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Strategies of ICT Firms in Developing Countries: Strategic Group Analysis on Tunisia's Software and IT Service Industry

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This article reports on an investigation of firm strategies in the software and information technology service industry in Tunisia. The research contributes to the ongoing discussion on competitiveness of information and communication technology businesses in developing countries. It is based on the results of a survey conducted in 2004 with software and information technology service companies in Tunisia looking at their strategy implementation, utilization of external input factors, market focus and global reach. The article presents an analytical framework for the quantification of competitive challenges through the concept of strategic groups which clusters the industry structure along patterns and barriers in the strategic space of firms. The analysis identifies six groups, and discusses their competitive positions along the different patterns of diversification, internationalization and corporate control. The article argues that the view on the heterogeneity of the industry structure is key to an enhanced understanding of competitiveness. The results show that the concept of the strategic space of the software and information technology service industry and its challenges in Tunisia may be captured to some extend by prior research. Nevertheless, the complexity of the strategy construct still conceals much of the true sources of performance and international success that are frequently discussed at both the economic and business policy level.

INTRODUCTION

Tunisia is one of the leading developing countries regarding its achievements in information and communication technologies (ICT) and competitiveness (UNCTAD, 2004). Recently published comparative indicators illustrate some remarkable performance in both fields. Tunisia is ranked 34 out of 82 countries in the Networked Readiness Index (NRI) measuring the degree of preparation of a nation to participate in and benefit from ICT developments (Dutta and Jain, 2003). The country holds the highest ranking in Africa and in the Arab world. In the Growth Competitiveness Index (GCI) the country is ranked 34 (Cornelius, Blanke and Paua, 2003), and in the Microeconomic Competitiveness Index it comes 32nd out of 80 countries (Porter, 2003). With the exception of South Africa, Tunisia's competitive indicators outperform all African and Arab states in the rankings. Also with regard to government efforts to successfully promote ICT competitiveness, Tunisia is clearly showing the way among poor and middle-income countries (Lanvin, 2003).

The government e-strategy defines the overall framework for national ICT development. In Tunisia the underlying e-policy framework is embedded in the national development plan, currently the Tenth Plan 2002-2006. This intends software and information technology (IT) service companies to play more of a key role in furthering the ICT development process both as suppliers of technology at the core of the information economy and increasingly as exporters (Ministère du Développement et de la Coopération internationale, 2001).

Various institutions and researchers have analyzed opportunities and challenges for such businesses in the context of developing countries and several contributions to this discussion exist on Tunisia (FIPA, 2002; ITU, 2002; World Bank, 2002; Dutta and Coury, 2003; Lanvin, 2003; Made IT, 2003; Porter, 2003; Chaabouni and Zghal, 2004; UNCTAD, 2004; UNDP and CEPEX, 2004; Neumann, 2005). Most of the work shed light on comparative advantages and disadvantages that reside in the national business environment of firms. This has enhanced our understanding of competitiveness and ICT development in Tunisia but is not sufficient to explain how exactly the supposed internationalization and exports challenge software and IT service firms. Not all firms are affected by the same competitive challenges to the same extent. Firms can capitalize on different environmental attributes, focus on different sources of competitive advantage, and develop them in different ways. This confirms the Tunisian experience in the software and IT service industry. Relatively little attention has been paid to the differentiated view on firm strategies, even though the strategies are the key to develop and enhance competitive advantages, sustained success, higher performance and exports (Porter, 1991; Barney and Arikan, 2001).

Chaabouni and Mezghani (2001), Jouili and Chaabouni (2005), and Raffe, Esposito, Iandoli and Bruno (2002) provided first exploratory insights into the subject of strategy formation and the strategic positioning of software and IT service companies in Tunisia. This empirical study aims to differentiate their view on firm strategies and makes particular reference to the heterogeneous nature of the industry in terms of strategies, performance and internationalization. The concept of strategic groups presents an appropriate approach to analyze systematically such heterogeneity (McGee and Thomas, 1986; Hatten and Hatten, 1987; Cool and Schendel, 1988). The conceptual framework for strategic group research involves multiple levels of analysis which permits to differentiate also competitive challenges like barriers to performance for firms, firm groups and the industry as a whole in the national and international context (Pehrsson, 1990; Dranove, Peteraf and Shanley, 1998; Thomas and Pollock, 1999; Leask, 2004).

Eventually, this study makes the attempt to answer two research questions: 1/ Which strategic groups exist in Tunisia's software and IT service industry? Strategic patterns among firms are being analyzed. Mobility barriers are being hypothesized and tested; 2/ Which competitive challenges exist towards internationalization? Strategic strengths and weaknesses, opportunities and threats of firms are being discussed.

THEORETICAL BACKGROUND

Strategic groups are a widely discussed but still controversial term. Therefore, the analysis of such firm groups and their competitive effects should not lack a brief overview on its evolution and the current stage of the scientific debate in the field of strategic management. The first contributions to the subject were based on traditional concepts of industrial organization (IO) economics but analyzed firm groups within an industry instead of industries as a whole (Hunt, 1972; Caves and Porter, 1977). Numerous authors have been following this school of thought and provided conceptual extensions such as mobility barriers between groups that act as equivalent to entry barriers of industries, and methodological extensions towards more sophisticated analytical techniques (Porter, 1979; McGee and Thomas, 1986; Cool and Schendel, 1988). The cognitive approach, as second main stream in strategic group research, focuses on the perceptions of managers whose cognitions tend to simplify the industrial environment and drive the convergence of strategies and group formation (Fombrun and Zajac, 1987; Porac, Thomas, Carroll, Wilson and Paton, 1993; Reger and Huff, 1993; Lant and Baum, 1995; Hodgkinson, 1997).

The advancing conceptual work of strategic group researchers has been accompanied by a large body of emerging concurrent schools in management theory that refueled the fundamental discussion on the strategic space in which firms compete. According to the resource-based view (RBV), firm-specific capabilities and unique resources can cause widely varying levels of performance of firms in the same environmental settings and groups, pursuing the same strategies (Cool and Schendel, 1988; Yami and Benavent, 2000; Short, Palmer and Ketchen, 2002; Leask, 2004). Contributions from the new economics of industrial organization (NEIO) stressed the relevance of interaction effects between strategic groups to explain performance differences of groups (Peteraf and Shanley, 1997; Dranove et al., 1998).

Obviously there is little agreement on the meaning of strategic group research for strategic management, the characteristics which classify groups, and the effects of strategic groups on the way firms compete (McGee and Thomas, 1986; Barney and Hoskisson, 1990; Hodgkinson, 1997; Dranove et al., 1998). Nevertheless, the ongoing debate on advanced concepts of strategic group analysis provides several valuable approaches that may guide researchers; i.e. in the delineation of the strategic space (Kim and Lim, 1988; Fiegenbaum and Thomas, 1993; Yami and Benavent, 2000; Kim and Lee, 2002; Dornier, 2004; Zúñiga-Vicente, de la Fuente-Sabaté and Rodríguez-Puerta, 2004).

DELINEATION OF STRATEGIC SPACE

McGee and Thomas (1986) emphasized the primary necessity of detailed knowledge and understanding of the industry context as key condition for an adequate specification of the strategic space, the operationalization of relevant strategy variables and dimensions along strategies are measured for the strategic group analysis. The literature

review on theoretical and empirical implications from strategic group research suggests five levels to analyze what Thomas and Pollock (1999) called 'The Puzzle' when they reflected on competitive strategy and the delineation of its space:

– Global level: internationalization can distinguish competitive contexts and shape the way firms compete (Chetty and Campbell-Hunt, 2001). Globalized enterprises may capitalize on different demand and supply characteristics across different countries (Pehrsson, 1990). For instance, multi-point competition at a global scale can result in different international product-market combinations (Duysters and Hagedoorn, 1995).

– Country level: local idiosyncrasies of countries may have significant influence on the competition (Kim and Lim, 1988; Ariyawardana, 2003; Peng, Tan and Tong, 2004). Such idiosyncrasies may relate to the stage of economic development in terms of the business environment and the sophistication of firm strategies and operations. For instance, theory concepts on the role of technology in competition in developed economies can be compromised by the country-specific context as technology development processes may differ in developing economies (Kim and Lee, 2002).

— Industry level: every industry requires intimate knowledge and understanding of the industry-specific focus of competition. The strategic space delineated through traditional IO concepts may apply in industries following more stable patterns of competition based on advantages through lower costs or greater differentiation (Hatten, Schendel and Cooper, 1978; Hayes, Spence and Marks, 1983; Hergert, 1987; Cool and Schendel, 1988). In more dynamic industries other concepts may better capture the essence of the strategic space, for instance, when innovation rather than solely structure drives competition (Thomas and Pollock, 1999; Miles, Snow and Miles, 2000; Lee and Harrison, 2001).

— Group level: a strong interdependence of firms and partnerships may cause significant interaction effects that make interaction an important aspect of competition in an industry (Duysters and Hagedoorn, 1995; Sanchis Palacio and Ribeiro Soriano, 1997). All types of strategic alliances and firm networks may bear potential for such strategic interaction and competitive processes at the group-level (Moldoveanu, Baum and Rowley, 2003; Thomas and Carroll, 1994). This applies particularly when competition is characterized by collusive behavior (Cool and Dierickx, 1993; Dranove et al., 1998). Similar resource endowments of firms can also result in comparable objectives of managers and strategies, which can be understood as mental model at the group-level (Porac, Thomas and Baden-Fuller, 1989; Dornier, 2004).

— Firm level: the RBV shows that the firm-level is a rich source of diversity within an industry because of unique firm-specific resources such as particular licensed technologies and technical know-how, organizational configurations and managerial skills (Ketchen, Thomas and Snow, 1993; Lant and Baum, 1995). An industry may compete on the demand side with similar strategies in similar markets. If one or

more firms obtain core competencies that others cannot acquire or imitate then this may indeed cause significant performance differences and is a significant element of competition in an industry (Cool and Schendel, 1988; Yami and Benavent, 2000; Short et al., 2002).

The diverse approaches mentioned above demonstrate, not surprisingly, that it is hard to develop a unified model of the strategic space through a fixed set of strategy variables since it will be outdated as soon as it is applied in different industries and in different competitive contexts (Leask and Parker, 2004). In other words, the delineation of strategic space must consider strategy as complex multi-dimensional construct and reference the competitive context in which this space expands as a recipe tailored to a specific industry (Thomas and Venkatraman, 1988).

MOBILITY BARRIERS AND ISOLATING MECHANISMS

According to McGee and Thomas (1986), strategic groups can be classified by their mobility barriers and isolating mechanisms. Mobility barriers between groups within an industry are the intra-industry equivalents to barriers to entry of an industry as a whole (Caves and Porter, 1977). The basic logic is that a firm within a group can make strategic decisions that are hard to imitate for firms outside the group because imitation would require substantial cost, take a long time, and have uncertain outcome (Mascarenhas and Aaker, 1989; Sudharshan, Thomas and Fiegenbaum, 1991; Merha and Floyd, 1998).

Isolating mechanisms generalize the concept of mobility barriers at the level of the firm. Such mechanisms make a firm's competitive position sustainable by unique resources and firm-specific capital (Rumelt, 1984). This position can be isolated to the extent that others cannot imitate the strategy to achieve it, which preserves rents above the industry average (Lippman and Rumelt, 1982). Therefore, isolating mechanisms are regarded as the strategic complement of resource barriers from the RBV (Wernerfelt, 1984; Kor and Mahoney, 2000).

Dranove et al. (1998) emphasize the strategic interaction among group members to control mobility barriers and isolating mechanisms. They argue that mobility barriers are necessary to identify strategic groups but not sufficient to discuss their real effect on performance. Nevertheless, the argument that strategic interaction would be a prerequisite for strategic group effects should be rejected since it has been shown that one-firm groups can occur when one company is, for example, by far the largest, most specialized, or technologically superior player in an industry (Duysters and Hagedoorn, 1995).

The literature review shows that, in contrast to Barney and Hoskisson (1990), the group-level cannot be abandoned in the analysis of strategic group but should be placed in a consistent analytical context based on mobility barriers and isolating mechanisms. **Table 1** integrates both elements into a framework that will guide subsequent analysis on the application of the multi-level concept of strategic space outlined above.

PERFORMANCE EFFECTS

There is no strong evidence of performance differences between strategic groups. However, drawing conclusions is complicated by differences across studies in the way performance is defined and measured (Cool and Schendel, 1988). In terms of performance differences as group-level effect, Porac et al. (1989) acknowledged the divergence of the strategic and the competitive space and suggested to distinguishing competitive groups from strategic groups. Several authors demonstrated that some companies may compete in the same markets to mutual benefit, and hence satisfy even the idea of group effects based on interaction. Nevertheless, these companies were not necessarily assigned to the same strategic group (Porac et al., 1989; Bogner and Thomas, 1993; Duysters and Hagedoorn, 1995; Leask and Parker, 2004).

Hatten and Hatten (1987) eventually rejected the necessity to imply the performance link to group-membership or a supposed mobility barrier in case of lacking empirical and theoretical evidence for the linkage. Research should then confine the understanding of the concept of strategic groups to an analytical convenience to detect firm-level commonalities.

Table 1. Mobility Barriers and Isolating Mechanisms

	Mobility barriers and isolating mechanisms as structural and behavioral properties of groups with…				
	Outward effect		Inward effect		
Mobility barriers (a) Isolating mechanisms (b)	Barriers to entry: group-entry causes substantial cost, time, uncertain outcome Non-group members are deterred		Group members preserve rents Barriers to exit: group-exit causes substantial sunk costs		
	Mobility barriers and isolating mechanisms may intersect the strategic space in different levels…				
	Global level (c)	Country level (d)	Industry level (e)	Group level (f)	Firm level (g)
Different levels may contain different determinants of competition	*Globalization* controls for the way firms compete and shapes their strategic posture	The local *business environment* determines the essential competitive context	The *industrial structure* determines the way firms compete	*Group interaction* controls the height and integrity of mobility barriers	Firms compete primarily on the basis of *resources*
	Structures of strategic space and competitive context may follow a multi-level model/configuration				

(a) Caves and Porter, 1977; McGee and Thomas, 1986; (b) Rumelt, 1982; Lippman and Rumelt, 1984; (c) Pehrsson, 1990; Duysters and Hagedoorn, 1995; (d) Kim and Lee, 2002; Peng et al., 2004; (e) Kim and Lim,1988; Zúñiga-Vicente et al., 2004; (f) Porac et al., 1993; Dranove et al., 1998; (g) Cool and Schendel, 1988; Thomas and Pollock, 1999; Dornier, 2004; Leask, 2004.

STRATEGIC SPACE

It has been widely discussed that strategic group analysts need to develop 'industry recipes' for an appropriate delineation of the strategic space (Barney and Hoskisson, 1990: 191). This underlines the importance of an analytical framework with a strong industry focus based on intimate industry knowledge in order to decipher an optimal set of strategy variables (Leask and Parker, 2004: 31; Kim and Lim, 1988: 808).

Following this understanding, a vast literature review of currently available studies, reports, and empirical research on the performance of Tunisia's ICT sector, competitiveness and firm strategies was accomplished in preparation of this study. Material from statistical raw data to recent scientific articles was examined from various international organizations, ministries and other governmental bodies, universities, and private research institutions. A short-list of possible strategic concerns of firms and corresponding variables for the strategic group analysis was compiled on the basis of the literature review.

Subsequently, interviews were held with 21 ICT experts from various Tunisian institutions such as venture capital firms, public administration, business associations, and ICT firms in order to validate the relevance of the issues listed, and to complete the list. Personal interviews took place in Geneva, Switzerland, and in Tunis, Tunisia. In addition to the interviews, open-ended discussions on the telephone were conducted. This way, strategy variables could be identified that represent true strategic concerns of software and IT service firms in Tunisia.

As noted already by Kim and Lim (1988), independent from which stream of strategic group research, most studies have been undertaken in relatively mature or declining industries and primarily focused on developed economies. Therefore, on the one hand, expert interviews and literature review on the Tunisian software and IT service industry were an essential input to capture accurately true strategic concerns of firms. On the other hand, integration of this industry knowledge into a concept for strategic group analysis could not resort to a large body of similar studies.

The final delineation of the strategic space considers the five levels as proposed above: global, country, industry, group, and firm.

FIRM SIZE

Firm size refers to inter-firm differences in capabilities to generate economies of scale. In this sense, it is an appropriate indicator of economic magnitude (Duysters and Hagedoorn, 1995: 362). However, size is clearly a structural and arguably not a behavioral property of firms. It rather reflects the result of successful strategies (Leask and Parker, 2004: 16). It might be argued that true strategic group formation can only emerge from similar strategies that need to be seen detached from structural aspects such as size (Fiegenbaum and Thomas, 1995). However, structure-related characteristics of companies are important phenomena for understanding strategic group for-

mation. If the structural dimension is not included then the existing barriers that limit the scale and scope of the behavioral autonomy are ignored (Barney and Hoskisson, 1990: 190). This underlines that the economic magnitude of a firm has a number of strategic implications. Companies are undeniably moving between a rather specialized or rather diversified status according to their size (McGee and Thomas, 1986: 151). However, as the following sections show, the specialization or diversification of a firm's activities does not only depend on size.

PRODUCT LINE BREADTH

In terms of products and services, small firms may search for ways of offsetting the cost advantage of size and economies of scale by providing more sophisticated and specialized customer-adapted products (McGee and Thomas, 1986: 151). Yet, in Tunisia's software and IT service industry, the increasing sophistication of the demand for technology controls the diversification behavior rather than any opportunity to offset cost advantages of larger firms through a specialization on certain products and services. Firms follow a certain «technological determinism» (Chaabouni and Mezghani, 2001: 49). Even though there are some types of software and IT service solutions that are gradually losing in importance, at the industry-level the technological offer is continuously extending. This indicates that the corresponding product line breadth reflects the advancing technological needs in customer segments. Customers in turn have increasingly developed their needs towards more sophisticated technological requirements on software and IT service solutions (Chaabouni and Zghal, 2004; UNCTAD, 2004: 196).

MARKET SEGMENTATION

Regarding market segmentation in terms of specialization in target industries, the nature of the markets served can differ significantly. Given that knowledge-based competition plays at least some role in the software and IT service industry, differences in target industries require specific intimate industry knowledge in order to produce tailored customer-adapted products (Capaldo, Ianoldi, Raffa and Zollo, 2003: 350). The necessary organizational availability of experience and expertise is clearly related to different growth strategies and size-attributes. Knowledge of individual business units might be hard to transfer from one target industry into another. Nikolova, Reihlen and Stoyanov (2001: 30) presented a corresponding dichotomy of qualitative and quantitative aspects of firm size which appears to be very applicable in the context of knowledge-based competition. When companies serve customers in different market segments then they may either employ transferable capabilities which implies standardized products and services, or they may have additional capabilities for different customer-adapted products. The first option draws a quantitative link from size to standardization which can be frequently found in Tunisian software and IT service firms. The latter option draws a qual-

itative link from size to sub-market specialization. Furthermore, at the industry-level, companies appear to increasingly explore new customer segments. Specialization efforts are hard to find to a significant extent (UNCTAD, 2004: 197-198).

GEOGRAPHIC COVERAGE

According to McGee and Thomas (1986: 151), geographic coverage and the choice of international markets cause initial investment cost and require time in order to successfully enter a market. Not surprisingly, the ongoing discussion on barriers towards exports and internationalization in Tunisia's software and IT service industry confirms that especially the economic magnitude limits business opportunities abroad. Only few companies have obtained the necessary critical size (World Bank, 2002: 51; UNDP and CEPEX, 2004: 26). Therefore, firms and respectively strategic groups can be expected to differ significantly in firm size along with different modes of geographic coverage (Chaabouni and Mezghani, 2001: 51).

Duysters and Hagedoorn (1995: 362) noted that different distances between international markets can also be expected to play at least some role in group formation. Distance in this sense comprises a variety of differences between international markets that are market-specific cost drivers; i.e. political and technical barriers, geographic and physical barriers, and social barriers (Mélitz, 2002; Martínez-Zarzoso and Márquez-Ramos, 2004). **Table 2** illustrates vice-versa that proximity and similarity of markets can be key sources of competitive advantages of firms in the Tunisian software and IT service industry in the international competition.

If companies perceive and communicate proximity in language, culture and geography as a significant aspect in their business relations abroad then it is logical to theorize that the market choice of at least these firms has also significant implications on their strategic posture to cope with different market distances and types of trade barriers.

GEOGRAPHIC DISTANCE

Geographic distance is a significant cost driver in international businesses (Ceglowski, 1998: 20). Regarding the strategic space of firms this distinguishes companies by their choice of target markets by dis-

Table 2. Country Advantages of Tunisian Firms

Groupement d'Entreprises Tunisiennes IT (GET IT)

In 2004, nine enterprises from Tunisia founded the common platform GET IT in order to give to foreign customers a global technological offer of Tunisian software and IT service solutions. The companies involved in this project are 3S, Discovery, Hotix, Netcom, Net-Concept, Oxia, Progidec, ST2i and WebOne. The platform is supported by two public key institutions in the ICT sector development: FAMEX at the national level, and FDSP at the international level.

Key target markets are Africa, Europe, and the Middle East. Advantages of Tunisian firms in these markets towards international competitors are geographic proximity, proximity in terms of culture and language (GET IT, 2004).

tance. If the height of costs reflects the geographic proximity of a market then distance implies investments. Such investments can present substantial costs and constrain firms in their freedom to move into a market, as it has been acknowledged in a number of reports on export development in the Tunisian software and IT service industry (UNDP and CEPEX, 2004: 26). Larger firms may easily send business people to distant markets in order to explore a market's opportunities while such exploration presents a serious challenge for smaller businesses that do not have the necessary resources to do so (World Bank, 2002: 51).

CULTURAL DISTANCE
Countries have an idiosyncratic cultural heritage that separates them from other nations, while cultural variations within a region are usually much less pronounced than across regional borders. Cultural distance between countries can cause substantial constraints for the activities of international companies (Hofstede, 1980; Hofstede, Pedersen and Hofstede, 2003). It has been shown that such constraints cause costs, referred to as cultural costs, that relate to investments in learning (Kónya, 2002: 6). It is necessary either to learn and to acquire country-specific knowledge, or to make an alternative commitment to offset the cultural distance; both ways present advantages in a specific country (market) towards competitors that can not afford the underlying investments. However, the choice of the regional market implies less effort in learning than a distant market (Chetty and Campbell-Hunt, 2001: 23).

LANGUAGE DISTANCE
Similar to cultural distance, language distance can act as a barrier to international trade which can be reduced by learning (Kónya, 2002: 6). In this context it is important to specify how the impact of a truly common language of trade partners is different from that of linguistic diversity of trade partners including the capabilities to speak 'open-circuit languages' such as English (Mélitz, 1999). Linguistic diversity encourages trade with all foreigners indiscriminately. However, a common tongue promotes businesses with those foreigners with whom communication is especially easy (Mélitz, 2002: 16; Noguer and Siscart, 2003: 10). In terms of differences in firm strategies and strategic implications, companies benefit from two aspects if they choose markets that permit to leverage language commonalities. First, investments in language trainings for international business people might be saved. Second, there is an increased opportunity for communication across a firm's whole organization since everybody speaks the same language.

UTILIZATION OF INPUT FACTORS

According to Dranove et al. (1998: 1035), the influence of environmental input factors on strategic group formation and vice-versa the control of strategic groups over such inputs cannot be overestimated.

The behavioral and structural posture of groups can be crucially shaped by scarce environmental resources and imperfectly competitive factor markets.

Lanvin (2003) outlined a comprehensive set of crucial factors promoting and hindering ICT business development in a country. Compatible taxonomies adapted to Tunisia and the Maghreb region confirm the following three factor categories (Raffa et al., 2002: 334; Neumann, 2005):

– ICT infrastructure: availability and quality of access to communication networks, sophisticated communication services;

– Human resources: availability of scientists and engineers, quality of higher education, quality of professional training programs;

– Venture capital and finance: availability of venture capital, presence of foreign investors, sophistication of financial services.

Heeks (1999) narrowed down a concept of roadblocks for software and IT service companies that captures these factor markets and specifies the environment-strategy link. Through the clear isolation of such roadblocks, this study responds to the need in strategic group research to concentrate only on those factors that are truly integral to behavioral and structural properties of firms and have a direct strategic impetus (Dranove et al., 1998: 1035).

ICT INFRASTRUCTURE

The communication infrastructure is crucial for the growth of IT, in particular for value added services such as IT outsourcing and e-commerce (UNCTAD, 2003a). Among other fundamental strategic functions of infrastructure for firms, the access and affordability of quality communication networks facilitates the delivery of intangible digital products and services, and supports efficient information flows between companies and their customers (Mann, Eckert and Cleeland-Knight, 2000).

According to the Digital Access Index (DAI), Tunisia is the most advanced country in the Maghreb region in successfully facing the infrastructure development (ITU, 2003). For the period of the Ninth Plan between 1997 and 2001, the Tunisian government invested 1.016 billion US dollars in the ICT infrastructure. The Tenth Plan provides 2.070 billion US dollars to advance this process between 2002 and 2006 (Ministère du Développement et de la Coopération Internationale, 2001: 86-87).

Despite governmental efforts, Tunisia has still a below average position in the global comparison –NRI rank 52 of 82– regarding the average availability and quality of access to communication networks (World Economic Forum, 2003b). The main reason is the heterogeneous proliferation of ICT across different geographic segments. As with many other countries, Tunisia is still working on the densification of its existing telecommunication infrastructure (Dutta and Coury, 2003). **Table 3** provides an overview.

Strategic implications on imperfectly competitive markets are hard to derive from the ICT infrastructure. Companies locate their offices in larger cities such as Tunis, Sfax, Sousse, Monastir, Gabès, and Djer-

ba (Chaabouni and Mezghani, 2001: 47). They do not choose locations where they might be affected for example by poor rural network densities. Thus, it is logical to assume that they have equal access to adequate communication networks.

HUMAN RESSOURCES

The national human resources development in Tunisia supports excellent production conditions for software and IT services (Neumann, 2005). Education plays a key role in the governmental development strategy as the international comparison of public spending on education may illustrate—NRI rank 8 of 82 (World Economic Forum, 2003b). For instance, relative expenditures for higher education increased between 1997 and 2003 from 1.27% to 1.80% of gross domestic product (GDP) (Ministère de l'Enseignement Supérieur de la Recherche Scientifique et de la Technologie, 2003). **Table 4** shows how technical studies and the generation of technological know-how have been vigorously promoted.

The effort made in the promotion of such studies results in a relatively high international ranking of Tunisia –NRI rank 14 of 82– regarding the availability of university graduates and scientists in the field of ICT. In addition, the high quality of math and science education shows how the

Table 3. ICT Infrastructure Development in Tunisia

Telephony	The number of fixed-line and mobile phone subscribers per 100 inhabitants increased from 6.5 in 1997 to 15 in 2001. Further progress of the network densification can be expected due to the liberalization of the market for mobile communication in 2002 when the monopoly of Tunisie Télécom (TUNTEL) has been broken and a second mobile provider Orascom Télécom Tunisie (TUNISIANA) entered the market. The costs of mobile telephony are declining constantly and the number of mobile phone subscribers is increasing significantly. In 2002 there were 400,000 subscribers and by 2006 the government estimates up to 3,000,000 users (Ministère du Développement et de la Coopération Internationale, 2001).
Internet	Regarding the Internet, Tunisia plays a pioneer role for the region. In 1991, it was the first country connected to the Internet in Africa and the Arab world (ITU, 2002). Nevertheless, the international comparison shows that the competition in the ISP sector is still rather low—GCI rank 62 of 80 (World Economic Forum, 2003a). Consequently, the level of prices is still relatively high, there is poor pressure on ISPs to improve their technological basis, and the variety of services available to individuals and businesses is rather limited compared to other countries.

Table 4. Number of Students in ICT Related Studies

Year	1997	1998	1999	2000	2001	20002	2003
Students	3,534	6,995	9,995	11,729	18,288	23,071	30,260

Source: Ministère de l'Enseignement Supérieur de la Recherche Scientifique et de la Technologie (2003)

ICT education system fullfills both qualitative and quantitative require-ments—NRI rank 6 of 82 (World Economic Forum, 2003b).

In international competition in the field of software and IT services much depends also on the affordability of qualified human resources because the share of cost for personnel can be up to 80% in total production cost of software (FIPA, 2002: 23). **Table 5** illustrates the factor cost in the international comparison of several essential production factors, includ-ing human resources. Consequently, firms in Tunisia can draw on rela-tively favorable cost conditions which also reflect their stage of econom-ic development since Tunisia is classified as low income country with a GDP per capita of 6,769 US dollar (World Economic Forum, 2003a).

The national human resources development effectively supports ideal factor conditions for firms in terms of technological expertise. Software and IT service companies as employers do not need to compete for such expertise in Tunisia (Chaabouni and Mezghani, 2001: 49).

VENTURE CAPITAL AND FINANCE

Inefficient capital markets are a serious obstacle for entrepreneurship and investments in the information economy in Maghreb states as with many other developing countries (Raffa et al., 2002: 335). This problem materializes in Tunisia as lack of expertise regarding adequate risk eval-uation in both banks and the vast majority of venture capital companies (UNCTAD, 2004: 185). They show in general a preference for invest-ment and financing projects with large enterprises in more traditional Tunisian industries such as textiles, logistics and tourism rather than in software and IT services companies (World Bank, 2002: 64). **Table 6** presents two exceptions that are currently operating in Tunisia.

Table 5. Cost of Software Production

Country	Tunisia	Morocco	Poland	Hungary	Czech Republic	France
Cost Rank	1	2	3	4	5	6
Cost Value*	115	129	174	179	213	649

* Cost Value: Labor cost, rent and services, general cost, and finance cost. Cost keys aggregated in US dollar per man-day. Source: FIPA (2002).

Table 6. Exceptions in Tunisia's Venture Capital Landscape

Tuninvest Finance Group (TFG)	Tunis Information Technology Fund (TITF)
TFG is a private venture capital company with investment projects in various indus-tries. It addresses specifically the ICT sector since 1998. Until 2004, seven pro-jects have been carried out in various fields of ICT such as hardware assembly, software development, software integra-tion, software distribution, IT consultancy, and ICT education. A TFG team special-ized in ICT businesses accompanies all investments in this field with active man-agement and strategy consultancy since 2000 (www.tuninvest.com).	TITF is a venture capital company which addresses explicitly the ICT sector. It is a public-private sector partnership initiated by the government to promote the ICT sector. TITF was found in 2002 by seven large pub-lic and private enterprises in the banking and ICT sector. Six investment projects have been carried out in the field of telecommuni-cation, ICT education, software develop-ment, and software integration until 2004 (www.titf.com.tn).

Chaabouni and Mezghani (2001: 50) confirm such market inefficiencies and the resulting obstacle for software and IT service businesses in Tunisia since the availability of venture capital is an important precondition for innovation and business development. Financial and consulting services from banks can be vital input factors in customer projects in this sector; and the larger the projects are the more important such factors become (UNCTAD, 2003b).

The government launched a variety of initiatives in order to resolve underlying market inefficiencies. Facing the disadvantage regarding the weak capitalization of ICT firms, the government established a number of public venture capital funds which take part in joint investment projects in the ICT sector together with private finance institutions (UNCTAD, 2004: 185-186). **Table 7** illustrates that the strategic effect of the public initiative goes far beyond the financial aspect since the collaboration of firms with public funds often involves special management consultancy and know-how transfers relating to the specific objective of a fund.

Support in terms of finance is designed to provide firms either with private equity or finance. This implies an indirect impact on strategies since the strategic choice on how to use the means is not pre-determined by the Business Development Support (BDS) program. Moreover, programs can aim at specific strategic objectives with a direct strategic impetus. These objectives are in general supported by the transfer of know-how on the design and implementation of specific business processes to support the strategy (UNCTAD, 2004: 189).

There are also a number of international private and public organizations in the field of ICT in Tunisia. **Table 8** shows the strategic impact mainly on learning and know-how including trainings on foreign management practices, language skills, legal and regulatory aspects of international trade.

Table 7. Tunisian Business Development Support

Program	Objective	Assitance	Strategic Impetus
FAMEX.- Fonds d'Accès aux Marchés d'Exportation	Export market access, management consultancy	70% subsidies of cost of export marketing plan; up to 50% of market access cost: marketing, market research, business travels	Know-how, finance
FOPRODEX - Fonds de Promotion et Développement d'Exportation	Export promotion, marketing support, international branding, export market access	15 to 50% subsidies and 30% loan for export marketing efforts including promotion material, registration of trade marks, participation in trade fairs abroad	Know-how, finance
FODEC - Fonds de Développement de la Compétitivité (Mise-à-Niveau)	General competitiveness, technology absorption, quality control systems	10 to 20% subsidies of material investments such as in hardware; 70% subsidies of immaterial investments such as in quality certification	Finance
FOPRODI - Fonds de Promotion et Développement d'Industrie	Project finance for ICT investments across all economic sectors, demand stimulation	Up to 45% public venture capital in joint investment projects; shareholders: FOPRODI, venture capital company, investing company	Finance
FITI - Fonds d'Incitation à l'Innovation dans les Technologies de l'Information	Promotion of investments in technological upgrades, technology absorption in small businesses	Up to 49% public venture capital in joint investment projects; shareholders: FITI, venture capital company, entrepreneur	Finance
RITI - Régime d'Incitation à l'Innovation dans les Technologies de l'Information	Promotion of entrepreneurship in software development, systems development, IT services	Up to 49% public venture capital in joint investment projects; shareholders: RITI, venture capital company, entrepreneur	Finance

The capability of firms to attract foreign direct investments (FDI) can also play a key role in getting around the obstacles for business development regarding the poor provision with finance and capital (Raffa et al., 2002). Foreign participation in Tunisia's software and IT firms' capital is as follows: 6% of the firms are entirely owned by foreign capital and 21% have joint Tunisian and foreign owners (Made IT, 2003).

One explanation to this is in the relatively little size of the average ICT firm in Tunisia and the correspondingly low interest that foreign investors may have in an engagement in such small businesses (World Bank, 2002: 36). Another argument is that forms of inter-firm co-operation as a crucial pre-requisite for spill-overs are poorly developed among software and IT service companies in Tunisia, independent from whether they are fully or partly Tunisian, or subsidiaries of multi-national entreprises (Chaabouni and Mezghani, 2001: 51).

In contrast to the factor conditions regarding ICT infrastructure and availability of technical expertise, venture capital and finance are clearly scarce input factors. The national and international BDS programs compensate this finance roadblock to some extent (Heeks, 1999: 9). Yet, as shown before, the impact of public and public-private initiatives is both financial and non-financial so that companies likely differ significantly in their strategies and performance compared to other firms when they participate in such programs.

CONTROL SYSTEMS

A firm's organizational production function can be thought of as its organizational structure and the skill of its management in employing it efficiently (Porter, 1991; Barney and Arikan, 2001). There is a systematic link from strategic choices to organization structures to an organization's market behavior. On the one hand, this link may be given through the organization's chart assignment of responsibilities and lower level decision makers. On the other hand, how far the behavior of an organization is consistent with strategic choices depends also on an organization's system of measuring and rewarding performance (McGee and Thomas, 1986: 152).

Table 8. International Business Development Support

Program	Objective	Assitance	Strategic Impetus
CLDP - Commercial Law Development Program (United States)	Promotion of international business relationships, preferably to the US	Know-how transfers on key legal issues and trade law, capacity building, learning US management practices	Know-how
MEPI - Middle East Partnership Initiative Tunisia (United States)	Promotion of international business relationships, preferably to the US	Professional training, learning US management practices, language training	Know-how
PSDF - Private Sector Development Fund (Canada)	Promotion entrepreneurship in the private sector, reduction of administrative barriers to business	Capacity building, know-how transfers, management consultancy	Know-how
USAID - Agency for International Development (United States)	Trade facilitation, support of global business networks, promotion of international business relationships	Business matching services, technology transfers, trade lead follow up services, trade financing referrals, and market information	Know-how

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Such control mechanisms are important from two different perspectives. Internally, an important skill in any business is the ability to translate strategy into action. This is increasingly difficult in larger or more complex organizations, where the distance between those who formulate the strategy and those who carry it out is significant (Porter, 1996). With size and complexity comes the necessity for communicating strategic intent and for providing a management framework that aligns the capabilities of the business with the requirements of the competitive environment (Kaplan and Norton, 1992). Externally, control systems can be used for communication purposes towards customers. Therefore, quality standards play a key role for firms in image and trust building with customers (Magee and Tripp, 1997). In the field of software and IT service businesses, the implementation of such standards ties together this internal and external function (Li and Gao, 2003). This crucially shapes a firm's organization in technical and non-technical management linked in interdependent control and leadership mechanisms in software engineering processes (Shoemaker and Jovanovic, 2002). Both the internal and external perspectives have important strategic implications that require some further specification.

QUALITY CONTROL SYSTEMS

There is an increasing awareness of software and IT service companies in developing economies for quality standards. Such standards are essential success factors to approach customers in international markets especially in developed countries (Raffa et al., 2002). In general it is argued that the accreditation by an independent certification body shows commitment to quality, customer needs, and to working towards improving efficiency (Li and Gao, 2003). This demonstrates the existence of an effective quality management system that satisfies the rigors of an independent, external audit. Therefore, the quality certification effectively supports a better company image and gives a competitive edge to an organization's marketing (Magee and Tripp, 1997). It is important to note, as engineering processes and technologies change, so do industry standards and specifications in the field of software and IT services. Therefore, there is a variety of standards that differ in a variety of aspects such as the process area they are applied on, scope and purpose, complexity and size of solutions, originating committee and issuing organization (Caputo, 1998).

Table 9 presents three of the more established international quality standards and illustrates the internal control function for each standard. These are also the most frequently employed certifications in Tunisia's software and IT service industry.

The implementation of these quality standards requires costly investments. First, the certification bodies need to be paid. Second, the organizational realignment of control and leadership mechanisms presents at least some effort in terms of human and financial resources. Hence, companies that implement such quality control systems differ from others in structural and organizational characteristics. The strategic intent towards an improved image and trust building with customers presents the behavioral reference of such system.

Notably, the latter function, related to the organizational realignment, is also a key development goal of export-related BDS programs in Tunisia. Among other smaller and larger investments, companies have been using the public means in order to acquire a costly quality certification in order to support a better image for quality in international markets (UNCTAD, 2004: 200). This may indicate a distorting side-effect of BDS in the competition within the local software and IT service industry. Of course, export-related BDS programs may preferably support the most promising export candidates. These companies then have access to subsidies in order to obtain the quality certification. Whereas, most firms still realize a large extent of their turnover at home. Consequently, companies that only produce for the Tunisian markets may find it harder to compete with quality-certified companies that benefit from such subsidies since the certificate may not only appeal to customers abroad but to those in the domestic market.

STRATEGY IMPLEMENTATION
In terms of pure strategy formation, one can construct a sequence of implementation levels reaching from strategy formation and the definition of a vision, to related incentive systems, to resource allocation, to strategy-guided operational planning, to review and organizational realignment (Kaplan and Norton, 1992). In other words, strategic planning and strategy implementation require a consistent organizational linkage. Consequently, the more consistent a company informs, aligns, controls and rewards its organization the more sophisticated and effective is the strategy implementation (Hambrick and Snow, 1989).
Such organizational characteristics of strategy formation can become essential success factors the more complex businesses become

Table 9. International Quality Standards in Tunisia's Software and IT Service Industry

CMM	CMM is a model of process maturity for software development. The standard was created in 1986 by the U.S. Software Engineering Institute in cooperation with the Mitre Corporation. The key concept of CMM is organizational maturity that implies clearly defined procedures for software development and project management. CMM defines five levels of organizational maturity: initial level, repeatable level, defined level, managed level, optimizing level.
ISO 9001	ISO 9001 is an internationally recognized series of standards for the quality management of businesses created in 1987. It provides a common worldwide set of quality system guidelines and requirements. It applies to the processes that create and control the products and services that an organization supplies. Companies are supposed to implement a quality management system covering the design, development, quality assurance, testing, and release procedures of software products to be certified. ISO 9001 was modified in 1994 and 2000.
ISO/IEC 12207	ISO/IEC 12207 is an international standard for software life cycle processes. It was developed in 1995 in collaboration with IEC. The standard presents a common framework for a firm's activities and tasks by processes and groups. In 2001, an amendment was made that fixed certain defects and added additional appendices providing a process reference model.

Note: CMM: Capability Maturity Model; ISO: International Organization for Standardization; IEC: International Electrotechnical Commission.

(Porter, 1996). Hence, diversified companies are likely forced to pay more attention to strategy than other more specialized firms need to do. Whereas, diversification has implications on complexity within all areas of a firm's activities including for instance product lines, market segments and the choice of international markets in number and distance.

The potential to distinguish strategic groups exists due to the cost and time to organizationally implement a consistent strategy implementation process which includes several systems relating to organizational performance measurement, reward mechanisms etc. Furthermore, strategy implies certain managerial skills to develop a strategy which extends the primarily structural organizational issue to a structural and behavioral construct.

EMPIRICAL EVIDENCE

The strategic space as outlined above covers a complex set of strategy variables to be integrated into an analytical model. As mentioned before, due to lacking prior empirical and theoretical evidence for the strategy-performance link at the group-level in Tunisia's software and IT service industry, a number of evident but not sufficiently tested features of the strategic space can not be included in this study in favor of the gradual adaptation of the known strategic space to the industry context. Consequently, the analysis follows Hatten and Hatten (1987) and does not primarily imply any performance effects relating to group-membership or mobility barriers. Eleven variables are included in the final framework. Furthermore, there are three different performance measures and one market growth estimate. The following sections present the specifications of the sample population, the data collection, and the analytical methodology.

SAMPLE

The necessary firm-level data were obtained from a survey with 49 of 274 companies in the Tunisian software and IT service sector. This was carried out by the Electronic Commerce Branch (ECB) of the United Nations Conference on Trade and Development (UNCTAD) in Geneva, Switzerland in 2004.

The clear size of the sector made it possible to include all firms in the sample without limiting the choice by any sampling technique. According to the Tunisian ministry of finance (Ministère des Finances), the overall turnover of the sector increased continuously from 24 million US dollar in 1997 to 85 million US dollar in 1999. After this period of steady growth, the turnover fluctuated between 60 and 86 million US dollar during 2000-2002. Tunisia has been exporter of software and IT services since 1999. The exports grew from 15 million US dollar in 1999 to 29 million US dollars, when at the same time the overall turnover of the sector declined. Subsequently, the export turnover fluctuated between 18 million US dollar in 2001 and 26 million US dollar in 2002.

The 49 companies that eventually participated in the survey generate an overall turnover of 28 million US dollar including 7 million US dollar related to exports in 2003. Although the final sample covers 18 per cent of the whole population, it shows an overrepresentation of larger firms. For instance, according to the Tunisian business association of software and IT service companies (Chambre Nationale Syndicale des Sociétés de Services et d'Ingénierie Informatique—CNS SSII), 84% of these firms have less than 10 employees in 2004. This applies only to 53% in the final sample of this study.

DATA COLLECTION AND MEASUREMENT

The firm-level data was obtained from a questionnaire distributed by the Tunisian ministry of telecommunication technologies and transports (Ministère des Technologies de la Communication et du Transport) to all of the 274 software and IT service companies. The questionnaire was sent together with a letter from UNCTAD, explaining the nature and significance of the proposed research. Responses were collected by ECB via email, fax, and on the telephone.

The indicators developed on basis of the survey data reflect all strategic dimensions discussed above. While most indicators are rather simple and could be derived directly from the available data, the multi-dimensional character of the geographic coverage as discussed above required a more advanced construction technique for illustrative purposes and statistical testing.

A separate taxonomy that emphasizes the strategic meaning of a specific market choice necessarily reflects strategic country-specific investments of firms. Available data on the impediments in international trade as discussed above provide eligible proxies for a quantification of such market differences in a multi-dimensional market distance indicator. The dimensions included in the calculation are culture distance *(#CDIST),* language distance *(#LDIST)* and geographic distance *(#GDIST)* from Tunisia to each country, referred to as target market. Culture data are taken from Hofstede's database of cultural dimensions. Language and geography data are obtained from the geodesic distances database of the Centre d'Études Prospectives et d'Informations Internationales. The geographic distance measure between Tunisia and other countries includes city-level data to assess the geographic distribution of population inside each nation (Gaulier, Mayer and Zignago, 2003). Culture distance from Tunisia as ordinal reference point to other countries was calculated by Euclidean distance along four sub-indicators per country according to Hofstede's (1980) four classical dimensions: power distance, individualism, masculinity, uncertainty avoidance[1]. Even though neither the cost of culture in trade nor the culture-strategy link can be ultimately quantified through these dimensions, they reflect investments that present a company's relative need for cultural learning compared to other competitors. Furthermore, another indicator was recently added to this framework by Hofstede et al. (2003) on long-term orientation. This was not applicable due to the incomplete dataset on the countries included in the sur-

1. Culture data for Tunisia correspond to values for Arab World in Hofstede's database available from his web site: http://www.geert-hofstede.com

vey sample. Language Distance was measured by the number of significantly common languages for two countries (Gaulier et al., 2003). The final market distance *(#DIST),* presented in **Table 10** is the Euclidean distance between Tunisia and the target markets envisaged by firms along the three standardized variables above. Mismatches of data from the survey and other databases were adjusted by proxies and dummy variables.

It is important to note that a consistent market distance indicator would require weights in the calculation to not overestimate the effect of a possibly less significant sub-indicator (Weber, Eisenführ and von Winterfeldt, 1988). However, this would be too large a step to be taken at once in the course of this study. Still, the value added of this market distance indicator is the clear focus to the strategic meaning of distance, and the ability to compare firms according to the commitment to more or less distant markets.

Table 11 presents the definition for each strategy variable and assigns the respective level of analysis from the underlying multi-level model of the strategic space. Most of the variables contain ordinal scaled rank-order data that are either discrete or partly continuous.

Several strategy variables are rather complex and require some explanation in order to better understand the strategic meaning and the difference of high and low scores. Commitment to market distance *(#MDST),* reflects the geographic coverage and measures the share of turnover per international target market in total turnover weighted by the proximity of the market, which attributes the market distance *(#DIST),* to the market commitment of firms. The underlying concept of market distance relating to market access and transaction costs permits a meaningful agglomeration of true strategic groups according to the market choice. It emphasizes the choice of markets as choice of market proximity versus distance. The commitment to a market puts a weight on the market orientation according to the relevance of a market for a firm's business. Otherwise, companies that address similarly distant markets but differ significantly in their respective commitment would be erroneously attributed to one group. This way also crossloads of the market variable can be minimized when firms operate in many different countries in multi-market competition. Even though, this is meaningful in order to capture true structural commonalities in the geographic coverage of firms it diminishes the effect of possible strategic implications on international diversification of firms that aim to serve the global market. Therefore, another indicator on the affinity to global reach *(#GLB),* is needed. A corresponding specialization measure indicates the strategic intent to address international markets. It reflects the breadth and diversity in the market choice independent from the turnover realized. Consequently, the global reach is measured as sum of target markets weighted by the market proximity. In comparison to market distance *(#DIST),* the indicator on global reach identifies a firm's affinity to globalize its business heading for global multi-market competition. Another central variable in the model refers to strategy implementation *(#STRAT).* It is measured along 6 levels which reflect the model of Kaplan and Norton (1992) on management

control and strategic management systems: 1/"a company has a strategic planning"—for more than five years, where five years are chosen to distinguish a long-term and short-term orientation of strategy; 2/"a company employs its strategy as basis for action and decision-making"; 3/"leaders, teams, and individuals are aware of the strategy and their roles in the achievement"; 4/"a company pursues integrated strategic action plans to effectively operationalize the strategy"; 5/"a company offers special rewards to motivate employees"; 6/"a company measures the effectiveness of strategic targets among employees."

Table 10. Distances from Tunisia to Target Markets

Country	Market Distance	Culture Distance	Language Distance	Geographic Distance
Tunisia	0.000	0.000	0.000	0.000
United Arab Emirates	0.300	0.000	0.000	0.506
Africa and Arab World	0.324	0.318	0.250	0.368
France	0.439	0.526	0.500	0.141
Belgium	0.485	0.620	0.500	0.186
Switzerland	0.546	0.763	0.500	0.130
Germany	0.739	0.721	1.000	0.186
Canada	0.770	0.807	0.500	0.887
Netherlands	0.821	0.938	1.000	0.199
United Kingdom	0.849	1.000	1.000	0.225
United States	1.000	0.919	1.000	1.000

Table 11. Survey Data Mapped to Strategy Variables

Variable	Survey Data	Measure
#SIZE: Firm size (F*)	Economic magnitude	Turnover in 2002
#DIVSOL: Diversification in solutions (I)	Product line breadth	Number of software and IT service solutions (1-18)
#SPSOL: Specialization affinity in solutions (I)	Change in product line breadth	Ranked affinity in 2002-2003 (0 specialize - 2 diversify)
#DIVIND: Diversification in industries (I)	Market breadth	Number of target segments (1-23)
#SPIND: Specialization affinity in industries (I)	Change in market breadth	Ranked affinity in 2002-2003 (0 specialize - 2 diversify)
#HOME: Reliance on domestic market (G,I)	Share of domestic market	Percentage of domestic market in turnover in 2002
#MDST: Commitment to market distance (G,I)	Commitment to distance	Number of markets weighted by distance and share in turnover
#GLB: Affinity to global reach (G,I)	Diversity in geographic coverage	Number of markets weighted by distance
#INP: Utilization of external inputs (C,I)	Utilization of external inputs	Number of sources of financial and non-financial supply (0-8)
#QUL: Implementation of quality standards (I,F)	Commitment to quality	Number of international quality standards implemented (0-3)
#STRAT: Strategy implementation (F)	Organizational depth of strategy implementation	Number of implementation levels (0-6)

*: G = Global level (characteristics of internationalization; i.e. international competition); C = Country-level (characteristics of the business environment; i.e. Tunisia); I = Industry-level (industry characteristics; i.e. software and IT service industry); F = Firm-level (firm-specific characteristics; i.e. economic magnitude).

The performance variables used in this study are adopted from Kim and Lim (1988: 808). The data for sales growth rate, export performance and market growth rate are either estimates by managers or precise performance measures that could be directly transferred into an indicator. Moreover, return on assets was calculated based on the financial output per employee. This seems to be an appropriate proxy value since in the field of software and IT services in Tunisia the share of cost for personnel is about 80% in total operating cost (FIPA, 2002: 23). Thus, personnel can be seen as the main asset of firms. The market growth rate perceived by managers used as illustrative measure reflects the market dynamics also controlling for firm performance. **Table 12** assigns the performance indicators to the data obtained from the survey. The variables build on continuous data.

ANALYTICAL METHODOLOGY

In terms of methodology, cluster analysis has been commonly used to identify strategic groups in previous studies (Hatten and Hatten, 1987; Barney and Hoskisson, 1990). Even though, principle criticism relates to the ability of cluster analysis to uncover natural clusters of strategic groups rather than artifacts of the method. Therefore, this study follows recent advice on improving the use of cluster analysis (Aldenderfer and Blashfield, 1984; Ketchen and Shook, 1996; Everitt, Landau and Leese, 2001). First, to avoid skewed results in cluster solutions due to variables with different relative scales, all variables were standardized to a common scale from zero to one (Anderberg, 1973; Cool and Schendel, 1988). Second, the eleven variables selected in this study were tested for intercorrelations. Variables showing a significant correlation were separated out in the clustering process to prevent overweights of similar variables and erroneous clusters. Spearman's Rho was used as correlation coefficient for rank-order data. The results from this stage of the analysis are presented in **Table 13**.

The variables related to geographic coverage *#MDST* and *#GLB,* reflecting a firm's commitment to market distance and the affinity to global reach were removed from the variable set to be clustered because of strong correlation with each other and the reliance of a firm

Table 12. Survey Data Mapped to Performance Variables

Variable	Measure
#ROA: Return on assets	Financial output realized per employee in 2002 (US dollar/number of employees)
#SGR: Sales growth rate	Sales growth rate in the period 2001-2002 (in percentage)
#EXP: Export performance	Share of exports in corporate turnover in 2002 (in percentage)
#MGR: Market growth rate	Estimated annual market growth rate in the period 2001-2002 (in percentage)

on its home market *#HOME.* Strategy implementation *#STRAT* corre-
lates significantly with the diversification measure of product line
breadth *#DIVSOL* and the utilization of external inputs *#INP.* The exter-
nal input variable *#INP* also shows some relatedness to firm size
#SIZE. Firm size *#SIZE* is the separated variable because at lower sig-
nificance levels it also correlates with the commitment to quality con-
trol *#QUL,* and organizational strategy implementation *#STRAT. #INP*
on the other hand shows at this significance level only a connection to
the already isolated global reach *#GLB.*

The cluster analysis follows a three step procedure to confirm the pres-
ence of a natural structure by using the two sets of separate variables
in two separate analyses. Everitt et al. (2001) recommend this proce-
dure to confirm the presence of a common natural structure within the
data, through the independent clustering of two sets of different vari-
ables. Step 1 divides the clustering variables into two, unrelated vari-
able groups that are shown not to be strongly correlated. Step 2 con-
firmed a common structure by the results of a two-component cluster
analysis. First, through a hierarchical clustering technique on the appli-
cation of the unweighted pair-group average method using arithmetic
averages (UPGMA) (Sneath and Sokal, 1973). The proximities
between variables are calculated using squared Euclidean distance
(Råde and Westergren, 1995). Second, the analysis is repeated using
the cluster partitions for a k-means cluster analysis, which is a divisive
technique. This use of a divisive technique provides a validity test on
the number of appropriate clusters (Ketchen et al., 1996). The results

Table 13. Means, Standard Deviations, and Intercorrelations of Strategy Variables

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Firm size	.187	.24										
2. Diversification in solutions	.235	.22	.21									
3. Specialization affinity in solutions	.806	.25	-.12	-.22								
4. Diversification in industries	.356	.33	-.05	.25	.25							
5. Specialization affinity in industries	.714	.29	-.23	-.05	.16	-.05						
6. Reliance on the domestic market	.805	.28	-.23	-.27	-.01	.13	.17					
7. Commitment to market distance	.128	.24	.10	.17	.01	-.17	-.20	-.92**				
8. Affinity to global reach	.286	.24	.13	.11	-.01	-.03	.07	-.46**	.41**			
9. Utilization of external inputs	.240	.27	.40**	.12	-.07	-.14	.16	-.04	-.06	.34*		
10. Implementation of quality standards	.204	.22	.31*	.23	-.02	.14	-.15	-.17	.07	.32*	.18	
11. Strategy implementation	.384	.27	.28*	.38*	-.08	.13	-.03	-.31*	.26	.30*	.42**	.34*

*: p < .05; **: p < .01.

from the two methods confirm a common structure in the data. Step 3 merges the two variable cluster sets of seven variables again. Here the intention is to provide a better definition of the clusters from a more comprehensive set of variables (Anderberg, 1973). Once again, the cluster analysis is carried out in two stages: the identification of the correct number of clusters is based on the UPGMA method followed by a k-means analysis. In examining the cluster process, the correct number of strategic groups is in the six-cluster solution. The large increase in the fusion coefficient from the six- to the five-cluster solution indicates that two dissimilar clusters merged.

After the determination of the correct number of clusters, the most distinctive strategy variables in the final cluster solution are analyzed using a one-way analysis of variance (Mcdonald, Seifert, Lorenzet, Givens and Jaccard, 2002). This points out which variables are the most distinctive at the industry-level. Confidence intervals are calculated for each cluster combination in each strategy variable, including those from the cluster process and the ones excluded from the cluster process, in order to isolate the group specificities for the whole variable set (Råde and Westergren, 1995). This way, the most discriminant variables serve as basis to characterize cluster types. In the analysis of performance differences, one-way ANOVA is used again in order to test performance linkages for significance within the clustering solution. Computations were performed in SPSS.

RESULTS

The empirical results answer the first research question: Which strategic groups exist in Tunisia's software and IT service industry? The presentation of the results is based on a complex set of tests and various testing techniques.

STRATEGIC GROUPS IN TUNISIA SOFTWARE AND IT SERVICE INDUSTRY

The cluster analyses identified six distinct clusters in the Tunisian software and IT service industry. Group data are shown in **Table 14**. The ANOVA results rejected the null hypothesis that the clusters do not differ for nine of the eleven strategy variables. This first step is sufficient to understand which strategy variables are more or less distinctive for the groupings. In the next step, this general picture is specified in terms of significant group characteristics using confidence intervals analysis for each group-pair combination on each of the strategy variables (see **Table 15**). The strategic group typology is based on the strategy variables that are statistically significant group properties in the industrial context in comparisons of group means to the total sample mean.

STRATEGIC GROUP #1: LARGE GLOBAL STRATEGISTS
The group consists of three companies. These are the large players in the industry that account together for 17.27% of the total employment

in the sample and 18.53% of the total turnover. However, they contribute only 5.84% to the total turnover of the sector in the Tunisian home market. In international markets, the group accounts for the largest share of 52.13%.

Table 14. Mean Values for Strategic Groups

Variables	Large global strategists	Local opportunity seekers	Local specialists	Global explorers	Offshore specialists		F
1. Firm size	.576** (.39)	.066 (.05)	.180 (.23)	.394 (.03)	.026 (.03)	.042 (.00)	3.6**
2. Diversification in solutions	.795** (.24)	.316 (.23)	.154** (.13)	.359 (.16)	.115 (.05)	.231 (.00)	10.2**
3. Specialization affinity in solutions	.500* (.00)	.889 (.22)	.774 (.25)	1.000 (.00)	1.000 (.00)	1.000 (.00)	2.2
4. Diversification in industries	.362 (.11)	.957** (.13)	.215** (.16)	.290 (.05)	.065 (.09)	.087 (.00)	36.6**
5. Specialization affinity in. industries	.500 (.00)	.667 (.25)	.726 (.28)	1.000 (.00)	1.000 (.00)	.000* (.00)	3.2*
6. Reliance on the domestic market	.217** (.26)	.922 (.11)	.904** (.10)	.783 (.14)	.050** (.07)	.000** (.00)	48.2**
7. Commitment to market distance	.528** (.36)	.035 (.05)	.059** (.08)	.081 (.06)	.664** (.48)	1.000** (.00)	25.1**
8. Affinity to global reach	.435 (.17)	.249 (.36)	.236 (.19)	.610* (.24)	.405 (.14)	.507 (.00)	2.1
9. Utilization of external inputs	.417 (.14)	.083 (.13)	.234 (.23)	.833** (.29)	.000 (.00)	.000 (.00)	6.8**
10. Implementation of quality standards	.333 (.00)	.222 (.24)	.161 (.19)	.556** (.38)	.000 (.00)	.333 (.00)	2.7*
11. Strategy implementation	.833** (.17)	.389 (.19)	.317* (.26)	.667 (.17)	.250 (.12)	.500 (.00)	3.6**
Number of cases	3	9	31	3	2	1	

$*\ p < .05$; $**\ p < .01$; Standard deviations are in parentheses; F values are derived from ANOVA analysis.

Table 15. Signifiance of Strategic Group Differences

Variables	1-2	1-3	1-4	1-5	1-6	2-3	2-4	2-5	2-6	3-4	3-5	3-6	4-5	4-6	5-6
Confidence Interval Significance (Group-to-Group Combination)															
1. Firm size	**	**		**	*		*								
2. Diversification in solutions	**	**	**	**	**	**				*					
3. Specialization affinity in solutions	*		*	*											
4. Diversification in industries	**			*		**	**	**	**						
5. Specialization affinity in industries			*	*					*			**		**	**
6. Reliance on the domestic market	**	**	**					**	**		**	**	**	**	
7. Commitment to market distance	**	**	**		**			**	**		**	**	**	**	*
8. Affinity to global reach							*			*					
9. Utilization of external inputs	*		*	*			**			**			**	**	
10. Implementation of quality standards							*			**			**		
11. Strategy implementation	**	**		*						*					

$*\ p < .05$; $**\ p < .01$

2. For illustrative purposes, a clustering procedure on the distance dimensions of international markets using UPGMA was undertaken in order to create a more aggregated view on international markets, reflecting differences of a truly significant strategic meaning. The market cluster solution agglomerates five market types: 'Tunisia', 'Africa and Arab World', 'Francophone West Europe', 'Non-francophone West Europe', and 'North America'. The meaningful market cluster solution reflects the market distance logic of culture distance #CDIST, language distance #LDIST, and geographic distance #GDIST. The five cluster solution presents market aggregates that are significantly different along the three dimensions and reduces the analytical complexity from the country-level to relevant market differences at a true market-level.

The group members are the full-line providers of software and IT services in the industrial context with the largest product line breadth. This reflects their size but also indicates economies of scope. Still, an important feature in this group property is also the consistently clear focus on the existing number of solutions they offer. The companies do not intend to change their product line breadth in the future. Market segmentation on different target industries is at a rather moderate level, and also follows a clear focus on a steady set of customer segments. Regarding internationalization, contrary to the particularly weak reliance on the home market (22.88% of group turnover), their commitment to international markets indicates an affinity to middle-range target markets in West Europe[2]. However, at the firm-level, companies have either a clear focus on the non-francophone (12.50% of group turnover) or francophone markets (54.94% of group turnover). If business in the short-range African and Arab market (9.68% of group turnover) occurs then it is only in combination with francophone European markets. This strategic group shows a moderate utilization of external inputs reaching from BDS to venture capital. Still, private means are the primary source of inputs. Regarding corporate control, all firms have acquired to some extend international quality certifications. In terms of strategy formation, they maintain the highest level of organizational implementation across the sample. Therefore, the strategic group is eventually termed 'large global strategists'. The term 'global' applied in the typology of strategic groups is adapted to the definition of inter-continental businesses by Knudsen and Madsen (2003: 19). Hence, intra-continental businesses are regarded as international. Instead of continents, the multi-dimensional market distance logic suggests to emphasizing regions. Therefore, this study classifies activities of firms either as 'local' or 'domestic', 'regional' and 'global'. In general terms the two latter ones are collectively called 'international'.

STRATEGIC GROUP #2: LOCAL OPPORTUNITY SEEKERS
This group consists of nine companies. They account for a relatively little share in the overall economic magnitude of the sample with 6.79% of total turnover. On the other hand, they generate 11.03% of the total employment. This is disproportionately much in relation to the turnover they realize. Consequently, when employment and turnover are regarded in an input-output relation then the group members have the lowest productivity in the industry context.
Notably, the firms have the greatest breadth of target industries. Together with this by far broadest market segmentation in the sample, group members address their customers with a relatively large range of products and services compared to their relatively little size. This peculiarity in diversification needs to be regarded together with the capabilities of firms to realize economies of scale or scope. In comparison to other firms of similar size in the sample, the first aspect would imply a significantly lower level of diversification and a rather specialized status for products and services. The latter one implies that in contrast to the other groups the firms aim at providing similar soft-

ware and IT service solutions for a variety of customer segments. However, this product-market dichotomy may change over time since the affinity towards development of new products and services is considerably higher than the affinity to acquire new customer segments. Thus, there is presumably a certain general affinity to seek after opportunity instead of developing a certain focus in one or both of the areas, products and markets. Consequently, the 'local opportunity seekers' may hardly aim at economies of scope but move even further away from any supposed specialized status for products and services that might better reflect their size. In terms of internationalization, the companies in this group show a strong dependency on the domestic market (90.80% of group turnover). They are in fact not aiming at any global reach but realize some marginal business opportunities that they find in any international market, preferably in the francophone West Europe (5.97% of group turnover[3]). However, this is clearly not a priority for the group since the vast majority of firms do not have any activity abroad. Access to external inputs and corresponding usage is very limited. Nevertheless, some firms invested in costly international quality certifications which stands in contrast to the in average poor global reach and the commitment to international markets. In terms of strategy formation and organizational alignment, the 'local opportunity seekers' group scores relatively low.

STRATEGIC GROUP #3 LOCAL SPECIALISTS
This group consists of 31 companies. In terms of size, there are in fact two classes in this entity, small and medium-sized enterprises. They represent the vast majority in this sample of the Tunisian software and IT service industry. They generate the major share in the total turnover with 60.80% and 58.48% of employment. Despite the two-tailed size-classes, the companies clearly follow common strategic patterns. Roughly, they present the strategic opposite of 'large global strategists'.
Group members are relatively specialized in both products and services, and in the choice of market segments. On the other hand, similar to the latter local group, they tend to seek vigorously after growth opportunities. However, their affinity to approach new target industries with an increasing breadth of software and IT services is rather balanced and relates to a considerably lower level of diversification than with the first local group. Even though there are significant regional export businesses (10.14% of group turnover), truly global businesses do not appear to play an important role for the 'local specialists': 85.94% of group turnover are realized in Tunisia. Some firms have acquired an international quality certification which, in this case, does not stand in contrast to the in average poor commitment to international markets. In fact, the vast majority of group members is to some extent active abroad. They also realize significant shares in their corporate turnover in the regional market. The weight of larger firms with less international ambitions blurs the group-level average in this regard. However, the 'local specialists' enjoy a relatively generous access to BDS. In terms of strategy formation and implementation, the group scores significantly low.

3. Export businesses are regarded as marginal with less than 10% share in total corporate turnover according to Chaabouni and Mezghani (2001: 48).

STRATEGIC GROUP #4 GLOBAL EXPLORERS

The group consists of three companies. They are relatively large players in the market compared to the predominant SME type of firms in the sample. However, they are by far not of the same economic magnitude as the 'large global strategists'. These firms account together for 12.73% of total turnover within the sample, and for 11.65% of employment.

The most significant property is the extensive access to, and usage of external inputs. This strategic group benefits most from national and international BDS programs. Furthermore, all firms collaborate with private venture capitalists. There are two aspects that all group members have in common, and that clearly relate to the type and number of external resources they can draw on. First, public BDS programs including the national export promotion funds and international training programs aim to facilitate market access abroad. Among others, corresponding subsidies have been used by group members to implement international quality standards. Therefore, such standards are now most widely implemented in comparison to sample average. This refers to both the number of different standard certifications as well as the number of firms implementing them. Second, public national and international export promotion program also support market exploration efforts of the most promising export candidate firms. Therefore, it is not surprising that the 'global explorers' group still relies mainly on the domestic market (77.58% of group turnover) but shows clear ambitions towards global reach. All companies have significant businesses abroad, and they also combine markets in multi-point competition. Still, they all show a focus on rather proximate markets since they serve mainly francophone West Europe (10.43% of group turnover), Africa and the Arab World (10.50% of group turnover). Along with the complex market choice, these firms are also committed to strategy formation and implementation. Group members are clearly the more specialized regarding products and services as well as the target industries they serve in comparison to the other 'large global strategists' group. However, some convergence between the two entities can be expected in the near future since in contrast to larger players, explorers consistently increase their product line breadth and address new market segments within their international markets.

STRATEGIC GROUP #5 AND #6: OFFSHORE SPECIALISTS

Three firms distribute over the two smallest groups that are together consistently outliers in the analysis. In the overall industry context, their economic magnitude plays a minor role. The firms account together for 1.56% of total employment and 1.14% of turnover in the sample. Because of the great similarity of statistically significant strategic specificities, the following review of strategy profile refers primarily to both groups, but points out important differences.

Their market focus is detached from home market in Tunisia. Therefore, they appear to be identical in their most distinctive characteristics in the industry context as offshore producers with home-based production. Both groups are highly specialized also in terms of products

and services. Moreover, they show the strongest commitment to a very narrow set of specific target industries. Therefore, both are collectively termed 'offshore specialists'. Also a notable commonality is that neither group #5 nor group #6 uses external capital and finance from external sources. They (need to) rely solely on their own economic magnitude in their business development. Along with the poor usage of external inputs, these firms are the smallest players in the sample average. All this justifies a consolidated revision of the two strategic groups.

Notwithstanding homogeneity, remaining differences require a separate strategic grouping. First, strong commitment to international markets makes both groups independent from the local market in Tunisia. They are also internationally specialized on one key market and do not aim at any global reach in terms of a broad international market presence. The members of group #5 show a clear concentration of activities either in the longer range towards the non-francophone market in West Europe (20.86% of group turnover) or in the shorter range towards markets in Africa and the Arab World (71.22% of group turnover). Yet, market focus indicates that group turnover in fact distributes over the two group members by market. The smaller player in group #5 is in terms of market choice rather similar to group #6 which also produces offshore (100.00% of turnover) exclusively for the non-francophone market in West Europe. Second, regarding the consistency and sophistication of the organizational alignment to a firm's strategy, the larger company in group #6 scores higher than the two smaller companies in group #5. The higher score of group #6 on corporate control is due to commitment to international quality standards which group #5 does not show at all.

PERFORMANCE EFFECTS

To examine the distribution of strategic groups across different levels of performance and differently dynamic environments, the six strategic groups are placed along different states of market growth. For illustrative purposes, market growth-estimates from the survey are assigned to the traditional terminology of industry maturity stages (Anderson and Zeithaml, 1984; Wasson, 1974). Thus, the six market growth estimates *#MGR* from the survey for different dynamic environments are complemented by market growth terms from 'decline', 'saturation', 'slow growth', 'growth', 'rapid growth' to 'emerging markets'. **Table 16** shows that multiple strategic groups exist in each of the environmental settings. However, no group appears to predominantly occupy a specific growth environment, though some of them have so few cases that they should be viewed as deviants from the main clusters rather than performance clusters of an above-average tightness.

To explore performance implications, **Table 16** also presents the results for two financial performance indicators and one international performance indicator. One-way tests for performance differences of the resulting six clusters could not reject the null hypothesis that clusters do not differ significantly in performance. In other words, there are

no statistically significant performance differences among the six strategic groups identified. The only significance could be found in the export performance differences which are nothing but a confirmation of the effect of the geographic coverage variable on the reliance on domestic market which was applied in the strategic group cluster process —again, this variable is illustrative. Since ANOVA does not indicate any significance in group differences, a further statistical specification of between groups and interval testing can be neglected (McDonald et al., 2002). Therefore, in the absence of useful statistically justified group-performance relations, performance results are intended to be descriptive and suggestive.

At the aggregate level, the last column in **Table 16** shows that the larger players —'large global strategists', 'global explorers', and 'local specialists'— outperform the smaller players in terms of return on assets *#ROA* which is the most appropriate indicator to reflect prof-

Table 16. Performance Differences of Strategic Groups

Strategic Groups	Decline (<0%)	Saturated Markets (0%)	Slow Growth (5%)	Growth (10%)	Rapid Growth (20%)	Emerging Markets (>20%)	Total
1. Large global strategists							
n		1		1		1	3
#ROA		9.5		9.1		8.3	8.7
#SGR		40.0		20.0		0.0	9.5
#EXP		100.0		50.0		85.0	77.1
2. Local opportunity seekers							
n		1	1	3	2	2	9
#ROA		1.0	8.3	6.9	3.9	4.8	5.0
#SGR		−5.0	10.0	10.0	18.9	22.1	15.3
#EXP		0.0	30.0	5.8	3.5	4.4	9.2
3. Local specialists							
n	6	1	4	7	5	8	31
#ROA	11.5	6.0	8.4	9.2	6.6	8.5	8.4
#SGR	−3.74	0.0	−2.1	14.8	19.2	34.5	12.2
#EXP	14.6	0.0	3.5	15.2	18.4	13.2	14.1
4. Global explorers							
n		1				2	3
#ROA		8.5				9.0	8.8
#SGR		0.0				40.0	23.1
#EXP		30.0				18.4	22.4
5. Offshore specialists							
n		1		1			2
#ROA		8.0		3.5			6.3
#SGR		−5.00		10.0			−2.2
#EXP		90.0		100.0			92.1
6. Offshore specialists							
n				1			1
#ROA				3.5			3.5
#SGR				10.0			10.0
#EXP				100.0			100.0
Total							
n	6	6	5	12	7	13	49
#ROA	11.5	7.7	8.4	8.7	6.0	8.3	8.1
#SGR	−3.7	7.9	0.0	15.9	19.2	22.1	12.9
#EXP	14.6	52.4	8.6	26.5	16.3	36.5	27.4

*: #ROA = return on assets (standardized, minimum value = 1); #SGR = annual sales growth rate (percentage); #EXP = share of exports in total turnover (percentage).

itability in this variable setting. The more home-reliant groups have the stronger sales growth rate *#SGR*. However, 'global explorers' show the by far strongest performance in this regard at the group-level with an above-average increase of 79% compared to the total sample average. They are followed first by 'local opportunity seekers' and then by 'local specialists'. In terms of exports *#EXP,* it is self explanatory that the less home-reliant players show a stronger commitment to international markets. However, the relation of international performance to corporate growth appears to be inversely proportional, while profitability is clearly independent from internationality. In other words, the more home-reliant firms grow 'better', whereas profits are no function of the market choice in terms of being local or global.

At the disaggregate level, strategy and performance can be examined in order to verify how far the underlying model of strategic space may have captured intra-industry structure and any supposed mobility barriers that impede movements from one performance level to another. As the absence of statistically significant performance differences at industry-level already indicates, each strategic group has its market performers, under-performers, and out-performers. Therefore, it is hard to judge which differences relate to strategic posture of firms and which are more market-related. However, it is notable that declining market growth environment occurs together with the highest returns *#ROA* and supposed profit margins. In an inverse sense, sales growth rate *#SGR,* not surprisingly, depends on market growth rate *#MGR.* Regarding growth characteristics in international markets, significantly more above-average exports *#EXP* take place in a saturated market environment than in emerging markets, but the least in between. However, 'large global strategists' show that growth is in fact not only a function of market characteristics since the strongest growth rates *#SGR* are realized in the most saturated markets. The other way around, the lowest growth among these firms is experienced in emerging markets following the most dynamic growth patterns.

Another observation relates exclusively to the two global groups. 'Large global strategists' and 'global explorers' are the only groups with similar returns *#ROA* among group-members. Furthermore, they do consistently not have negative sales growth rates *#SGR* or market growth rates *#MGR.* Among the local groups, 'local specialists' realize in all environments higher returns *#ROA* than 'local opportunity seekers'. At the disaggregate level, local 'specialist' companies realize notably higher turnover abroad *#EXP* than 'seekers'.

DISCUSSION

From a methodological standpoint, this study spawns differentiated insights into the strategies of software and IT service companies in Tunisia but also suffers from critical limitations. On the one hand, strategy observations are empirically representative, significant and to a large extent consistent with theory concepts and practical experience underlying the strategic space as developed in this study. On the other

hand, there are outliers in the sample that thwart fundamental theoretical assumptions. Furthermore, the model of the strategic space can hardly capture mobility barriers that result in significant performance differences at the group-level. The only significant differences at the group-level relate to commitment to international markets which is a corollary of the home reliance. The respective variable *#HOME* was applied in the clustering process. Therefore, this performance phenomenon is a statistical artifact.

Nevertheless, empirical results enhance the understanding of competitive challenges of Tunisian software and IT service companies, especially in the context of internationalization. The following discussion points out the main findings along the study model structure from three perspectives: patterns of diversification, patterns of internationalization, and patterns of corporate control. Subsequently, the answer to the second research question is being derived from the strategic patterns identified in the model of the strategic space: Which competitive challenges exist towards internationalization in Tunisia's software and IT service industry?

PATTERNS OF DIVERSIFICATION

In the analysis of strategy variables, diversification and firm size are duals of each other. The primary dimensions along which companies diversify are product line breadth and market segmentation in target industries. The observed link confirms the assumption that companies' movements towards multi-market competition, as Duysters and Hagedoorn (1995: 362) argued, come along with their size. The only significant exception to this is in the 'local opportunity seekers' group that shows a rather unspecialized customer focus.

It is important to note the peculiarity regarding the relative diversification compared to size in three of the strategic groups. Size advantages in scale and scope would imply a much more specialized status for smaller firms (McGee and Thomas, 1986: 151). In contrast to this assumption, groups of smaller players, i.e. 'local opportunity seekers' and both 'offshore specialists' groups, address more customer segments with a broader set of software and IT service solutions than larger firms do in relation to their overall economic magnitude. This may give an explanation for the higher average performance of 'local specialists', 'global explorers', and 'large global strategists' that show a more deliberate size-diversification ratio. Smaller firms do not seem to search for ways of offsetting the advantage of size and economies of scale by providing more sophisticated and specialized customer-adapted products. Therefore, they may have difficulties to compete with larger players that have advantages due to superior economic magnitude.

In terms of specialization affinity, observations show that maximally diversified firms concentrate on the range of products and services, and the breadth of market segments they cover. The more specialized companies rather diversify their activities in both fields. This reshapes the observation of Chaabouni and Mezghani (2001: 49-50) that

Tunisian software and IT service companies follow a certain demand-controlled 'technological determinism' which may be confirmed in the industry average since the vast majority of firms is moving into new market segments with new products and services. However, at the group-level, 'large global strategists' clearly concentrate on their specific range of target industries. The 'offshore specialist' group #6 even retreats from certain market segments and aims at a narrower customer focus. The weak affinity of 'local opportunity seekers' to further explore new target industries is rather a result of the given unspecialized status in terms of customers. Therefore, it can be concluded that some firms, not only outliers, leverage their intimate industry knowledge and grow only within a limited number of market segments (Capaldo et al., 2003: 350). It is logic to theorize two growth paths that replace 'technological determinism'. Since knowledge of individual business units can be hard to transfer from one target industry to another, these paths have an important strategic meaning. When companies serve customers in different target industries then they may either employ transferable capabilities which imply standardized products and services or they may have additional capabilities for differently customer-adapted products (Nikolova et al., 2001: 30). First, the quantitative focus on standardization can be ideally supported by economies of scale. Therefore, it is not surprising that 'local specialists' and 'global explorers' expand their activities in new market segments corresponding to their greater size. The low profitability of the significantly smaller 'local opportunity seekers' and 'offshore specialists' in group #5 underlines that standardization efforts on products and services are less promising when undertaken without the sufficient ability to realize economies of scale. Second, the qualitative focus on submarket specialization is reflected by 'large global strategists' and 'offshore specialists' in group #6.

PATTERNS OF INTERNATIONALIZATION

The argument of firm size is again important in the context of internationalization. Even though it has not been precisely quantified, theorists argue that the extension of activities into markets abroad requires firm to have a certain critical size (UNDP and CEPEX, 2004: 26; World Bank, 2002: 51). Observations confirm that at the industry-level only few companies have this sort of critical size in order to realize significant businesses abroad (Chaabouni and Mezghani, 2001: 51). However, group-level analysis shows how far international strategies can still be pursued with significant international success by offsetting size-related advantages. Even though it is the outlier that the study model does not capture, the existence of 'offshore specialists' gives an indication that a narrow discussion on internationalization as question of economic magnitude is too simple.

However, in general, geographic coverage and choice of international markets cause industry heterogeneity due to the investments and time that entry into a new country market requires (McGee and Thomas, 1986: 151). This strategic space emphasizes the cost of learning tar-

get markets and international market exploration due to geographical distance, culture and language differences. It has been stressed that proximity vice-versa facilitates trade relations and supports low costs of market access and transactions (Ceglowski, 1998; Kónya, 2002). Observations confirm that these differences in market choice have also implications on differences in strategy formation of firms that might be attributed to such costs. This underlines the importance of economic magnitude in internationalization.

It is useful to now look again at the diversification and growth paths above. Sectoral average shows the strategic setup of internationalized firms in the 'global' and 'offshore' groups which is based on a broad offer of products and services for a rather narrow set of special target industries. This common dichotomy on product-markets works exactly the other way around within the more home-reliant 'local' groups. In a careful interpretation, local context appears to promote (or require) exploration of new growth opportunities, limited through local competitive context, in new target industries which implies that companies need to invest in intimate industry knowledge, in this sense learning. The more firms focus on businesses abroad, the more resources they need to commit also to learning languages, foreign management practices, business culture, customer needs, etc. If international businesses imply such investments then this may explain why a focused strategy on product market segments and a more specialized status in few target industries support a greater availability of means to learn and explore new markets abroad (Chetty and Campbell-Hunt, 2001; Noguer and Siscart, 2003).

This general view on geographic coverage requires an extension since those groups with a stronger international orientation do not only show the corollary weaker reliance on the domestic market but a stronger commitment to more distant markets. 'Large global strategists' have activities in West Europe, including francophone and non-francophone countries, and the regional market in the Arab World and Africa. 'Global explorers' concentrate on the francophone West European market, the Arab World and Africa. 'Local specialists' have also significant activities abroad but solely in the regional market. This growth path into international markets can illustrate that the weak economic magnitude of firms makes it more difficult for firms to cope with impediments in trade. However, size in a sub-market such as a specific country market primarily reflects the result of successful strategies to obtain a certain market position (Leask and Parker, 2004: 16). Therefore, growing in an international market may be facilitated by size, but at least outliers make clear that there are other ways to offset disadvantages.

Another important aspect in the context of internationalization is the utilization of external inputs. In this study, the aggregate of national and international public BDS and private venture capital appeared to be a useful indicator that captures the critical roadblock for software and IT service businesses in Tunisia (Heeks, 1999: 9). In terms of BDS and impact on strategic group formation, results show that the main focus of BDS is to support internationalization from two perspectives. First,

the higher the significant degree of internationalization is at the group-level, the less public support do group members receive. BDS programs are clearly focused on companies that operate to a significant extent in the home market, which is logic since other groups act already widely detached from home market and do not require further support to do so. Second, the more promising candidate firms are in terms of size, the more public support they have to pursue their internationalization plans. Correspondingly, the larger firms in the more profitable 'local' group benefit more from BDS than those in the less profitable group of smaller 'local' players. Regarding 'global' players, the less 'global' group receives more support than the 'large global strategists' because it is well established abroad.

On the application of Dranove et al. (1998: 1035), companies in the sample that have access to external inputs and participate in BDS programs —'global explorers', 'large global strategists' and 'local specialists'— differ significantly in their strategies and performance compared to others —'local opportunity seekers' and 'offshore specialists'. The effect of insufficient supply with such input factors limits development opportunities of firms along the whole range of strategic options not only in terms of financial means but also in terms of capabilities and know-how. The link from factor level to structural and behavior properties of groups is given through the significant difference in knowledge about managerial practices in target markets, language skills that facilitate business relationships abroad, and subsidies for marketing efforts and market exploration reducing financial market access barriers (UNCTAD, 2004). Therefore, it is not surprising that the companies in the 'global explorers' group with the highest score in access to such means show the highest affinity to global reach. They can afford to explore markets more than firms in other groups. Thus, they address a broader range of markets at once.

PATTERNS OF CORPORATE CONTROL

A firm's organizational production function can be thought of as its organization structure and the skill of its management in employing it efficiently (Porter, 1991; Barney and Arikan, 2001). However, with size and complexity comes the increasing necessity to maintain a management framework that aligns the capabilities of an organization to corporate strategy and requirements of the competitive environment (Kaplan and Norton, 1992). Results show the expected systematic link from complexity of strategy construct and organization of a firm to commitment to corporate control, strategy formation and organizational implementation. The specific strategic complexity concerns here the dimensions of firm size, market segments, products and services, and international markets.

However, groups differ most significantly in their commitment to strategy implementation and control to extent to which they depend on markets in greater distances. The argument of size has a minor weight in this context and underlines that strategy instead of size is in fact the key to succeed in international markets. Regarding the size-imple-

mentation ratio, the smallest players in the outlier groups of 'offshore specialists' show the strongest commitment to strategy while in terms of the absolute level of implementation the 'large global strategists' are clearly showing the way. In a careful delineation of an international growth path based on these results, it can be concluded that performance measurement, control, and reward of a firm's organization is key to a sustained significant presence in a market, the more distant and different it is from the Tunisian home market. Hence, firm size is one factor to facilitate internationalization but the consistent alignment of a firm's organization to strategy is key to employ successfully the pure economic magnitude.

Control systems assure efficient processes within the firm, but play also a role in external communication towards customers in building a company image and trust in customer relationships (Li and Gao, 2003). In the field of software and IT services, implementation of such standards ties together both internal and external functions (Shoemaker and Jovanovic, 2002). Tunisian companies are using international quality standards in their corporate communication in order to emphasize their technological competencies and their commitment to quality that would also satisfy the rigors of an independent, external audit (UNCTAD, 2004: 210-212).

At the group-level, the communication function is also one key development goal of export-related BDS programs in Tunisia (UNCTAD, 2004: 200). Observations show that companies have been using public means to some extent for investments in quality certifications. This indicates that public funds indeed preferably support those firms that are the most promising candidates in international markets, as the fact that 'global explorers' have the highest score in both fields may underline. However, 'local opportunity seekers' with the strongest dependence from the national market invest still more in costly certifications than 'local specialists' do, even though 'local specialists' have more activities abroad and enjoy a greater access to external inputs such as BDS.

CONCLUSIONS

The analytical concept in this study captures only to some extent the strategic space of software and IT service companies in Tunisia. It is based on prior research and the current knowledge about the stage of industrial development. However, results illustrate how strategic concerns in the discussion relate to each other.

Analysis within the strategic space confirms the presence of four distinct strategic groups: 'large global strategists', 'local opportunity seekers', 'local specialists' and 'global explorers'. These groups widely correspond to the theory concept applied here. Furthermore, there are two outlier groups, both 'offshore specialists', that make aware of different ways to internationalization; i.e. by offsetting size-related effects in exploring markets and developing activities abroad. Still, the following conclusions neglect the outlier phenomenon but

make suggestions for future model extensions in the 'unknown' strategic space.

The discussion of structural and behavioral properties and strategic patterns in groupings highlights group differences into a more complex idea of strategy cross-linkages. Two fundamental assertions on the way firms diversify can be confirmed:

— firm size controls for breadth of product lines;
— firm size controls for market segmentation.

To answer the second research question, findings shed light on the connection of performance and internationalization. It could be shown that the attractive growth potential frequently attributed to export businesses needs to be seen from two more differentiated perspectives: a firm's opportunity to grow but also its opportunity to perform. This underpins an essential point made by Porter (2003: 25) on competitiveness; being competitive does not mean exports per se but the capability of firms to increase productivity over time, which leads to higher performance and may also result in successful exports. In the context of internationalization, the following key findings are derived from the discussion of competitive challenges along the three strategic patterns identified:

— firm size controls for choice of market distance;
— choice of market distance controls for commitment to strategy implementation and corporate control;
— complexity of corporate activities controls for the degree of organizational strategy implementation;
— utilization of external input factors controls for affinity and capability to achieve global reach;
— global reach controls for implementation of international quality certifications.

Regarding possible model extensions to the concept of strategic groups, the study highlights three levels within the concept of strategic space that provide a clearer indication on how to continue Thomas and Pollock's (1999) 'Puzzle' in the context of the software and IT service industry, not only in Tunisia.

At the firm-level, regarding outliers in the analysis, the role of certain competencies, such as entrepreneurial skills, may also present a valuable avenue for future research in the field of software and IT service companies (Capaldo et al., 2003; Jouili and Chaabouni, 2005). This might help to explain how firms can develop successfully their market intelligence and internationalize without the utilization of otherwise crucial external inputs (Fischer and Reuber, 1996).

At the group-level, business networks are also an important feature of knowledge-based competition. This relates for instance to know-how transfers, innovation, reputation (Capaldo et al., 2003). Even though cooperation strategies might help firms to overcome limitations relating to size, software and IT service companies in Tunisia do not develop the necessary structures and resources for networking activities (Chaabouni and Mezghani, 2001; Raffa et al., 2002).

At the global level, as company cases indicate, besides the technological aspect, there is a strong awareness of customer needs and for

a further integration into the global economy (UNCTAD, 2004). This suggests paying more attention to the gradual organizational sophistication of firms that may internationalize increasingly with subsidiaries abroad (Porter, 2003).

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