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**ACCOUNTING INFORMATION SYSTEM OF TUNISIAN
SMES: COMPLEXITY, DETERMINANTS
AND IMPACT ON FINANCIAL PERFORMANCE**

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Working Paper No. 766

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Abstract

This research is twofold. The first is to identify potential determinants of Accounting Information System (AIS) characteristics for Small and Medium Enterprises (SMEs). The second is to prove whether an AIS, whose characteristics meet the needs of SMEs and their managers, is associated with increased financial performance of these companies. The analysis of data collected by questionnaires administered through direct interviews with 107 Tunisian SMEs belonging to different sectors reveals mainly that 1) the complexity of the AIS is associated with factors related both to structural and behavioral contingency and 2) increasing the complexity of the AIC is negatively and significantly related to financial performance.

JEL Classification: E1, G2

Keywords: Accounting Information Systems, SMEs, structural contingency factors, behavioral contingency factors, financial performance.

ملخص

هناك شقان في هذا البحث. الأول هو التعرف على المحددات المحتملة من نظام المعلومات المحاسبية (AIS) لخصائص المؤسسات الصغيرة والمتوسطة. والثاني هو لإثبات ما إذا كان نظام المعلومات المحاسبية (والتي تلبي احتياجات المؤسسات الصغيرة والمتوسطة ومديريها) يرتبط بزيادة الأداء المالي لهذه المؤسسات. تحليل البيانات التي تم جمعها بواسطة استبيانات تدار من خلال المقابلات المباشرة مع 107 مؤسسة تونسية صغيرة ومتوسطة تنتمي إلى مختلف القطاعات يكشف أساساً أن (1) يرتبط تعقيد نظام المعلومات المحاسبية بالعوامل ذات الصلة لطوارئ الهيكلية والسلوكية على حد سواء و(2) زيادة تعقيد نظام المعلومات المحاسبية يرتبط سلباً وبشكل كبير بالأداء المالي.

1. Introduction

In the current economic environment characterized by increased competition generated by opening of markets and combined with an increasing degree of demanding customers, companies compete aggressively to market their products in a market where only well organized companies can capture a good market share. In contrast, firms whose organization is poor are marginalized and even doomed to disappear.

The survival of such companies push their managers to face the challenge to follow rapid changes, in particular flow of information, through adopting effective management tools. Some studies have focused on one of these management tools, including accounting information systems (AIS), but the latter field of enquiry is still less explored, particularly with regard to small and medium size companies. This lack of interest is, perhaps, in part, due to the fact that in Small and Medium Enterprises (SMEs) the main stakeholder is often the owner-manager (Jennings and Beaver, 1997). He is involved in all aspects of management (Julien and Marchesnay, 1988) and he is often taken to be the company (Julien, 1990). Consequently he tries to give minimum information about his company which displays a greater information asymmetry with respect to any party external to it.

Rarely explored in Tunisia, the AIS theme raises interests of both theory and practice. On a theoretical level, the results of our study can be compared with those of previous studies. The results of this research led to mixed findings. Some argue that many SMEs have only embryonic management tools geared mainly towards the production of accounting data required primarily to satisfy tax authorities (Dapuy 1987; Bajan-Banazak, 1993). Others however, claim that this vision does not capture all SMEs reality and suggest that AIS of SMEs is well developed (Chapellier 1994; Lavigne, 1999; Nobre, 2001).

All of these studies were conducted in developed countries in Europe, Australia and North America where accounting practices were originally invented. Our study should contribute to the debate on the complexity of AIS of SMEs in developing countries, including Tunisia. In Tunisia, the transition from a heavy state-controlled economy to more of a free market requires managers of Tunisian SMEs to change their attitude towards the role given to accounting in order to cope with the turbulences which characterize this new business environment.

This research therefore examines the complexity of AIS of Tunisian SMEs and the factors that may influence the degree of complexity. First, we aim at identifying the variables that significantly influence the degree of complexity of adopted accounting practices. The literature indicates that researchers have used contingency theory to answer this question (Raymond, 1985; Holmes and Nicholls, 1988; Chanhall, 2003; Abdel-Kader and Luther, 2008). In our study, we chose to examine the influence of contingency factors of structural contextual nature on AIS complexity. These factors relate to the age of the business, its size, sector, ownership structure, its indebtedness and exports.

However, the literature indicates that structural contingency factors are not enough to explain heterogeneity of AIS complexity because they ignore the autonomy of human constructs (Chapellier 1994; Lavigne, 1999; Affes and Chabchoub, 2007). They offer other behavioral factors relating not only to SMEs managers but also to professional accountants including employee accountants and expert accountants. We choose as behavioral contingency factors: age, experience, level and type of training. As for the employee accountants, we choose as factors their mission in the company, level and type of training and also courses or training undertaken. We also study the impact of the involvement of the accountant in the management of the company on AIS complexity. Second, we propose to check our exploratory hypothesis that seeks to examine the impact of AIS complexity on financial performance.

SMEs' managers need to develop information systems that enable them to make the best decision and then to effectively run their businesses. In line with these ideas, we propose to treat the dual problem that which (1) relates to factors determining SMEs' AIS complexity and (2) tries to prove that AIS complexity is associated with SMEs financial performance.

Our paper is structured as follows: Section 2 presents the conceptual framework and research hypotheses. In Section 3, we present the research methodology. Section 4 is devoted to displaying, interpreting and discussing the results. Finally, we draw a conclusion from the research.

2. Conceptual Framework and Research Hypotheses

2.1 Determinants of AIS complexity of SMEs

Studies on the relationship between organizational specificities of a company and its characteristics allow us to note that in the context of large public companies, all studies adopted as a theoretical foundation the "positive theory" of Watts and Zimmerman (1978). For SMEs, the theoretical underpinnings are not the same because the authors interested in this type of accounting firms (Chapellier 1994; Saboley-Lacombe, 1994; Lavigne, 1999, 2002; Orser et al.,2000; Affes and Chabchoub, 2007) take as the basis of their research, : first, the subjective and objective contingency theory according to which AIS, which is part of the organizational structure, is conditioned by the characteristics of the context in which the company operates and :second, the agency theory.

In his study, Chapellier (1994) notes that in relation to SMEs, structural contingency factors can be reduced to a few basic characteristics that refer to concepts of complexity and uncertainty. Indeed, the size and age of the company, the level of computerization of management, nature of business, ownership structure and debt are determinants of AIS complexity. However, the results confirm only the relationship between size and accounting practices. Lavigne (1999) meanwhile demonstrates, through a questionnaire survey, that medium-sized companies have more complex AIS than those small and very small-sized companies. Likewise, ownership structure is an important determinant of general accounting practices for SMEs due to the presence of shareholders who are not members of the family of the manager. This is likely to encourage greater formalization in the preparation of financial information in order to solve agency problems and asymmetric information where AIS is a mechanism of monitoring tools.

The structural approach to contingency theory is instructive but some authors stress that it is insufficient to explain all accounting practices of SMEs (Gordon and Miller 1976; Lavigne 1999; Chapellier 1994; Affes and Chabchoub 2007; Santin and Van Caillie 2008) and it is necessary to broaden the approach by integrating an objective analysis of variables related to the type of profile of each accounting player of SMEs: This is the behavioral approach of contingency theory. This most often revolves around the central player in the SME; the manager. The entire literature agrees to emphasize that the manager's profile (competence, history, culture, family, etc..) plays a very special role of producer and user of accounting information which justifies the specificity of this type of organization. Three other players, however, were identified as likely to influence accounting practices of SMEs: the internal accountant (Chapellier 1994; Lavigne 1999), the external accountant (Chapellier 1994; Lavigne 1999) and the main external actor which is often a financial institution (Lavigne 1999; Saint Pierre and Bahri 2000).

Chapellier (1994) shows associations between accounting practices and the following behavioral determinants: formation and goals of the manager, the mission and training of the internal accountant and involvement of the external accountant. Lavigne (1999) identifies linkages between general accounting practices and the following behavioral contingency

factors: information preferences of the manager, the mission and training of internal accountants and demands of external actors in relation to financial statements. Based on the results of research and studies outlined above, we propose to test the hypothesis:

H1: AIS complexity depends on structural and behavioral contingency factors.

2.2 Association between the complexity of the AIS and the financial performance of SMEs

Many studies have examined the link between performance and some features of the organization. They are interested in the impact of the organizational structure on the performance (Nkongolo et al., 1994; Roper, 1998; Rue and Ibrahim, 1998; Smith, 1999; Schindehutte and Stoica, 1999; D'Amboise et al., 2000; Pelham, 2000). However, few studies have focused on the potential relationship between the AIS and the SME performance (McMahon and Davies, 1994; Gorton, 1999; Orser et al., 2000; Lavigne, 1999, 2002; Affes and Chabchoub, 2007).

The study of Lavigne (2002) indicates that congruence between different contingency factors and AIS complexity index, as a tool for measuring AIS characteristics, is associated with increased financial performance of SMEs. He noted that there is a positive relationship between size of SMEs and AIS complexity which would generate high performance. Moreover, the study of Affes and Chabchoub (2007) shows that AIS complexity, measured in terms of general accounting practices, management control and financial analysis, is positively associated with increased financial performance. This is based on the argument that accounting information provides managers with information about the evolutionary state of the company and therefore allows them to quantify and monitor the achievement of business objectives, insofar as it is possible to translate them into accounting terms. Thus, management control tools allow managers to obtain results consistent with the objectives defined on the basis of the best possible management of resources and abilities. Practices assessed through the use of tools of investment choices, profitability evaluation tools and risk evaluation tools allow a better allocation of resources and respect for the fundamental constraint of solvency. Basing ourselves on the features documented above, we propose to test the hypothesis:

H2: There is a significant relationship between AIS complexity and financial performance of SMEs.

3. Research Methodology

To reach the objectives of this research, i.e identifying structural and behavioral contingency factors likely to influence AIS complexity and highlighting a potential relationship between AIS complexity and financial performance, a survey administered through direct interviews was conducted with managers of Tunisian SMEs.

By referring to the definition of SMEs according to Bulletin No. 2588 of the Financial Market Council (2006): "SMEs are considered small and medium enterprises, in accordance with the recommendations of the ministerial council held on Monday, March 13, 2006, companies whose net and real fixed assets does not reach four million dinars worth of net fixed assets and a 300-strong workforce". Our sample consists of 107 legally independent companies belonging to a large range of economic activities as defined by the National Institute of Statistics. They have as number of employees between 10 and 300 employees, while the amount of net fixed assets is less than four million dinars.

Operationalizing the variables in this research is based especially on studies by Lavigne (2002, 1999) Chapellier (1994) and Lacombe-Saboly (1994). Among the structural contingency factors, we used the following variables: size, age, industry, ownership structure, debt and exports of the company.

With regard to behavioral contingency factors, we selected the following variables for each of the three accounting players considered: 1) the manager: age, level of education, the nature of training and experience, 2) the internal accountant: mission, level of education, training and nature of in-company courses and training, 3) the expert accountant: degree of involvement in the management of the company.

Operationalizing AIS complexity is based on studies by Chapellier (1994) and Lavigne (2002). Because accounting rules and tradition are the main sources of accounting practices in Tunisia, we are interested in the main accounting practices used by SME managers in managing their businesses which are defined in relation to the following three accounting fields: general accounting practices (Computerization of accounting, preparation of interim financial statements), management control practices (using a cost-computing system, budgeting, holding a dashboard) and financial analysis practices (using investment choice tools, use of profitability evaluation tools, using risk measurement tools). AIS complexity of SMEs will be measured by a complexity index that considers the defined components of the AIS, it is therefore about assigning 1 to one component of the AIS if it exists in the company, and 0 if not. Ultimately, the AIS has a total score on a scale of 0-8 according to the manager's degree of using the eight components of the AIS already listed.

Finally, with reference to a broad theory on financial performance of SMEs, we opted for accounting measures like the return on assets (ROA) ratio and the return on equity (ROE) ratio. First, the ROA ratio is determined by the ratio of profit before taxes, interests, depreciation; and then the total assets. This ratio measures the efficiency with which the company uses its assets. However, return on equity (ROE) ratio is determined by the ratio of, profit before taxes, interest, depreciation and provisions and then equity. This ratio measures the efficiency with which the company uses capital.

3.1 Bivariate analyses

The aim of the first phase of our work done on SPSS is to highlight the potential significant relationships between characteristics of the AIS and contingency factors and to identify the nature of the significant relationships between the different variables. We adopted the chi-square test to examine potential significant relationships between the six structural variables and the seven characteristics of AIS (see Appendix 1). Worth noting that in this section we consider the variables size and age of the firm as qualitative variables, they are stratified. Table 1 presents a summary of these relationships.

The results presented above in Table 1 provide a description of some accounting practices of SMEs. These characteristics can be divided into the following three dimensions of an AIS: 1) general accounting practices (preparation of interim financial statements), 2) management accounting and management control practices (budgeting system, cost-computing system, dashboard) and 3) financial analysis practices (investment ratios, profitability ratios, risk ratios).

The test indicates a relationship between company size and dashboard establishment and the use of risk ratios; the larger the company is, the more it tends to set up dashboards adapted to individuals' needs and consistent with their general organization and content, providing a common management language for the various stakeholders of the company, allowing for a rich and regular dialogue between hierarchical levels and other relevant entities. Similarly, the large company made recourse to risk ratios, which are intended to highlight the strengths and weaknesses of the company, like those of small ones, mainly the debts and receivables rotating ratio which expresses the retention of liquidity through payables and receivables. Thus, SMEs which establish dashboards and make use of "risk evaluation ratios" have a fairly large number of employees.

As for the age of the company, the chi-square test pointed to its association with three accounting practices: the establishment of dashboards, cost-computing and the use of investment ratios. Hence, the older the company sets dashboards and is more cautious about choosing a new investment.

Using industry sector as the third structural contingency variable, the test shows that the use of risk ratios is the only feature of the AIS which depends on the type of industry.

As for the ownership structure variable, it is significantly associated with the following accounting practices: establishment of interim financial statements, a budgeting system and use of investment and risk ratios; it is the family-owned SME with related shareholders that uses investment and risk ratios as well as a budgeting system and interim financial statements.

The results of the nine behavioral contingency variables are shown in Table 2. We find that their influence on the characteristics of the AIS is remarkable

We interpret the associations that have been given by the chi-square test between the seven characteristics of the AIS and the behavioral contingency variables. The test carried out shows that manager's age is the only behavioral variable that shows no significant relationship with any of the features of the AIS. Regarding the variable "manager's experience", it is closely related to interim financial statements, the budgeting system and dashboard. Thus, managers with experience between 10 and 20 years conduct these three accounting practices. However, there is a negative relationship between the manager's experience and these three features of the AIS; the more the manager is experienced, the rarer the presence of these latter features. The third behavioral variable that has been adopted is the manager's education level. Our results show that this variable is significantly related to five components of the AIS; namely, interim financial statements, the budgeting system, costing-computing system, the dashboard and investment ratios. The more the level of education increases, the denser the preparation of interim financial statements is. Among the nine interviewed self-made managers who have not received their "baccalauréat", only one answered "yes" for the presence of this feature. However, three quarters of the executives (BAC+4 and more) establish the variable Interim.FS. It should be noted that the same trend exists for the other four AIS characteristics; namely, the budgeting system, the cost-computing system, the dashboard and investment ratios.

In table 3, the results show that the mission of the internal accountant is strongly and significantly related to the five components of the AIS, namely IFS, budgeting system, cost-computing system, the dashboard, investment and risk ratios. The extent of producing budgets by the manager assisted by an employed accountant, "Management Controller", is significantly higher compared to the level of producing budgets by a manager assisted by an internal accountant, "accountant" or "bookkeeper." However, the use of investment and profitability ratios is more common for a manager assisted by an internal accountant "accounting" than by a "management controller."

Concerning training of internal accountant, it follows that of the manager and is strongly and significantly related to accounting practices, namely IFS, budgeting system, dashboard, investment and risk ratios. The more the level of training of internal accountant increases, the more all the five AIS characteristics are frequent; all surveyed accountant employees with post-graduate education level answered "yes" to the presence of these five AIS components. The third behavioral variable related to the profile of internal accountants is the nature of their training. It is significantly related to the budgeting system, the dashboard and financial analysis practice through investment ratios. thus the employee accountant- who holds a degree in accounting proceeds to budgeting more often than an accountant who holds a

degree in finance or other. The same trend exists for two other AIS features. The last behavioral contingency variable studied relates to the involvement of the expert-accountant in managing the company.

The results allow us to establish a significant link between the mission of the accountant and the three characteristics of the AIS, namely IFS, the budgeting system and practice of investment ratios; a manager assisted by an expert accountant heavily involved in managing the firm has a more complex AIS than a manager assisted by an expert-accountant weakly involved in management (involved only in the tax reporting) or a manager with no expert-accountant. SMEs seek more and more advice on AIS, taxation, management control and law.

In what follows, we will try to examine the relationship between AIS complexity and structural and behavioral contingency factors in Tunisian SMEs. We will therefore work with the mean difference test by breaking the sample into two groups namely SMEs with complex AIS and composed of at least five characteristics and SMEs with simple AIS made of a maximum of 4 features out of 8.

In the first part of this study, the review of the literature gives the link structural factors relating the company to AIS complexity. The two tables below show the effect of six structural contingency variables on the AIS complexity of Tunisian SMEs. The variables used in this study are company size, its age, its business, its ownership structure, its indebtedness and finally its exports.

We conducted two statistical tests to check the robustness of our results; the chi-square test and the means difference test across the sample of firms with complex AIS and those with simple AIS. (See Tables 4 and 5)

The tests indicate that company size and type of industry have no effect on the AIS degree of complexity of observed SMEs. This result is consistent with previous research. As for the age of the company, the results of means differences failed to conclude that there is any relationship between the age of the company and AIS complexity. This is consistent with the results of Chapellier (1994), Lacombe-Saboly (1994), Lavigne (1999,2000) and Affes and Chabchoub (2007).

As for the chi-square test, it shows that there is a relationship between the age of the company and AIS complexity at 5% significance level. This result is consistent with the study of Ben.Hamadi and Chapellier (2010). Similarly, for the type of business, no significant relationship between this characteristic and AIS complexity is found. Treating the variable "indebtedness", we asked whether the presence of a foreign creditor may influence the degree of complexity of an AIS and then followed the same line of thinking studied by Lavigne in 2002, but in our case, statistical results yielded no significant results.

However, the tests show that AIS complexity significantly depends on the company's ownership structure. Indeed, it is the companies that have one or more members, who are not part of the manager's family, which have more complex AIS than companies with family members. This result may relate to the presence of shareholders who are not part of the manager's family which creates agency conflicts of information asymmetry where the AIS is a potential source of monitoring tools. This result is consistent with that of Affes and Chabchoub (2007).

Finally, the test shows that AIS complexity of SMEs depends on exports. Indeed, openness to international markets encourages exporters to track changes at all levels and thus adopt a developed AIS in order to have information on time and thus act in a timely manner.

At this stage of the study, we will study not only the effect of the characteristics of SMEs managers on AIS complexity, but we will try to highlight the effect of behavior of professional accountants on AIS complexity of Tunisian SMEs.

According to this study, we expect that the level of education of the manager is significantly related to AIS complexity. The mean difference test shows a significant relationship between the level of training of the manager and AIS complexity; the more the manager is trained, the more the AIS is complex.

The results confirm the studies by Chapellier (1994), those of Lavigne (2002) and those of Affes and Chabchoub (2007) and indicate that training characteristics of the manager determine accounting practices of SME managers and lack of training harms the degree of using accounting information in the management of this type of company. Thus, AIS complexity increases when the educational level of the manager is better.

The results confirm those studies of Chapellier (1994), those of Lacombe-Saboly (1994) and those of Affes and Chabchoub (2007) for industrial SMEs in Tunisia examining the impact of the nature of training on accounting practices of SMEs. It is the manager who develops complex AIS inside his company. This may be explained by his mastery of financial and accounting tools. Accordingly, managers who have a background in accounting, finance and / or management have an AIS more complex than others.

Until now, the literature has allowed us to formulate the following hypothesis; the more the manager is inexperienced, the greater is his request for information. Years of work in the business provide the manager with greater knowledge of markets' functioning, customer needs and abilities of the company. His experience refines gradually his intuitions. He trusts his perceptions more than the figures given by the accounting department.

However, the results obtained by the bivariate analysis could not confirm this finding since there is no significant relationship between the experience of the manager and AIS complexity. Our results on this point are less surprising, while results of the different studies conducted until now on the relationship between the experience of the manager and the complexity of SMEs are "mixed". Finally, we studied the age of the manager as did Begon (1990) and Affes and Chabchoub (2007) to see whether there is a relationship between age and AIS complexity. The results yielded no significant relationship between AIS complexity and the variable "age of the manager".

Consistent with the first hypothesis we expect that the mission of the employee accountant significantly correlates with AIS complexity of SMEs. The mission of the 50% of the 46 accountants in the sample is to ensure bookkeeping but also to produce, occasionally, some accounting data for "accounting" management. The mission of 16% of them is limited to bookkeeping, that is to say, preparing for establishing annual filings by the expert accountant; "aid accountants". Finally, the mission of 16% of them is to ensure accounting, but also to produce regularly, accounting data for management purposes, "management controllers". The results show that the task of the accountant employee is significantly related to AIS complexity in the studied SMEs; Our results are consistent with those of Chapellier (1994). (See Table 7).

The analysis of the effect of the accountant's level of training on AIS complexity of SMEs shows a significant relationship between these two variables. This result corroborates that of Lavigne (2002) who found that managers of SMEs assisted by an internal accountant with a university education have a more complex AIS. Thus, the higher the level of training of the internal accountant, the better is the AIS complexity. The tests also show that AIS complexity significantly depends on the nature of training of the internal accountant. Thus, a manager

assisted by an internal accountant trained in accounting or in finance and accounting has a more complex AIS.

The above results point to a significant impact of in-company courses and / or training for the accounting staff on AIS complexity. This result is not surprising because the accountant employee should have the ability to design and implement differentiated information models tailored to the needs of the company and more specifically of its manager. Thus, the key position of the accountant employee is not without risks. Its limits are capacity constraints and skills of the accountant itself. Failure to attend seminars, courses and / or training generally leads to a lack of training for the accountant preventing him from providing useful management models. This leads to a rejection of the entire accounting language by the latter. Such a situation reduces the use of accounting data by the leader. It limits the influence of the accountant on strategic decisions and reduces its scope to simple bookkeeping. This explains the fact that managers assisted by internal accounting who attend courses and / or training have a more complex AIS than others.

The hypothesis that we have already formulated assumes that AIS complexity increases with the degree of the expert-accountant's involvement in managing the company. Our results confirm this hypothesis. Indeed, half of the expert-accountants of SMEs of our sample are involved in managing the company in terms of advice and relation with customers. Then, the manager assisted by an expert-accountant strongly involved in managing the company has a more complex AIS than a manager assisted by an expert-accountant weakly involved in managing the company or a manager with no expert-accountant at all.

3.2 The multivariate analysis

The second step of our study consists of a multivariate analysis to complete the bivariate analysis. This analysis will study the interactions that may exist between variables and their effects, all together, on the previously made conclusions.

Because the dependent variable "AIS complexity" is dichotomous (which takes the value of 0 if the AIS is not complex and 1 if the AIS is developed), the binary logistic regression model is the most appropriate to study the impact of the structural and behavioral contingency factors on the complexity of AIS. We will then make use of the classical regression model to study, in an exploratory way, the relationship between AIS complexity and the financial performance of SMEs.

First, we try to avoid the problem of dependence between variables which will bias the quality of results. We submitted fifteen contingency variables to different correlation tests according to their nature (Qualitative / Quantitative). We therefore performed the chi-square test between qualitative / qualitative variables and quantitative / quantitative variables. For quantitative / quantitative variables the Spearman statistical test is used.

After avoiding the risk of dependency between variables, it seems that in order to study the effect of fifteen contingency factors on the degree of AIS complexity of SMEs, it is necessary to classify them in twelve models that will be discussed later. (See Appendix 1).

We will first test the quality of the research model. This is performed automatically by the binary logit at SPSS. We will therefore follow two steps to check the quality of the model as follows:

The significance of the model by a chi-square test and by the two pseudo R2 and adjusted R2

The classification table to verify that the variables are classified correctly by the forecast.

In table 9, we combine together the results of the research model in a table in order to clearly identify its explanatory power.

We notice that as we add a variable the value of chi-square increases from one step to another, which means that the model is improved by the introduction of a new variable.

On the other hand, the value of $-2\log$ -likelihood says nothing by itself, but its decrease from one step to another also tells us that the model is improved by the introduction of the second variable. A perfect model would have a -2 Log likelihood of zero. Then, the model is improved by the gradual introduction of variables. Both the pseudo R^2 allow us to explain the percentage of the binary dependent variable that is explained by the variables. The Nagelkerke is an adjusted version of the Cox & Snell and is therefore more accurate. Thus, 100% of the variation in the complexity could be explained by the significant variables.

After checking for quality of the Logit model, we discuss in the following tables the results of the estimation of the regression coefficients according to the twelve models used previously. In the tables below, each factor is associated with a value which is the β coefficient estimated by maximum likelihood. (See table 10).

We note in the first three regression models the variable “export” always has a positive and significant relation at the 10% level with AIS complexity. Indeed, if the company is small and medium sized and is exporting, it sets up a complex AIS to monitor changes at foreign markets through the use and production of reliable accounting data and in a timely manner. It should be noted that the results on this topic are mixed.

We also observe that the experience of the manager is negatively and significantly related with AIS complexity. Indeed, the manager who has a little experience has a complex AIS. This result is in line with that of Chapellier (1994) and that of Holmes and Nicolls (1988) who explain this relationship claiming that the newly installed managers are trying to overcome their lack of experience by developing a more complex AIS, in order to have a clear idea about the situation of their businesses and their future prospects. The manager’s need for quantitative information disappears gradually with experience. When an SME is exporting, its AIS is complex. When the experience of the manager increases, AIS complexity decreases.

According to table 11, we notice in the fourth model that the ownership structure of “private company having only family-related shareholders” has a negative and significant impact on AIS complexity. Thus, the company whose shareholders have a relationship with the manager (spouse, child ...) has a less complex AIS. This result may be explained by the fact that the presence of shareholders who are not part of the manager’s family creates agency conflicts of information asymmetry, enough reason to push the manager to set up a complex AIS as a source of potential monitoring tool (Lavigne and St Pierre, 2002; Affes and Chabchoub, 2007).

Next, the tests indicate that the level of training of the manager has a positive and significant effect on the degree of AIS complexity. Thus, it is the managers who have the highest levels of education who display a more complex AIS. The results confirm those studies by Chapellier (1994), Lavigne (2002) and Affes and Chabchoub (2007) on the impact of the level of training of the manager on AIS complexity. Thus, AIS complexity increases when the educational level of the manager is better. These results indicate that the characteristics of the manager’s training determine the accounting practices of managers of SMEs. And the lack of training of these managers harms the degree of their use of accounting information in the management of this type of company. When the SME is a private company with one or more unrelated shareholders, it has a complex AIS. When the level of training of the manager is high, the AIS is complex.

The results of model 10 and 11 indicate that the level and nature of internal accountant’s training are positively and significantly related to AIS complexity in that the manager

assisted by an accountant employee with a higher training in accounting or accounting and finance has a more complex AIS. Results on this topic are mixed. The manager assisted by an internal accountant with Bac +4 level of training in accounting and / or finance has a complex AIS. (See table 13).

It should be noted that among the structural contingency factors, we have not found a significant link between company size, age, sector and indebtedness. The absence of a significant relationship between company size, age and AIS complexity can be justified by the introduction of these variables in only two models out of the twelve because of the strong correlation between them and other variables. We also believe that the limited size of the sample or the difference between the Tunisian context and that of other studies may be the cause of this non-significant link with AIS complexity.

The third variable that has no significant relationship with AIS complexity is indebtedness. This non-significant relationship can be justified by the non effectiveness of our method while approaching this concept. As was the case of the study of Lavigne (2002), we could have included in the questionnaires another section to fill by the financial institution to have an idea about the requirement of financial statements, bonds required, institutional involvement, the involvement of officers and trust relationships (Lavigne and St-Pierre, 2002). Approaching indebtedness in greater depth could have given more accurate findings.

The final structural variable “industry” has no significant relationship with AIS complexity. In other words, industry does not explain the observed variations in the degree of use of the AIS. Four types of activities have been identified: industry, trade, construction and others which include the remaining categories. Because the distribution of firms in our sample is not fair, the results may be biased. To limit the size effect, we grouped the companies into two groups of equal size: industrial / non-industrial, but the result is still not significant.

As for the behavioral contingency variables, we expected a better result of the effect of courses or training of the internal accountant on AIS complexity. This relationship has not been confirmed since this variable was not present in a single model because of its strong relationship with other explanatory variables. We can also justify this non-significance by the limited size of the sample of internal accountants who responded to the profile section of the internal accountant (many SMEs do not have internal accountants).

The second behavioral variable which has no significant relationship with AIS complexity is involvement of the expert-accountant in company management. This non-significance may be justified, as is the case with the previous variable. This variable is not presented in a any model because of its high correlation with other variables.

3.3. Relationship between AIS complexity of SMEs and their financial performance

The last expected result in this research comes from an exploratory study. We check the presence of a potential relationship between AIS complexity and financial performance in Tunisian SMEs. To investigate this relationship, we decided to work on the STATA software.

To explore this relationship in depth, we use the classical regression model (linear). Therefore, we have the following two regression models:

$$ROA = \lambda_0 + \lambda_1 \text{C.SIC} + \lambda_2 \text{SA} + \lambda_3 \text{ENDT} + \varepsilon$$

$$ROE = \lambda_0 + \lambda_1 \text{C.SIC} + \lambda_2 \text{SA} + \lambda_3 \text{ENDT} + \varepsilon$$

$$ROA = \text{turnover before taxes, interest, depreciation and provisions} / \text{Total Assets}$$

$$ROE = \text{turnover before taxes, interest, depreciation and provisions} / \text{Equity}$$

$$\text{C.SIC} = \text{AIS complexity}$$

SA = sector

DEBT = indebtedness

λ_0 = The constant term of the model

λ_i = regression coefficient of the variable (i ranging from 1 to 8)

ε = error term

We chose as control variables sector and indebtedness. We selected these two variables because after correlation tests performed in the framework of the binary logistic regression models, they are not correlated. In addition, they showed no significant relationship with AIS complexity, and we avoid any problem of multicollinearity between the three variables.

We want to check whether this function can be studied using a linear regression. To do this, we submit our equation to linear regression terms:

Normality of residuals

Homoskedasticity of residuals

Absence of multicollinearity between explanatory variables

We check normality of residuals by a chi-square test with two degrees of freedom. Our null hypothesis assumes normality of residuals. The following table gives the results of the test.

The results indicate that residuals of these two models are normally distributed at a significance level $\alpha = 1\%$, then the null hypothesis of normality of residuals is accepted. Next we use the Cook Weisberg homoskedasticity test on STATA. The hypothesis of absence of problems of heteroskedasticity of residuals is confirmed (P-value null). (See table 15).

We have already checked absence of correlation between the three variables (AIS complexity, indebtedness and industry).

We presented the results of the linear regression of ROA and ROE approached mainly by AIS complexity and two control variables which are industry and company indebtedness.

The table 16 summarizes the relationships that may exist between financial performance approached by two different ratios (ROA, ROE), and three variables which are namely AIS complexity, indebtedness and industry. The results show that both models are weakly significant with R2 not exceeding 13.21%. The first model shows no correlation between AIS complexity, indebtedness and financial performance approached by ROA. The second model shows a negative and a significant relationship at the 5% level between the variable "AIS complexity" and "financial performance" as approached by ROE. Thus, there is a negative and significant relationship between AIS complexity and financial performance, the more complex AIS is, the more the SME becomes less efficient.

It is noteworthy that the first model is not significant, while the second is significant at the 10% level. Thus, the results of this exploratory study are not robust because R2 is not very important. We expected a better result on the effect of AIS complexity on financial performance when approached by ROE. This relationship is significantly negative. If AIS is able to improve financial performance, it is through its determinants. Only three contingency variables among the seven (which have a significant effect on AIS complexity) have the same effect on financial performance. However, when we tested the direct effect of these contingency variables, which have a significant effect on AIS complexity, we were able to show that the ownership structure and manager's experience have a negative and significant impact on financial performance. This result may be the reason for which AIS complexity has a negative impact on financial performance. We believe that with a larger sample, we could have had a better result. As a reminder we have accounting figures of only 107 SMEs. In

addition, limiting ourselves to financial performance is reductionist, we could have added to it organizational performance by focusing on market share, customer satisfaction and innovation.

4. Conclusion

The present study confirms that Tunisian SMEs are heterogeneous and do not constitute reduced models of large organizations as we believed. This phenomenon of AIS complexity is nothing but the result of a need for more powerful encrypted, reliable and relevant information enabling managers to have a clear idea of the situation in their business and react quickly, when necessary, ensuring the sustainability of their businesses in an increasingly uncertain environment.

The results of this study showed, first, that there are relationships between some structural and behavioral factors and complexity of the accounting information system.

Of the six selected structural contingency factors retained; namely, company size, its age, its sector, its ownership structure, its indebtedness and exports, it is the ownership structure and exports that displayed significant relationships with AIS complexity. SMEs with complex AIS are those with one or more unrelated shareholders and those qualified as exporting.

As for behavioral contingency variables related to the profile of the manager, the results indicated that the level and type of training of the manager have a significant impact on AIS complexity; it is the manager with a higher education level that has a complex AIS. In addition, it is the manager with little experience who has a complex AIS. The higher the manager's experience, the more decisions he can make by using only his personal judgment, intuition and experience.

Tests conducted on other behavioral variables indicated that the level of training of the internal accountant, the type of training and his mission have a significant effect on AIS complexity whereby the manager assisted by an internal accountant "accountant or management controller" trained for Bac +4 and in accounting and / or finance has a complex AIS.

With respect to the exploratory study, we are unable to claim the presence of a positive relationship between the AIS complexity of SMEs and their financial performance.

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Table 1: Relationships between AIS Characteristics and Structural Contingency Variables

Structural V AIS charact.		size	Age	Sector	Ownersh structure	Indebt.	Exports
Interim F.S	Value	0.263	1.478	4.450	7.804*	0.104	3.213
	P.Value	0.637	0.382	0.918	0.006	0.570	0.076
Budg Sys.	Value	1.917	3.246*	5.257	7.869**	0.426	9.972
	P.Value	0.202	0.074	0.235	0.011	0.518	0.002
Cost-Com.Sys	Value	2.917	1.291	7.531	2.731	0.058	3.213
	P.Value	0.115	0.607	0.918	0.257	0.811	0.076
Dash.Bord	Value	3.902*	7.335*	6.322	4.485	0.002	9.814
	P.Value	0.053	0.009	0.963	0.127	0.968	0.002
Invest Ratio	Value	0.467	4.882*	7.765	6.338**	0.236	2.030
	P.Value	0.950	0.067	0.523	0.034	0.630	0.158
Prof. Ratio	Value	3.426	9.150	1.628	1.552	0.044	0.090
	P.Value	0.236	0.403	0.238	0.694	0.835	0.766
Risk Ratio.	Value	7.185**	5.283	5.975**	4.548*	1.323	1.516
	P.Value	0.028	0.525	0.024	0.061	0.254	0.222

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 2: Relationships between AIS Characteristics and Behavioral Contingency Variables of the Manager (Chi-Square test)

Behavioral V AIS Charact		Man. Age	Man. Exp.	Man.Edu	Man.Edu.Nat
Interim F.S	Val	1.780	8.921***	14.832***	8.319***
	P.Val	0.803	0.003	0.000	0.004
Budg. Sys.	Vale	11.249	5.499**	18.586***	9.009***
	P.Val	0.849	0.021	0.000	0.003
Cost-Com.Sys	Vale	5.669	1.452	12.092***	3.214*
	P.Val	0.211	0.243	0.002	0.076
Dash.Board	Val	9.929	3.592*	14.670***	3.185
	P.Val	0.975	0.061	0.001	0.077*
Invest. Ratio	Val	6.391	.634	14.068***	4.278
	P.Val	0.651	0.624	0.006	0.040**
Prof. Ratio	Val	7.123	1.378	1.359	1.171
	P.Val	0.481	0.597	0.663	0.283
Risk Ratio.	Val	4.542	.630	3.174	1.117
	P.Val	0.450	0.577	0.937	0.734

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 3: Relationships between AIS Characteristics and Behavioral Contingency Factors Related to Professional Accountants (Chi-Square test)

Behavioral.V		Miss.Acc	Edu.Lev	Edu.Nat	In.Com.Courses	INV-expert
Interim F.S	Value	4.002	17.263***	3.309	6.624	8.216***
	P.Value	0.127	0.006	0.152	0.011	0.005
Budg. Sys.	Value	13.812***	20.745***	9.442***	9.580	11.876**
	P.Value	0.002	0.000	0.005	0.002	0.012
Cost-Com.Sys	Value	7.133**	4.354	1.497	2.966	3.083
	P.Value	0.018	0.299	0.230	0.088	0.238
Dash.Board	Value	14.007***	8.520***	10.314***	1.411	3.693
	P.Value	0.001	0.004	0.002	0.239	0.125
Invest. Ratio	Value	5.935*	8.304**	7.828***	2.057	8.920***
	P.Value	0.053	0.030	0.006	0.156	0.003
Prof. Ratio	Value	2.552	1.658	1.009	0.134	6.640
	P.Value	0.117	0.585	0.347	0.717	0.141
Risk Ratio.	Value	6.911**	5.695*	.321	0.786	3.592
	P.Value	0.015	0.091	0.595	0.380	0.833

Notes:*Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 4: Effect of Structural Contingency Variables on AIS Complexity (Mean Difference test)

Structural variables	Mean G1 (complex)	Mean G2 (non complex)	Mean difference	T-test	P. Value
Ages	2.35	2.00	0.349	1.484	0.144
Size	1.44	1.38	0.057	0.244	0.808
Sector	2.54	2.14	.399	1.120	0.268
Ownership structure	2.242	1.850	0.572	2.823***	0.007
Indebtedness	0.670	0.540	0.136	0.887	0.379
Exports	0.420	0.08	0.342	2.351**	0.022

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 5: Effect of Structural Contingency Variables on AIS Complexity (Chi-square test)

Independent variables	Value	P-Value	hypothesis	Validation
size	11.847	0.352	H1	Non significant
Age	22.732	0.038	H2	significant
Sector	30.249	0.359	H3	Non significant
Ownership structure	23.853	0.028	H4	significant
Indebtedness	6.679	0.689	H5	Non significant
Exports	11.582	0.009	H6	significant

Table 6: effect of Behavioral Contingency Variables Related to the Manager on AIS Complexity

Behavioural variables	Mean G1 (complex)	Mean G2 (non complex)	Mean difference	T-test	P. Value
Age	3.15	3.12	0.038	0.109	0.914
Experience	2.51	2.15	0.358	1.506	0.138
Education level	4.74	2.62	2.129	4.045***	0.000
Nature of education	0.51	0.15	0.358	2.355**	0.022

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 7: Impact of Characteristics of Accounting Professionals and AIS Complexity

Independent variables	Mean G1 (complex)	Mean G2 (non complex)	Means difference	T-Test	P. Value
Mission of internal accounting	2.79	2.15	0.637	2.161**	0.035
Accountant's education level	4.83	3.90	0.933	2.891***	0.006
Nature of education of internal accountant	1.90	1.25	.650	2.592**	0.013
In-company course and training	0.530	0.10	0.428	-2.526**	0.015
Involvement of the expert accountant in managing the company	2.530	2.000	0.535	2.730***	0.009

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 8: Effect of Behavioural Contingency Variables on AIS Complexity (Chi-square)

Independent variables	Value	P-Value	Validation
Manager's age	34.161	0.601	Non significant
Experience	14.483	0.037	significant
Education level	48.611	0.000	significant
Nature of education	12.678	0.002	significant
Mission of internal accountant	33.520	0.000	significant
Internal Accountant's education level	34.611	0.001	significant
Internal Accountant's education nature	23.330	0.008	significant
In-company courses or training of the internal accountant	10.261	0.009	significant
Involvement of expert-accountant	23.904	0.003	significant

Table 9: Model Summary

Step	Chi-square	-2log-likelihood	R-2 of Cox & Snell	R-2 of Nagelkerke
1	2.152	58.536	0.038	0.057
2	2.235	58.453	0.038	0.057
3	3.203	57.485	0.056	0.084
4	12.529	48.158	0.2	0.303
5	12.695	47.992	0.203	0.307
6	15.775	44.913	0.245	0.371
7	15.175	44.512	0.257	0.379
8	17.418	43.270	0.267	0.404
9	23.495	37.192	0.343	0.518
10	23.954	36.734	0.348	0.526
11	24.001	36.686	0.349	0.527
12	27.458	20.712	0.449	0.693
13	27.570	20.600	0.451	0.695
14	28.032	20.138	0.456	0.703
15	48.17	0.000	0.649	1.000

Table 10: Estimation of the Impact of Contingency Variables on AIS Complexity According to the Three Models

Variables	Modalities	Model 1		Model 2		Model 3	
		β	P-Value	β	P-Value	β	P-Value
Size		-----	-----	-0.236	0.664	-----	-----
Age		0.399	0.363	-----	-----	-----	-----
Sector	Industrial	-----	-----	-20.247	0.998	-21.023	0.998
Ownership structure	Individual	-----	-----	-----	-----	-----	-----
	Family-owned	-----	-----	-----	-----	-----	-----
Indebtedness		0.586	0.400	0,784	0,312	0,396	0,634
Exports		2.074*	0.058	1,927*	0,096	2,406*	0,084
Experience of manager	Less than 5 years	-----	-----	-----	-----	-0,231	0,801
	between 5 and 10 years	-----	-----	-----	-----	-2,483**	0,042
R-2 of Cox & Snell		13,3%		26.5%		33.2%	
R-2 of Nagelkerke		20,1%		40.1%		50.1%	

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 11: Estimation of the Impact Of Contingency Variables on AIS Complexity (binary logit)

Variables	Modalities	Model 4		Model 5		Model 6	
		β	P-Value	β	P-Value	β	P-Value
Age		----	-----			----	-----
Sector	Inindustry	-----	-----	20.461	0.998	22.877	0.998
Ownership structure	Family-owned	-2.896**	0.042			-----	-----
	Non family-owned	-1.463	0.220			-----	-----
Indebtedness		-0.452	0.662	1.461	0.146	1.933	0.159
In-company courses		2.196*	0.074			-----	-----
Age of manager	between 20 and 29 years			1.542	0.434	2.452	0.323
	between 30 and 39 years			-0.249	0.857	1.782	0.324
	between 40 and 49 years			1.287	0.376	2.167	0.233
	between 50 and 59 years			0.429	0.763	0.899	0.579
Education level of manager	Bac+4 and more			2.792**	0.013	3.894**	0.019
Experience of manager	Less that 5 years					-0.288	0.838
	between 5 and 10 years					-4.328**	0.026
R-2 of Cox & Snell		21.5%		36.6%		45.1%	
R-2 of Nagelkerke		33.9%		55.3%		68.1%	

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 12: Estimation of the Impact Of Contingency Variables on AIS Complexity According to the Following Three Models (binary logit)

Variables	Modalities	Model 7		Model 8		Model 9	
		β	P-Value	β	P-Value	β	P-Value
Sector	Industry	23.098	0.998	20.566	0.998		
Indebtedness		1.925	0.167	1.283	0.164		
	between 20 and 29 years	2.622	0.297	0.230	0.899	0.221	0.898
Age of manager	Between 30 and 39 years	1.880	0.299	-0.021	0.987	-0.254	0.842
	between 40 and 49 years	2.573	0.206	0.877	0.540	1.997	0.160
	Between 50 and 59 years	1.033	0.536	-0.453	0.716	1.171	0.399
	Less than 5 years	0.342	0.803				
Experience of manager	Between 5 and 10 years	-4.568**	0.024				
Education level of manager	Bac+4 and more	4.362**	0.030			1.970**	0.028
Nature of education of manager	Manager	-0.811	0.651	1.795*	0.078		
Mission of internal accountant	Accountant and management					2.218**	0.015
R-2 of Cox & Snell		45.3%		31.4%		28.2%	
R-2 of Nagelkerke		68.4%		47.4%		42.6%	

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 13: Estimation of the Impact Of Contingency Variables on AIS Complexity According to the Following Three Models (binary logit)

Variables	Modalities	Model 10		Model 11		Model 12	
		β	P-Value	β	P-Value	β	P-Value
Indebtedness		0.740	0.507			1.072	0.364
Sector	Industry	21.648	0.998	-53.273	0.996	20.973	0.998
Experience of manager	Less than 5 years	-1.784	0.149	-.740	0.621		
	Entre 5 et 10 ans	-1.565	0.236	-0.221	0.881		
Education level of internal accountant	Bac+4 and more	3.222**	0.025				
Nature of education of internal accountant	Accounting			2.424*	0.094		
	Finance			-15.220	0.997		
Involvement of the expert-accountant	No expert-accountant			-53.851	0.996		
	Weak involvement between 20 and 29 years			-34.551	0.997	0.570	0.757
Age of manager	between 30 and 39 years					1.333	0.390
	between 40 and 49 years					2.422	0.128
	between 50 and 59 years					-0.859	0.526
In-company courses or training					1.814	0.164	
R-2 of Cox & Snell		33.9%		44.8%		34.5%	
R-2 of Nagelkerke		53.7%		70.8%		54.6%	

Notes: *Significant at 10% ; ** Significant at 5% ; *** Significant at 1%

Table 14: Results of Normality of Residuals

	ROA	ROE
Chi-square	56.13	-
P-Value	0.000	0.000

Table 15: Homoskedasticity Test

	ROA	ROE
Chi-square	25.53	27.48
P-Value	0.000	0.000

Table 16: Estimation of the Impact of AIS Complexity on Financial Performance Using ROA and ROE

Variables	ROA		ROE	
	Coef.	P-Value	Coef.	P-Value
AIS complexity	-0.012	0.560	-0.862	0.021
Sector	0.177	0.049	0.140	0.924
Indebtedness	0.005	0.952	-1.691	0.229
R2		1.92%		13.21%
Fisher's F		1.36		2.64
Significance		0.265		0.059

Appendix 1: Models Summary

Model 1 Company age Indebtedness Exports	Model 2 Company size Sector Indebtedness Exports	Model 3 Sector Indebtedness Exports Experience of manager
Model 4 Ownership structure Indebtedness In-company courses and training by internal accountant	Model 5 Age of manager Sector Indebtedness Education level of manager	Model 6 Age of manager Sector Indebtedness Education level of manager Experience of manager
Model 7 Experience of manager Sector Indebtedness Age of manager Education level of manager Education nature of manager	Model 8 Education nature of manager Sector Indebtedness Age of manager	Model 9 Mission of internal accountant Sector Age of manager Education level of manager
Model 10 Education level of internal accountant Sector Indebtedness Experience of manager	Model 11 Education nature of internal accountant Sector Experience of manager Involvement of the expert-accountant in managing the company	Model 12 In-company courses and training by internal accountant Sector Indebtedness Age of manager

Appendix 2: Summary of Results

Studied relationships	Bivariate analysis	Multivariate analysis
Company age/ AIS complexity	Non significant	Non significant
Company size/ AIS complexity	Non significant	Non significant
Sector/ AIS complexity	Non significant	Non significant
Ownership structure/ AIS complexity	Positive and significant	Negative and significant
indebtedness/ AIS complexity	Non significant	Non significant
Exports/ AIS complexity	Positive and significant	Positive and significant
Age of manager/ AIS complexity	Non significant	Non significant
Experience of manager/ AIS complexity	Positive and significant	Negative and significant
Education level of manager/ AIS complexity	Positive and significant	Positive and significant
Education nature of manager/ AIS complexity	Positive and significant	Positive and significant
Education level of internal accountant/ AIS complexity	Positive and significant	Positive and significant
Education nature of internal accountant/ AIS complexity	Positive and significant	Positive and significant
Mission of internal accountant/ AIS complexity	Positive and significant	Positive and significant
In-company courses and training/ AIS complexity	Positive and significant	Non significant
Involvement of expert-accountant/ AIS complexity	Positive and significant	Non significant
AIS complexity /financial performance (ROA)	Non significant	Non significant
AIS complexity /financial performance (ROE)	Non significant	Non significant