partners of interventionist researchers.

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