



JISTEM: Journal of Information Systems and
Technology Management

E-ISSN: 1807-1775

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Brasil

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JISTEM: Journal of Information Systems and Technology Management, vol. 6, núm. 2, 2009, pp. 227-
245

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São Paulo, Brasil

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FACTORS OF INFLUENCE ON THE ENTREPRENEURIAL INTEREST: AN ANALYSIS WITH STUDENTS OF INFORMATION TECHNOLOGY RELATED COURSES

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ABSTRACT

The purpose of the research was to analyze the entrepreneurial interest of students in information technology related courses. A literature review was performed, from which four hypotheses were announced, affirming that the student interest in entrepreneurial activity is influenced by (1) the perceived vocation of the area, (2) the ownership of a company, (3) the perceived social support from friends and family, and (4) the entrepreneurial skills mastery. A field study was developed, with data collected from the 171 students of higher education institutions from Fortaleza. The data were analyzed by using statistical techniques of descriptive analysis, analysis of variance, and multiple regression analysis. It was found that: (1) students, in general, have a moderate predisposition to engage in entrepreneurial activities; (2) the entrepreneurial interest is influenced by the perceived entrepreneurial vocation of the area, the social support, and the perceived strategic entrepreneurial skills mastery.

Keywords: Entrepreneurship; Entrepreneurial interest; Information technology students

Recebido em/*Manuscript first received*: 26/01/2009 Aprovado em/*Manuscript accepted*: 10/07/2009
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1. INTRODUCTION

Professional background in university courses, in the various academic areas, has presented strong changes in the past 15 years, influenced, among other reasons, by the alternative of entrepreneurship for the future professionals. Several courses of the areas of Applied Social Science (such as Business Administration, Accounting and Tourism) and Information technology (such as Computer Science, Information Systems and Software Engineering), have begun to include at least one discipline directly related to entrepreneurship, with guidance for the construction of the necessary skills for initiating and maintaining a new business (although the word entrepreneurship has an extensive use referring to managerial and professional innovative, and visionary activity [FILION, 2004], here the word refers to the opening of a [new] business).

The model of training with emphasis on entrepreneurship seemed an interesting option for these courses, since it could enable students to combine theoretical knowledge acquired in courses with the exploitation of market opportunities, forming professionals oriented to beyond the culture of employment (CHIAVENATO, 2006).

The central belief is that the entrepreneurship oriented institutions (by means of specific disciplines, or the development of projects like junior enterprises or incubators, for example) have a (theoretical) potential to guide the professionals to get involved in entrepreneurial experiences, by providing the practical experiences required for future entrepreneurs. On the other hand, exploratory studies conducted for this research did not indicate the effective results of these actions.

It is believed that the actions of these institutions have an impact mainly on the construction of entrepreneurial skills, both strategic (such as business strategic vision, capture of opportunities) and operational (for the management of the day-to-day of the business). Here it is assumed that meeting the skills requirements, despite its relevance to the success of a business, has limited potential for the construction of entrepreneurial interest of future professionals. Aspects such as national environment (BEGLEY; TAN, 2001), social relations (GREVE; SALAFF, 2001), family influence (MILLER, 2000), among others, are examples of factors of influence that university institutions have limited power to work on.

Considering these possibilities, it was set up as topics of analysis for this study the 'perceived vocation' of the entrepreneurship courses, the social 'support' (of family and friends) and the 'mastery' of entrepreneurial requirements (for more details, see item 2.2 and 2.3). Accordingly, the following central question was defined: how do these factors (perceived vocation, support and mastery) influence the entrepreneurial interest of students in higher education courses?

The proposition of this study is initially related to students, since they are the future professionals, and we decided to focus specifically on students in Information technology related courses. The main reason for this choice stems from the fact that these courses are, in an *a priori* analysis, very oriented to entrepreneurship, especially when technical and managerial skills are taken into account. As it could be observed in some courses curricula, according to exploratory research carried out by the authors,

many courses present a subject related to entrepreneurship, probably to stimulate the future professional to start a new business in the technology sector, recognized as innovation intensive, and with lots of success opportunities.

The main objective of the research was so defined: to analyze, in the context of the courses considered, some selected factors (perceived vocation, support and mastery) of influence for the students' entrepreneurial interest. Other objectives were: to understand the specific influence of each of the selected factors on the students' entrepreneurial interest; and to assess the variations of these factors considering some the categorical information about the students.

To answer the main research question and achieve the objectives, the rest of the paper was divided into five parts: the second part brings the literature background, with emphasis on specific topics of the research; the third part presents decisions and methodological procedures used in the survey; the fourth part brings results and analysis of the collected data; finally, a summary and the conclusions of the study is presented, including a discussion of results and some limitations and recommendations for future studies.

2. BACKGROUND

This item brings the main results review of the literature performed. It was decided to present it in three parts: first, some considerations of the entrepreneurship theory are presented; then the specific topics of the study are exploited; and, finally, the third item brings the development of hypotheses.

2.1. Entrepreneurship overview

The entrepreneurial activity can be understood as the ability of human beings to shape environmental conditions in their favor through a visionary process of creating reality. According to Murphy, Liao and Welsch (2006), the increase in entrepreneurial activity is one of those factors for the increase of the per capita income in the West, especially from the 19th century on¹.

The delimitation of entrepreneurship as a field of study may be attributed to the seminal work of Schumpeter (1934). In his text, the author makes a distinction between owner and entrepreneur, the latter being associated with the idea of enterprise, or a person who starts a new business. Schumpeter (1934) works with the concept of creative destruction, according to which new practices replace older ones, which become obsolete. From this point of view, the author (Schumpeter) suggests some forms of innovation, such as the development of new products, new ways of organizing production (including the use of new raw materials), and innovations in commercialization and distribution (including access to new markets). Such forms of

¹ According to Murphy, Liao and Welsch (2006), entrepreneurship is linked to several phenomena related to the development of international trade, demand curves, competition as a mechanism of and innovation and opportunities for construction.

innovation are, in their totality, possibilities to change the production standards.

From this perspective, entrepreneurship would happen from changes in the market through the opportunities for innovation generated by the production system dysfunctions. The prospect of Schumpeter is what was recognized as the economic approach of entrepreneurship thought (SOUZA; GUIMARÃES, 2005).

However, several other authors turned to the analysis of the relationship between personal characteristics and entrepreneurial activity, which was conventionally understood as the behavioral approach of entrepreneurship thought. The assumption of this current is that people seek their personal fulfillment, and have entrepreneurial initiative as a way to achieve this goal (SOUZA; GUIMARÃES, 2005).

The two perspectives (economic and behavioral) are focused on personification of the entrepreneur, and could be understood in a common sense, by the sense complement. So, one can understand that the entrepreneur, conditioned by specific features (behavioral basis), seek to identify business opportunities and propose innovative deals to seize these opportunities (economic basis).

Despite the strong reference to these two currents, more recent studies on entrepreneurship have paid their attention to the social context, such as the influence of social agents that are near the entrepreneur (such as friends and family members), and environmental (such as national norms) or the general context of the daily routine of the entrepreneurial agent (business environment, educational field of study...) (BAUGHN *et al.* 2006, GREVE; SALAFF, 2001, BEGLEY; TAN, 2001).

It is possible to understand that these perspectives converge in order to provide a better comprehension of the entrepreneurial process, as a form of identification and understanding of the factors of influence on both entrepreneur interest and entrepreneurial activity itself. The following item describes these topics.

2.2. Topics of research

The entrepreneurial initiative has been subject of intense debate, both within the academic context (on the research level) and in the design of public policies. For any of the contexts, one of the central challenges is to understand the motivations for the basic interests of people in the entrepreneurial activity.

On a first level, the entrepreneurial interest can be explained by behavioral aspects of entrepreneurship, which highlights motivation for the search for self-realization. One can also understand motivation as a necessity (lack of alternative to the job), an especially relevant fact in the context of developing countries. The first considers the externalization of the entrepreneur himself, while the second is related to an alternative search for a professional placement (DOLABELA, 1999).

Filion (1999, 2001) argues that professions of the future will have a greater entrepreneurial orientation, which suggests the development of different types of entrepreneurship. Some examples of the different possibilities are: those who start a new business (classic entrepreneurship); those who innovate in companies in which they are employed (intrapreneurship); and more recently, social entrepreneurs, environmental entrepreneurs, and institutional entrepreneurs have been in evidence (the ones that work on the relations between different enterprises).

In order to achieve the objectives of this article, it is necessary to analyze the factors of influence on the entrepreneurial interest. In the paper of Baughn *et al.* (2006), the following factors were analyzed (see item 2.3): influence of the national context, which the authors understood as the vocation of the countries for entrepreneurship; social capital (friends and family); and of entrepreneurial skills mastery. These factors formed the basis for the analyses developed here, as explained below.

Although Baughn *et al.* (2006) posit a first focus on a nationwide analysis, their paper is suggestive of other reflections, especially considering that an environment analysis could go beyond the national context, involving aspects such as cultural, historical, and economic context, or even in a more restrict view, such as the family or the professional context. Taking the study of Baughn *et al.* (2006) as a theoretical evidence of the influence of the context, here we chose to assess the perceived vocation of courses/areas, which can be defined by as incentives and rewards that the areas of study give to entrepreneurial activity. This incentives and rewards may be in the form of admiration, reputation, and the belief in the success of entrepreneurs.

Thus, considering this evidence, and taking into account the different areas of professional education (and not the national context, as done by Baughn *et al.* [2006] did), it can be admitted that entrepreneurship is a transversal logic through different areas of knowledge. The authors' experience and some exploratory evidences indicate that some areas show greater orientation to the development of entrepreneurial activity, as business administration, engineering and information technology, while others are more oriented to employment (such as the courses for the graduation of future school teachers, for example).

According to Araújo *et al.* (2005), universities, both in Brazil and abroad, have gone through a 'second evolution' since they came to adopting social and economic development search as part of their goals. Thus, according to the authors, in addition to the transition to incorporate research into the practice of teaching (first development), it emerges a new function called 'entrepreneurial university', which involves an integration of teaching and research with economic and social development, which would be viable from the dissemination of the entrepreneurship culture in universities.

The authors (ARAÚJO *et al.*, 2005), based on data from research done by Canadian higher education institutions, identified a concentration of entrepreneurship education in few areas (more than half of the disciplines of entrepreneurship are in courses of management area, and, to a lesser extent, in courses of engineering area). The authors do not bring Brazilian data, but it is possible to consider that this situation is similar in Brazil. The explanation for this is believed to be the fact that these areas (management and engineering) are more oriented to entrepreneurship than the others.

Regarding the social capital, it was understood as the support of the closest people to the (potential) entrepreneur, like family and friends. In the literature review, it was possible to conclude that the entrepreneurial activity actually suffers influence of the existing social relations (GREVE; SALAFF, 2001; MILLER, 2000). As Filion (1993, p. 59) argues, this system of relations is essential for entrepreneurial activity because, "[...] The entrepreneurs are originally products of the family relation systems, and then develop a network of business relationships, in such a way that people involved in it become social products which entrepreneurs need, as they perform their

vision”.

In this author’s (Filion) point of view, family support is especially relevant at the beginning of the development of the entrepreneurial vision, which will shape the type of initial vision that the entrepreneur may have in creating a new business. However, for the shaping and consolidation of a broader vision, the new relations established (friends) are fundamental parts of the visionary process.

Concerning entrepreneurial skills, the literature reviewed seems to depart from the comprehension that to start a new business it is necessary, first of all, to master some specific skills (DOLABELA, 1999; DORNELAS, 2005; CHIAVENATO, 2006; BARON; SHANE, 2007). A general suggestion, given by various authors of manuals that are supposed to examine entrepreneurship and develop entrepreneurial actions, is that, in addition to a well conceived idea, entrepreneurs need to have some practical skills such as managing financial sources and dealing with various partners; promoting daily activities business management; developing personal discipline and organization, among others.

Topics listed above have, as a general assumption, a potential influence on the interest of starting a new business (at least *a priori*). It is understood that it is appropriate to assess the nature of this influence in specific contexts (with delimitations such as geographic region, education area, profession, ethnic factors, gender ...). Baughn *et al.* (2006), for example, analyzed the factors together, considering regional delimitation. For this work, it was decided to assess specifically professional education areas. The details of this decision are described in the following item.

2.3. Development of hypotheses

Baughn *et al.* (2006) developed a study to assess the entrepreneurial interest of business students from three different countries: China, Vietnam and Philippines. In the study, the authors evaluated a set of hypotheses associated with the factors of influence on the interest of the students to develop activities related to entrepreneurship, and then they tested these hypotheses with approximately 800 students, distributed in the three countries.

For this article, it was considered appropriate the proposition of using the background developed by the authors (Baughn *et al.*), and to develop some appropriate adjustments for the Brazilian context, and specifically for the conditions of the new empirical context of analysis. Thus, the main aspects of conversation between the work of Baughn *et al.* (2006) and the one presented in this article were the context of empirical analysis, the hypotheses, and the constructs measurement scale (the latter is shown in item 3).

Concerning the context of analysis, the original study evaluates the prospects of the different countries analyzed. Here, the idea of evaluating specific areas of professional study or undergraduate courses was regarded as consistent.

With regard to hypothesis, Baughn *et al.* (2006) developed five different hypotheses which announced influential relationships to the entrepreneurial interest. These hypotheses were evaluated in the specific context of the original paper and have been adapted to both context and objectives of this article. The details were:

- First, Baughn *et al.* (2006) developed the hypothesis that the entrepreneurial interest is conditioned by vocation and national culture of encouragement and support for entrepreneurship. The authors depart from previous findings that acceptance, admiration, or even encouragement directly promoted by countries are conditioning factors for the interest of people in developing an entrepreneurial behavior. Moreover, it is believed that these conclusions are extensive to the analysis of different areas of professional background. As explained above, in the general context of higher education in Brazil, it can be assumed that the courses present different positions with respect to entrepreneurship, and some are more oriented than others. Thus, taking the evidence from the exploratory analysis and adapting the hypothesis of Baughn *et al.* (2006) for this study, it was decided to take no longer the national norm, but the vocation of the course (incentives and rewards or the course/area for entrepreneurial activities) as the new hypothesis, which has been defined as follows:

H1. The entrepreneurial interest is positively related to the perceived vocation of course for the entrepreneurship;

- Baughn *et al.* (2006) also examined the influence of social capital, perceived as the support from family and friends for an entrepreneurial initiative. The hypothesis developed by the authors was used here without adjustments and assessed with the following statement:

H2. The entrepreneurial interest is positively related to the support provided by relatives and friends;

- The authors (BAUGHN *et al.* 2006) have also developed a hypothesis directly related to the previous hypothesis, that the entrepreneurial interest is related to entrepreneurial activity of a family member. For this study, it is considered important to assess not only the conditions of family members, but also the student's condition. Thus, the hypothesis has been defined as follows:

H3. The entrepreneurial interest is positively influenced by the ownership of a company by the student or by their relatives;

- The fourth hypothesis developed by Baughn *et al.* (2006) associates family with entrepreneurship again, assessing the relationship between the entrepreneurial interest and the perception that an entrepreneurial activity would influence family obligations. Here, it was understood that such evaluation is compatible with the analysis of the attitude of different countries in relation to family institution and related obligations, but this attitude is not appropriate in the analysis of the areas of study within the same country. Thus, specifically in relation to this hypothesis, it appears that its application to the context of education, even if possible, would not be appropriate;

- The fifth hypothesis of Baughn *et al.* (2006) related the entrepreneurial interest to the self-confidence of respondents concerning the necessary skills for developing entrepreneurial activities. This hypothesis was maintained for this study, and is announced as follows:

H4. The entrepreneurial interest is positively related to the perception of individual skills mastery necessary to initiate and sustain a new business.

From these assumptions, an empirical study has been developed to be validated by means of appropriate statistical techniques. Procedures and decisions are described in the following item.

3. METHOD

The study was conducted in three phases: exploratory procedures; definition of instruments and data collection; and empirical work. The exploratory procedures were developed in two moments: the first consisted of literature review and development of hypotheses, as stated in item 2; the second consisted of general exploratory procedures, which were related to the evaluation of similar studies, analysis of scales used, and conversations with experts for the delimitation of the constructs of the research.

As a way to access empirical information, the questionnaire was selected as instrument. For the definition of the structure of the instrument, it was decided that this would be divided into three blocks: the first block containing identification variables related to the context of analysis and respondent's future intentions; the second block involving issues related to the central constructs of the study; finally, the third block included the identification of the respondents, with questions about demographic and socioeconomic aspects. Specifically relating to the scales for measuring the constructs, all variables were extracted from Baughn *et al.* (2006). The items were initially translated into Portuguese by the authors, and then they were evaluated regarding the need of adjustments and adaptations:

- To the construct entrepreneurial interest (interest), the five items of the original scale, which were listed as questions, were translated and adapted for statements;
- To the construct vocation of the course (vocation), the items from country vocation were translated and adapted in order to change the vocation from national context to vocation of the course;
- To the construct support of family and friends (support), the six original items were translated, and suffered no adjustments;
- To the construct entrepreneurial skills mastery (mastery), the 16 items were translated and then reassessed, and it was decided to exclude one item that referred to a general assessment of skills mastery;
- About business property (ownership), measured on a single item, the statement has been adjusted to include the possibility of ownership of a company by the respondent (in the original scale, it was questioned only the ownership of a family member).

After this procedures, all the items were carefully analyzed by the authors and submitted to other researchers in order to assure that the set of items would be measuring what they were supposed to measure (content validity) and that they were adequately worded (face validity). With some more adjustments, the items were consolidated and put in the questionnaire. For the measurement, the first four constructs were presented in the form of statement, by asking the degree of agreement through a 5 points Likert scale, in which 1 indicated total disagreement, and 5 indicated total

agreement. The fifth construct (ownership) was measured by a dummy variable, with 0 indicating no ownership of companies, and 1 indicating ownership.

After preliminary consolidation of the instrument, a pre-test was made with a sample of 10 respondents. The proper adjustments were then made, and finally the questionnaire was applied. At this stage, the following decisions were outlined:

- Universe: the universe was formed by students of Information technology related courses from the city of Fortaleza (State of Ceará). The exact size of this universe could not be defined;
- Sample: for the purpose of analyzing the hypotheses developed, it was selected a sample of 172 respondents from four different academic institutions, two of public nature, and two private. As the purpose of the research is just to analyze the relationships hypothesized and present an evidence of the relationship without generalize for all the population, this sample size is considered enough;
- Method of data collection: the collection of data was preceded directly in the classrooms, with the support of the courses coordinators and of some teachers who made the application viable.

The statistical procedures for the analysis of data collected in the fieldwork were of three types: description of the sample; univariate analysis of the construct related variables; and multivariate analysis, with the evaluation of the hypotheses defined. All procedures were developed with the support of SPSS software, version 13.

The description of the sample was made by extracting response frequencies of each of the variables related to: course; future intentions; and demographic and socio-economic variables. In the univariate analysis, the mean and standard deviation were initially extracted from each of the independent variables.

The set of variables was also submitted to an Exploratory Factor Analysis, a technique that, according to Hair *et al.* (2005, p. 91), consists of a “class of multivariate methods whose main purpose is to define the underlying structure in a matrix of data”. From this technique, it was possible to verify that the items used in the questionnaire were consistently associated with defined constructs. After these procedures, for each of the constructs the Cronbach’s alpha measure was extracted, a measure for assessing the measurement reliability of the items defined for each of the constructs (MALHOTRA, 1999).

After these procedures, and confirmed the structure of the items in the composition of constructs, a general measure of the construct was extracted, with aggregation of the scores of correspondent entries of items components of each construct, with the exception of construct ‘property’ (the variables aggregation procedure was made according to the recommendations suggested by Bagozzi and Edwards [1998]). The constructs were also assessed by their means and standard deviations, and also considering the various alternatives of answers of some of the categorical variables of the study, as a way to identify and discuss possible differences. This last procedure was made possible by the statistical technique analysis of variance - ANOVA (MALHOTRA, 1999).

Considering that the hypotheses announced involve relationships between

constructs, it was decided to evaluate these relationships through the Multiple Regression Analysis technique, which enables to assess the consistency of influence relationship between two or more independent variables and a dependent variable (MALHOTRA, 1999). Thus, the four hypotheses were tested considering the (aggregated) construct 'interest' as a dependent variable, and the (aggregated) constructs 'vocation', 'support', 'mastery' and 'ownership', as independent variables.

4. RESULTS

The results of the research are presented in three parts: initially, the description of the sample is presented; then the analysis of the constructs; and the third moment brings the regression analysis performed.

4.1. Description of the Sample

The sample consisted of students from the four different courses selected, with 50.0% of students from Information Systems, 25.6% of Computing Science, 12.8% of Computing Networks, and 11.6% of Electrical Engineering. In this composition there was a preference for students of the second half of the course (73.8%), as it is believed that they have a better condition to evaluate research questions because of the greater experience with the course. With regard to the nature of the institution, the composition was predominantly of students from private institutions (73.0%).

The variable that questioned the ownership of business by the respondents or their families presented a low percentage of the affirmative answer (with 25.0% of the sample). Regarding the condition of work, the majority (62.2%) of students informed to be working (46.5% full time and 15.7% in part time), and approximately four out of ten students (37.8%) reported not having a job.

When asked about the professional future, the majority of the students stated that they wanted to find a job (public or private), with 59.3% of respondents. Those who wished to work in their own company totaled 23.8%, and only 2.3% intended to work in family businesses (11.6% indicated 'other' as a response to the item). These results demonstrate that the search for a job, at the expense of entrepreneurial activity, is a preferential option for students of courses from the area of information technology.

As an exploratory way to evaluate the hypothesis of association between the business ownership and entrepreneurial interests, the variables 'own company or in the family' and 'future intentions related to work' were cross tabulated. The results of the dependence test indicated that there is a significant difference between the expected and observed values ($\chi^2=14.751$, $p<0.01$), and it was identified that students who have a business (own or in the family) are disproportionately more interested in working in these, while those who do not have a business (own or in the family) are disproportionately more interested in finding a job. These results strengthen the hypothesis H3 announced above. It is now necessary to verify the nature of this influence taking into account the other factors defined by this study. A procedure has been performed for that, which is presented in item 4.3.

Specifically, regarding the intentions related to studies, the majority of students want to do a *latu sensu* graduate course (44.8%), followed by the ones that have the intention of engaging in a masters degree course (33.1%), and the ones wishing to make another undergraduate course (14.0%), a total of 8.1% stated 'other' in response to this question. The results are indicative of students' interest to follow in-depth studies, especially through graduate level, reinforcing the trend of looking for continuing educational improvement.

With regard to age, the vast majority (58.7%) informed to be 'until 24 years old' (27.9% with 'below 21 years old' and 30.8% 'above 21 until 24 years old'), 19.8% 'above 24 until 27 years old', 21.5% are 'above 27 years old'. In relation to gender, 86.0% were men and 14% were women. The sample was still composed of 83.7% married respondents, and 10.5% unmarried (5.8% reported 'other' as a response). Regarding family income, data showed a good distribution through the alternatives, with 20.3% for family rent 'below R\$ 1,000.00', 25.0% 'over R\$ 1,000.00 until R\$ 2,000.00', 23.3% for 'over R\$ 2,000.00 until R\$ 3,000.00', and 31.4% 'over R \$ 3,000.00'.

4.2. Analysis of the variables

The set of variables of each of the constructs was submitted to the statistical technique Exploratory Factor Analysis - EFA, which allowed a comparison of the previously defined proposal with the results actually found from fieldwork. In the constructs, 'entrepreneurial interest', 'support of family and friends', and 'perceived vocation of the course', the factor structure generated remained as previously defined, and there was not the need for any adjustment procedure.

Specifically in the variables associated with the 'entrepreneurial skills mastery', in the EFA procedure, two factors emerged from the 15 different variables initially submitted. The verification of the meanings of the variables that got together in each factor indicated that they were grouped in order to demonstrate two specific types of skills, which were then identified by 'strategic skills' and 'operational skills' (see appendix).

Considering these results, and evaluating the statement of the hypothesis H4 (The entrepreneurial interest is positively related to the perception of individual mastery of the skills necessary to initiate and sustain a new business), we decided to divide this hypothesis in two others. Considering also that the set of variable that each factor generate maintained the focus on the mastery of skills, the new hypothesis was announced with the same sense of hypotheses H4, but separating the two emphasis of the skills under analysis. The statements are the following:

- H4a. The entrepreneurial interest is positively related to the perception of individual mastery of the strategic skills necessary to initiate and sustain a new business;
- H4b. The entrepreneurial interest is positively related to the perception of individual mastery of the operational skills necessary to initiate and sustain a new business.

From these results and decisions, the variables used in the research were grouped by construct, and the means and the standard deviations were extracted. (The

appendix presents the information for interdependent variables of each construct. The statements were maintained as presented in the questionnaire). The variables were also analyzed about their reliability to represent the constructs. To this end, the Cronbach's alpha measure was selected.

The *alpha* was extracted from each construct and acceptable values (all above 0.6) were found in all of them. Considering the results of the factor structure found in the Exploratory Factor Analysis, and the reliability extracted, it was decided to aggregate the variables to generate a general measure of each construct. Thus, taking the mean of the scores of each construct variables as the aggregation rule, in each entry, five new variables were then generated. The results for the values of means and standard deviations of each construct are displayed in Exhibit 1.

As it is possible to see (Exhibit 1), the means of the constructs are between moderated and high, and the highest mean was to 'perceived vocation of the course' (4.05) and the lowest one was to 'personal entrepreneurial interest' (3.37). Standard deviations can be considered low or moderated, indicating convergence in the respondents' evaluations.

Exhibit 1: Results of the means of the constructs

Construct	Mean	Deviation
Personal entrepreneurial interest	3.37	0.87
Perceived course vocation	4.05	0.68
Perceived social support	3.64	0.69
Strategic skills mastery	3.53	0.76
Operational skills mastery	3.84	0.50

Source: Research data

The conclusions are that: the students' interest in starting a new business is intermediary, despite the high vocation perceived in the courses; the social support is at an intermediate level, with higher means for the support of friends; finally, the variables of perception of operational and strategic skills mastery were at a higher level, probably due to technical knowledge and skills learned during the studies in Information Technology courses.

With these results, it was decided to carry out more investigations considering the categories of some of the non-metrics variables of the study. This procedure was made by using the technique analysis of variance (Anova) and the main results are displayed below:

- Regarding the variable 'half of the course', there was a significant difference only in the 'entrepreneurial interest' ($F=3.934$, $p<0.05$), and the mean was higher for whomever was in the second half of the course.

In this case, the results are justified because it is understandable the assumption that as the students progress in their courses, they increase their mastery of technical skills, and their knowledge on the course possibilities, what may provide higher entrepreneurial interest.

- In the analysis by nature of the educational institution, there were differences in dimensions, 'personal entrepreneurial interest' ($F=4.765$, $p<0.05$), and 'operational skills mastery' ($F=4.632$, $p<0.05$). In these two cases, the means were higher for students from private institutions;

The fact that the entrepreneurial interest was higher in private institutions is understandable by the strong guidance that this type of institution has given to entrepreneurship, at least in Fortaleza. Exploratory verifications indicated that, in various Brazilian institutions, the courses from the Information technology area had a discipline of entrepreneurship in the curriculum. Specifically, related to perception of operational skills mastery, it was also verified in the courses of private institutions, disciplines that specifically aim at management training, with subjects such as Introduction to Administration and Project Management.

- In relation to the 'business ownership', there was a significant difference in 'personal entrepreneurial interest' ($F=10.699$, $p<0.005$), 'strategic skills mastery' ($F=12.732$, $p<0.001$), and 'operational skills mastery' ($F=4.180$, $p<0.05$). In all the cases, the means were higher for the group that has a business company.

From these results, we have a reinforcement of hypothesis H3, announced above, as it is reaffirmed that there is, in general, an influence of the ownership of business on the interest of the students to create a new business.

Some other verifications were performed, but the results did not bring relevant information to this paper.

4.3. Regression Analysis

The hypotheses defined for the study were evaluated by using the statistical technique multiple regression analysis, since this enables the simultaneous evaluation of the influence of the factors selected for this research. Thus, the construct 'entrepreneurial interest' was placed on condition of dependent variable, while perceived vocation in the course, perception of social support, the two dimensions of skills mastery (these on the same scale of the dependent variable), and company ownership (as a dummy with 0 for no possession, and 1 for possession) were entered as independent. For the purpose of analysis, the enter method was used, which indicates the results of each of the variables, independent of the statistical consistence of the standardized coefficients.

Exhibit 2: Multiple regression results

Variável	Coefficient (β)	Statistic t	Signi. (p)
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Perceived course vocation	0.370	5.907	0.000
Perceived social support	0.167	2.576	0.011
Business ownership	0.093	1.593	0.113
Strategic skills mastery abilities	0.306	3.732	0.000
Operational skills Mastery	0.029	0.368	0.714

Source: Research data

The values of the estimated regression models are in Exhibit 2. The model could be considered consistent ($R^2=0.495$), and, as it is possible to see three of the relations (constructs perceived course vocation, perceived social support, and of strategic skills mastery were statistically significant ($p<0.05$).

From this result, there are conditions for the analysis of the hypotheses, as described below:

- Hypothesis H1, which stated that ‘the entrepreneurial interest is positively related to the perceived vocation of course for the entrepreneurship’, was confirmed ($\beta=0.370$, $p<0.001$). Thus, it is confirmed that the students from the Information technology area get more interested in opening a new business when they perceive that the area has an entrepreneurial orientation;
- Hypothesis H2, which stated that ‘the entrepreneurial interest is positively related to the support provided by relatives and friends’, was also confirmed ($\beta=0.167$, $p<0.05$). In this case, the relevance of the support that is favored by families, and especially from friends, is attested as necessary to motivate students to get involved in entrepreneurial activities;
- Hypothesis H3, which stated that ‘the entrepreneurial interest is positively influenced by the ownership of a company by the student or by their relatives’, was rejected ($\beta=0.093$, $p=0.113$). In this case, it is evident that the entrepreneurial interest is probably more influenced by the technical skills inherent in the course, which would relieve the experience in a family’s enterprise or their own enterprise. It should be noted, moreover, that this hypothesis may have been harmed by the low frequency of respondents who owned a company, which may have hindered the validation of the hypothesis by the low variation, especially in dealing with a dummy variable;
- Hypothesis H4a, which stated that ‘The entrepreneurial interest is positively related to the perception of individual mastery of the strategic skills necessary to initiate and sustain a new business’, was confirmed ($\beta=0.306$, $p<0.001$), and hypothesis H4b, which stated that ‘the entrepreneurial interest is positively related to the perception of individual mastery of the operational skills necessary to initiate and sustain a new business’, was rejected ($\beta=0.029$, $p=0.714$). The evidence in that case was that the strategic skills mastery is considered by students, in the Information

Technology area, as essential to get involved in entrepreneurial activities, what is justified by association between entrepreneurship and the identification and management of market opportunities. The rejection of the second hypothesis is not justified *a priori*, and it is possible to assume that students of the area analyzed, in spite of considering themselves as good at operational requirements (see Exhibit 1), do not believe that these requirements are prerequisite for initiating a business.

In summary, the results ensure that the perceived entrepreneurial vocation of the area, the support provided by family and friends and the perceived entrepreneurial strategic skills mastery are factors that determine consistently the students' entrepreneurial interest (Exhibit 3). The other two factors (business ownership, and perceived operational skills mastery), did not present significant influence on this interest, although other statistical manipulations indicated some influence in the bivariate tests (chi squared test in the cross tabulation of business ownership with intention to open a new business [item 4.1], and analysis of variance for entrepreneurial interest and business ownership [item 4.2]).

Exhibit 3 – Synthesis of the results of the tests

Hypothesis	Factors of influence on the entrepreneurial interest	Resultado
H1	Course vocation	Confirmed
H2	Support perception	Confirmed
H3	Business ownership	Rejected
H4a	Strategic skills	Confirmed
H4b	Operational skills	Rejected

Source: Research data

5. SUMMARY AND CONCLUSIONS

The study here developed had the purpose of analyzing the specific aspect of the entrepreneurial activity, related to the expression of interest of the students in Information technology related courses to create a new business. It was further analyzed how this interest is influenced by the perceived vocation of the course, by the perception of social support (from friends and family), by the ownership of a business, and the perception of entrepreneurial skills mastery. Research results enabled the comprehension of how these factors interact in the influence of the entrepreneurial interest.

In general, results indicated that students have a moderated level of interest in the entrepreneurial possibility; that they perceive a high vocation of the courses for entrepreneurship; perceive a good support from friends and family; and additionally,

they evaluate themselves as having good mastery of the skills necessary to create and maintain a new business. These results are understandable because of the potential that the courses offer to entrepreneurship through the development of innovative technologies and products.

Specifically, regarding the influences on the entrepreneurial interest, three hypotheses were supported, and the two others were rejected. The conclusion is that institutional (vocation of the course), social (social support), and personal aspects (strategic skills mastery) are fundamental elements for the definition of the students' entrepreneurial interest.

Additionally, from the analysis of variance performed, the importance of some constraints on the dimensions analyzed became clear, with special attention to the time in the course (with a greater entrepreneurial interest for students who were in the second half of the course), and to the nature of the institution (with a greater entrepreneurial interest and perceived operational skills mastery of students from private institutions). It was also highlighted the relationship between the company ownership with the entrepreneurial interest and also with perception of entrepreneurial skills mastery although this finding was not supported in the test of the hypothesis.

It is believed that results showed consistent assessment of the character of students in Information technology related courses and has successfully achieved the goals set. It is also understood that the findings may generate relevant knowledge for course coordinators, and managers of institutions that seek to promote entrepreneurial activity (such as public institutions, civil society entities, and university institutions). It is believed that the results can facilitate a better direction in the process of shaping an entrepreneurial culture in institutions of education, especially in Information technology related courses.

The results were limited, since the sample was restricted to institutions from a single city (Fortaleza), besides the fact that sampling was not randomly processed. Thus, as a recommendation for future research, since it is believed that a replication of the study in other Brazilian states, or even in other countries. It is also recommended that this work be replicated in other areas, such as Management, Law, Health, among others, so that a comparison can be performed to evaluate the differences and similarities among between different areas.

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Appendix: Means and standard deviation of the variables**INTERESSE PESSOAL NA ÁREA**

Variável	Média	Desvio
É muito provável que eu abra meu próprio negócio nos próximos 5 anos	3,08	1,30
Se eu abrir um novo negócio, é muito provável que tenha sucesso	3,80	0,97
Para mim, é muito desejável abrir um negócio próprio	3,55	1,27
Começar um negócio é uma idéia muito atraente para mim	3,66	1,18
Seria fácil para mim abrir meu próprio negócio	2,78	1,07

VOCAÇÃO PERCEBIDA NA ÁREA

Variável	Média	Desvio
O pensamento criativo é visto como um caminho para o sucesso na minha área de formação	4,46	0,89
Transformar uma boa idéia em um negócio é bem visto na minha área de formação	3,37	1,04
As pessoas na minha área de formação valorizam aqueles que abrem seu próprio negócio	4,36	0,97
O empreendedorismo é admirado na minha área de formação	3,99	1,05

PERCEPÇÃO DE SUPORTE DE FAMILIARES E AMIGOS

Variável	Média	Desvio
Se eu abrisse meu próprio negócio, alguns de meus amigos trabalhariam comigo	3,74	1,00
Meus amigos aprovariam se eu abrisse meu próprio negócio	3,95	1,00
Se eu abrisse meu próprio negócio, meus amigos me ajudariam	3,47	1,15
Se eu abrisse um negócio, alguns membros de minha família trabalhariam comigo	3,24	1,18
Minha família aprovaria a idéia de eu abrir meu próprio negócio	3,83	1,12

Se eu abrisse meu próprio negócio, os membros de minha família me ajudariam	3,63	1,16
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PERCEPÇÃO DE DOMÍNIO DE HABILIDADES ESTRATÉGICAS

Variável	Média	Desvio
Tenho capacidade de identificar fontes de capital para um negócio	3,33	1,01
Sou capaz de desenvolver relacionamentos com possíveis fontes de financiamento	3,44	1,05
Tenho capacidade de reagir a mudanças ambientais, em tempo hábil	3,68	0,91
Sei identificar e avaliar informações de mercado para um novo negócio	3,54	1,01
Consigo entender os aspectos legais associados a um novo negócio	3,35	1,14
Tenho condições de criar produtos que atendam as demandas dos clientes	3,76	1,05
Tenho facilidade em identificar oportunidades para futuros negócios	3,69	0,98

PERCEPÇÃO DE DOMÍNIO DE HABILIDADES OPERACIONAIS

Variável	Média	Desvio
Consigo trabalhar produtivamente em situações estressantes	3,79	1,12
Tenho capacidade de me comunicar adequadamente com outras pessoas	4,18	1,04
Tenho condições de gerenciar um fluxo de caixa	3,99	1,01
Sou capaz de promover venda pessoal	3,67	1,14
Sou hábil em gerir meu tempo produtivamente	3,73	1,03
Tenho capacidade de gerenciar riscos eficientemente	3,63	1,03
Eu consigo ser persistente, mesmo em situações adversas	3,92	1,10
Tenho capacidade de desenvolver ações de planejamento de negócios	3,81	1,05