A proposed strategic alignment of IS/IT with supply-chain management for UAE dates industry

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Abstract
Purpose – This paper seeks to elicit the challenges faced by the UAE dates industry in adopting and aligning its business strategy with the use of information system and information technology (IS/IT) within its operations.

Design/methodology/approach – The adopted approach is based on the combination of conclusive feedback research technique and action research. The intention is to elicit background information in its initial phase, formulate an interim solution, which will evolve through users’ constant feedbacks into a full-blown desirable system.

Findings – Highlights the UAE dates industry existing state of readiness in adopting IS/IT and the extent of optimizing supply-chain management business practices.

Research limitations/implications – Transforming organization manual operations to achieve efficiency towards strategic effectiveness is a lengthy process. While quantitative and qualitative evidences suggest the adoption of a certain solution, the benefits yield cannot be realized overnight.

Practical implications – This research proposes a paradigm shift in the organization’s culture. Adopting supply-chain principles and implementing a strategy to align both business and use of IS/IT will facilitate an elevation for UAE dates factory to be one of the economy contributing industries.

Originality/value – This research addresses existing states of readiness to implement IS/IT within the UAE dates factory, proposes supply-chain model customized to UAE dates factory and highlights challenges faced by the factory in implementing the strategic alignment of its business through IS/IT optimization.

Keywords Supply chain management, Information systems, Process management, Internet

Paper type Research paper

Introduction
Until recently, UAE had emphasized on their crude oil productions to support their growing economy. According to a survey on knowledge economy by Madar Research Group (2003), recent initiatives by UAE Federal Government successfully encouraged the diversification of the country’s economy into other sectors of the industry. Although the survey focused mainly on the development in Dubai, it typified a common
behavior, which in no time will be extended into other emirates. While UAE economy contributing industries such as finance, tourism, transports and real-estate, to name a few, experience speedy growth and are successfully flourishing, similar performance is absent in the country’s dates industry. Upon analyzing this survey, one prominent similarity enjoyed by these successful industries, to a large extent, can be attributed to the extensive use and optimization of ICT. A characteristic, if it is not minimal, is non-existence within UAE dates industry.

**ICT influences on UAE economic development**

While this section highlights the planned UAE ICT future capabilities in inflicting a healthy economic growth, it also formed the basis for proposing dates industry IS/IT strategic plan. Championed by UAE Federal Government, the country’s current and future ICT infrastructures and policies provided not only a firm foundation but will also encourage a continuous and steady growth of UAE economy. Driven by a political will to migrate both government and businesses towards “digital economy” (Madar Research Group, 2004), it fuels increasingly aggressive IS/IT investments in software products, computer equipments, IT services as well as data communications on par with those as exercised in other developing countries (Madar Research Group, 2003). Using ICT state-of-the-art infrastructure to create “smart buildings” latest technology to support voice and data communication services for businesses as well as voice, data and television services for consumers will be readily available for all to optimize in the near future (Madar Research Group, 2004). The former facilitates business organization with world-class data centers in Dubai to service e-hosting, broadband internet as well as video-conferencing and telephony capabilities. In addition, services for consumers include 3G mobile communication networks, sophisticated telephony features that include broadband internet as well as state-of-the-art satellite and cable advance programming functions for interactive television.

In line with the motivation of this research paper, the successful penetrations of e-commerce activities within Dubai, in particular, business-to-business (B2B) (Stair and Reynolds, 2003a, b) as well as business-to-consumer (B2C) (Schneider, 2004) are expected to worth about US$2.4 billion and US$180 million by 2008, respectively, (Madar Research Group, 2003). Registering a five year compounded average growth of 36 percent for B2B and 20 percent for B2C, Madar survey reflects the trust and confidence on the reliability and efficiency of ICT infrastructures. Such projections will only ensure successful implementation and maintenance supports on related IS/IT services in enhancing the country’s future economy. Industries that capitalize on such ICT initiatives and optimize the extensive use of ICT have begun to enjoy and benefit from such business transformations. While the seed for future expansion and growth has been laid, what is left is for UAE dates industry to identify and address various challenges in mapping and aligning its business strategy with its IS/IT plan.

*Why UAE dates industry is not an economy contributing industry?*

Very much a traditionally conservative operations, dates industry remains largely labor intensive operations. An integral part of the local diet, dates impressive credential and nutritional values have been well documented. Estimated at over 15 percent of the world’s dates being cultivated, gathered and processed, 25 out of 155 varieties of UAE dates are commercially marketed with increased sophistication.
While different machineries are used to process and pack raw dates into different range of dates products, the use of automation ends there. All other aspects of business operations are manually done. Although such commercialized operations actively existed within UAE these past 15 years, significant improvement only emphasized on the use of better machines for processing and manufacturing dates products. Apart from improved communication devices for correspondence, ICT optimization have been rather minimal. While simple office automation may exist in some factories, the extent of its usage is under utilized. With the advent of ICT and its extensive use to yield competitive advantage (Porter, 1998) in most industries, one ponders on the reason/s of its absence within the dates industry. The existence and optimization of numerous applications software to integrate various aspects of business operations, which are becoming more sophisticated (Casati et al., 2001), seems unheard of. Effectively proven theoretical principles and concepts on streamlining business value chains (Erb, 2003) with either suppliers or customers seem unnecessary. As compared to those industries that are contributing to UAE economy, such observations reflects a possible reason for the lack of efficiency and effectiveness of business operations and hence, its current insignificant contribution to the UAE economy.

Together with supply-chain theoretical concepts, the above findings motivate the introduction and strategic optimization of ICT within the dates industry. The intention is to elevate its efficiency into competitively effective organization (Schneider, 2004). In turn, enhance its chances of contributing to the growth of UAE economy. The subsequent sections discuss the adopted research method before highlighting the dates industry’s IS/IT states of readiness. It is followed by proposing how supply-chain management (SCM) (Stair and Reynolds, 2003a, b) through optimizing web services technology (Murray and Golluscio, 2002; Systinet, 2002; Perez, 2002; Newcomer, 2002) could enhance the industry competitive advantages. Subsequently, this paper identifies the challenges that must be addressed in implementing IS/IT strategy. It will also highlight the anticipated constraints in implementing the proposed solution. While mapping this research future initiatives and collaborations, this paper concludes that IS/IT strategic improvement must be aligned to the organization business strategy, in order for date industry to become an UAE economy contributing industry.

Research methodology
Motivated in identifying challenges faced by UAE dates industry in adopting IS/IT within their operations, a conclusive research technique (Joppe, 2001), in the form of an onsite survey through formal interviews was conducted with several UAE dates factories. Detail interactions emphasizing dates factory current business operations, its trends and constraints, and their future business strategies were elicited from these factories top executives. Findings from such interviews assisted in formulating the initial proposal to map the organization IS/IT strategic improvement. Being an initial research investigation, this proposal will also be validated for future enhancement. The following diagram (Figure 1) shows the adopted research approach.

The conducted survey was categorized into the factories organizational strategy, IT usage, financial budget and their value-chain interactions. These were further decomposed into several main objectives as follows to:
investigate the alignment of this industry’s business strategy against the current and future capabilities of ICT within UAE;

- examine the industry awareness and optimization of IS/IT;

- analyze the dates industry capabilities in automating its operations; and

- elicit appreciation on basic theoretical concepts and principles of SCM within the industry, respectively.

Questions within each objective formed the various survey elements that were demographically represented and shown as in Figures 2 and 3.

Mixed questioning techniques were used to avoid any bias interpretation of the gathered information. Apart from Likert scaling technique (Trochim, 2001) for ranking responses between two possible extremes, this survey also incorporated checkboxes with predetermined answers. In addition, respondent were asked to provide open-ended short answers during the interviews. Some of these questions were designed to correlate with one another. The purpose is to ensure accuracy and validity of the elicited information.

There are only six dates factories within UAE. Among them, the scale of operation for the government factory is distinctly larger than all the private factories combined together. The elicited information across all private factories projected significantly similar pattern in percentage values for the various elements surveyed. As such, data for these private factories were summarized, averaged out and plotted as a single representation for direct analysis and comparisons against those collected for the government factory. Such direct comparison highlighted important differences on the various concerns identified within the survey’s objectives. Two extremes of “Non-existence” and “Excellent” as its level for measurement were used in demographic data representations to project the survey’s findings. The former extreme reflects an absence in implementing components
highlighted within the survey’s objectives. The latter, indicates an extensive initiatives towards achieving organization efficiency leading to effective competitive advantage. These appraisals highlighted the extent of the challenges faced by dates industry into becoming one of UAE economy contributing industry. In turn, such findings facilitated
appropriate proposal and justifications for adopting SCM as well as IS/IT strategy into its operations.

Since, this is an ongoing initiative, action research (McNiff, 2001) methodology is also used to validate any proposed solution. With periodic assessments, the proposed approach will alternate between critical appraisal and implementation of a proposed solution. This facilitates continuous enhancement of the solution based on the understanding elicits in the earlier stages.

**Empirical evidence: dates industry’s IS/IT states of readiness**

Implemented a conclusive survey on the challenges faced by UAE dates industry in adopting IS/IT, this section discussed the survey quantitative findings as follows: firstly, the dates factories general backgrounds are established to correlate with the various objectives of this survey. Subsequently, analyzing their business and IS/IT strategies before examining their appreciation and optimization of IS/IT usage. This is followed by determining their capabilities to invest in computerization and their future IS/IT plan.

Apart from having no official record on the actual total land mass currently being used to commercially farm dates, the total number of farmers actively supplying dates to these factories is also unknown. Among the six factories in operations within UAE, at least two are not commercially active profit driven organizations. Based on a very simple organizational structure, privately owned factories employ on average less than 30 workers while the UAE Government owned factory employs 486 workers. With an education distribution of mainly high-school certificate holders or less, a small minority in the management positions are university graduates with a few holding a doctorate in various specialties. Estimation of only 5 percent of this workforce had formal training in some IT courses and a handful within this group attended a user-training on a specific computerized financial packages. With an estimated seasonal total dates processed amounting to about 30,000 tones among them, only one factory has 18 years of operational experiences, while the majority are within less than ten years and another merely established some time in 2003.

Analyzing the long term business strategy, Figure 2 shows significant differences upon comparing private sector to the government owned factories. Among the privately owned factories, only one is focusing on setting up another factory with better machineries. While some are penetrating international market with their products, others have no definite plan. However, the government factory is more ambitious with not only increasing the number of their product lines internationally but also computerizing and integrating all of its inter-departments business operations. Unfortunately, none of the privately owned factories has any consideration in utilizing IS/IT to computerize their business operations. Among them, only one is aware of the benefits to align business with IS/IT strategy (Stair and Reynolds, 2003a, b). All factories have no plan to extend collaboration of their business operations with their suppliers since the buying of dates from suppliers are much less complicated than most other business ventures. However, the government owned factory has plans to enhance value added (Schneider, 2004) relationship with its customers via advance IS/IT integration. This is in steps with optimization of IS/IT within its clients operations.

Figure 3 shows the imbalance of 5 percent IT trained employees as compared to the total number of employed workers within each factory. It also shows that all are aware
and acknowledge the general benefits and influences of optimizing IS/IT in improving their operations. However, due to their low level of IT literacy with an average of only two PCs running standalone Microsoft office suites and the occasional internet correspondence with clients, the lack or absence of IS/IT optimization are typified within the privately owned factories. More PCs are being utilized within the government factory. However, apart from this factory there is only one other that uses off-the-shelves accounting software to assist its finance manager. Neither is aware of any software packages that could effectively facilitate better collaboration between suppliers and customers together with their factories. Nor do they truly understand the benefits of establishing an integrated computerized link between them.

While most of the privately owned factories average their annual sales estimated at AED 5 millions, one factory performs better at about AED 10 millions. The government factory with its big volume of dates enjoys annual sales estimated between AED 50-60 millions. With low running costs, all factories do not think that they have any problems in budgeting investment for computerization of their operations. However, there is no definite plan to such effect in all of the privately owned factories except for the government establishment. The latter will inflate its current IS/IT investment from less than AED 100,000 to be between AED 500,000 and 1 million. Majority assumed that the bulk of investment would be in software, hardware and training only with vague ideas on running costs.

Introducing SCM to dates industry
SCM involves the management of materials and information flows both in between facilities across suppliers and customers (Thomas and Griffin, 1996). SCM involves “the integration of all the value-creating elements in the supply, manufacturing, and distribution processes, from raw material extraction, through the transformation process, to end-user consumption” (Basnet et al., 2003). The following sub-sections highlight the dates factory general supply chain before critically appraising their inadequacy in utilizing currently proven effective business practices, in particular SCM. It proposed the start-of-the-art technologies to overcome these inadequacies.

UAE dates factory’s existing value-chain
Figure 4 shows a typical UAE dates SCM model. The farmers initially bring their crops to a date factory for inspection and weighing. Quality dates will be sorted into their individual varieties before going through several processes of fumigation, sterilization and refrigeration prior to washing and drying; and finally packed into different types of dates finished products. Others are separately processed into animal feed, either pitted into powdered form or blocked for milking cows, calves, sheep and horses. The level of machine automation ends within these manufacturing processes.

UAE dates industry’s distribution processes and other management aspects of its organization are, in direct contrast to other UAE economy contributing industries, heavily manual in operation. UAE dates industry, while able to sustain its market shares, could improve and further elevates its value-creating elements through more efficient and effective computerized operations. This will be in line with those as practiced by other economy contributing industries. However, UAE dates industry’s traditionally conservative operational style does not optimize the benefits derivable from applying appropriate SCM principles and techniques. It needs to adopt SCM in
order to acquire the benefits and competitive advantages as well discussed and documented by various SCM researchers and advocators alike (Casati et al., 2001; Erb, 2003; Thomas and Griffin, 1996; Basnet et al., 2003; Wilson, 1996; Wang, 2002; Desbarats, 1999). Another reason for SCM absence within UAE dates industry is due to its operations being very much independent from its supplier or its customers. Its level of operational integration is restricted to only normal basic trading requirements without any strategic operational links between one and another. These are evident as highlighted in Section 3, where such efficiency leading to effective operations are, if not absence, lacking in existing dates industry’s operations.

Many researchers recognize that the competition basis will be the performance of one SCM against another, rather than distributor versus distributor. Such concern is amplified by Wang (2002), who claimed that “firm-to-firm competition is being replaced by supply-chain-to-supply-chain competition.” Global competition is forcing enterprises to reorient their business strategies from conventional, independent operations toward integrated, strategic partnerships. UAE dates industry needs to reconsider their current style of operations to this end if it is to improve its chances of becoming an economy contributing industry. It needs to break away from its conservatively independent style of operation to, the least, integrate with some its customers who have already started optimizing the use of IS/IT.

SCM deals with the expanding of value chain from within a corporation to a set of related entities. This would greatly improve the competitiveness of SC members. Desbarats (1999) highlighted that organization must improve its marketing, industrial design, engineering development, manufacturing, distribution channels, and their investors in order to inflict innovative SCM. He also indicated that customer experiences represent the ultimate challenge for most organizations. UAE dates industry needs to redress these elements and factor them into their strategic business plan. It must move away from its conservative approach towards innovative business operations.

Empirical findings in Section 3 suggest a few probable investment initiatives that will help dates industry towards innovative business operation. With healthy estimates on their annual sales against their existing low operating costs, the industry is not only capable but also confident in financing their organizations’ computerization.
The least, apart from developing their internal integrated information systems, if not their suppliers, the industry could integrate these systems to allow its customers to access and place sales orders online. Such initiatives, based on Madar’s survey, will be in line with the projected ICT infrastructure. This will facilitate better opportunities in communications between various SC members and optimize value adding activities to dates industry, particularly within B2B as well as B2C. Hence, bridging dates industry a step closer towards competitive edge and assimilation into one of the UAE economy contributing industries.

State-of-the-art technologies for UAE dates SCM

The growth of the web is revolutionizing the way businesses interact with their partners and customers. Millions of organizations are moving or have already moved their main operations to the web. This is to take advantage of the efficient business processes, and global visibility (Dogac, 1998, 1999). The current scale of e-commerce initiatives, particularly in B2B and B2C (Gartner, 2001; eMarketer, 2002), has been economically phenomenal in several domains, including SCM. This is confirmed by recent studies by Gartner (Aaron et al., 1999) and by Madar Research Group (2003).

Numerous organizations started using the web as means to automate interactive relationships with their business partners through both internal and external enterprise e-commerce based applications. The central concern in such applications, which composed of autonomous, heterogeneous, and distributed components, are the interactions among systems especially in areas such as databases, and knowledge based systems (El-Khatib et al., 2002). Interactions in e-commerce occur in three layers: communication, content and business process layers. In the case of UAE dates factory, the factory and packaging provider need to agree on their joint business processes (e.g. vital information needed by various process stakeholders, delivery mode, contracts and so on). Packaging provider needs to understand the content of the purchase order sent by the dates factory. There must also be an agreed communication protocol to exchange messages between them.

Within almost three decades, e-commerce technologies evolved from a linear communication between two parties into a much more complex distributed systems. From an electronic data interchange (EDI) (Orfali and Harkey, 1998) standard, the advances in software technologies give rise to complex distributed system components such as CORBA, DCOM and EJB (Arunachalam, 1995). With internet service provider (ISP) facilitating business functions via the internet, another state-of-the-art technology in the form of web services (Murray and Golluscio, 2002; Systinet, 2002; Perez, 2002; Newcomer, 2002) has been introduced. This service facilitates automated interactions between business partners that is accessible by clients, which is not restricted to human user alone but software applications as well. Using standard web protocols (Murray and Golluscio, 2002; Systinet, 2002), web services represent business logic (Thomas and Griffin, 1996; El–Khatib et al., 2002) that can be accessed by anyone, anywhere via any type of hardware. Web services standards technologies are based on open standards service-oriented architecture recommended by the World Wide Web Consortium (W3C) (2004). The key web services standards include Web Services Description Language, Simple Object Access Protocol, and Universal Description, Discovery and Integration, which are all based on Extensible Markup Language (Newcomer, 2002). The main intention provided by web services is to integrate various
organization business logics together across networks. In turn, facilitates effective communications through streamlined business processes across different organizations and their individual value-chains. This will lead to enhance business competitive advantage. Business logics such as integrated online purchasing systems (between dates factory and its material providers or dates suppliers), customers entering their order directly into a sales order system (triggering a chain reactions within the dates factory various enterprise IS applications), or even a real-time credit card validation (verifying customer credit worthiness) could be offered as a web service. Such services will facilitate UAE dates factory with the opportunity to strategies its B2B and B2C operations and leap into becoming one of UAE economy contributing industries.

The propose UAE dates factory web services architecture could be adapted from another SCM model as shown in Figure 5, Radaideh and El-Khatib (2004). Dates factory SCM has two paths to manage; information flow and financial flow. In information flow path, among other things, involves transmitting orders and updating the status of delivery for order tracking purposes. The path for financial flow typifies accounting issues relating to credit terms, payments and its schedules as well as consignments and title ownership. web services usage will enable all parties (dates factory, their suppliers and customers) to share forecasting, planning, and scheduling information. By using web services dates suppliers would expose their services to any web-enable formats such as XML, HTML, Java Applets, J2EE, Servlest or even JSPs (Murray and Golluscio, 2002; Systinet, 2002; Perez, 2002; Newcomer, 2002; Orfali and Harkey, 1998), where the dates factory will consume these services and vise versa. Similar in fashion, the relationship between the dates factory and its customer will also be via such web services.

On the other hand, customized information system emphasizing integrated enterprise-wide application could streamline the dates factory internal operations. Such initiative will pave the way for the organization to optimize efficiency through computerization and in the future leap to effective competitive advantage through, perhaps, inter-organizations-wide application systems that directly links with their various suppliers and regular customers.

Figure 5.
Proposed dates factory SCM model
Challenges towards IS/IT strategic improvement
The UAE dates industry state of readiness to optimize the advances in ICT as planned by UAE Government is far from desirable. Apart from the government factory with plans to computerize its business operations and integrate them with its customers, the privately owned factories merely appreciate the benefits of such initiatives. While some embarked on simple office automations, the level of IS/IT literacy and perhaps traditionally conservative business practices hinder much of the intention to optimize ICT. Another possible correlation is the minority of the workforce with IS/IT exposure as compared to the majority who are mainly involved in manually labor intensive operations. The simple organizational structure in all factories, without proper IT department and IS/IT expertise are another reason to this effect. Even though all are, to some extent, financially capable to computerize their business operations, they need appropriate consultative investigation into their operations and help to clearly define their business strategy before introducing and aligning them with an IS/IT strategy (Stair and Reynolds, 2003a, b). While numerous models for IS/IT strategic improvement initiatives (Robson, 1997) could be analyzed and suggested for UAE dates factory, this research proposed a simplified approach to inflict a basic appraisal towards this initiative. Appropriate enhancement will be adopted upon analysis of its findings from this initial implementation.

Based on the cyclic approach in business and IS/IT strategic alignment (Figure 6) as described by Alter (2002), the need for clear definitions of business strategy will assist UAE dates industry in realizing other various business opportunities. These factories will have to organize and decompose these defined strategies into various...

![Figure 6. UAE dates industry Strategic alignment](source: Alter (2002))
organizational structures and their supporting business processes to achieve them. Simultaneously, such defined business strategy will be analyzed to identify the IS/IT strategy. This is done by assessing the current as well as the future projected technology that could create opportunities and support the business strategy. The IS/IT strategy will in turn be refined to identify suitable IS/IT infrastructure and its related processes to map to the needs of the organizational structure in performing their business processes. However, if the identified infrastructure is not feasible to support these needs, then the repercussion will force the business and IS/IT strategy to be changed before the cycle rotates again. In addition, eminently, the following challenges and principles of information system planning (Alter, 2002) must also be adopted to ensure successful implementation of such initiative.

UAE dates industry needs to foresee and assess the various opportunities derivable from such IS/IT strategic initiatives and ensure that they are consistent with their organizational plan and objectives. Unlike the government factory, other factories must be clear and precise of their business strategy for the next five years, for instance. They must examine various opportunities that will capitalize on optimizing the extensive use of voice and data communication services for their business as forecasted by Madar survey. This will be in line with the projection by Madar group for the successful penetrations of e-commerce activities, in particular B2C since their trading with dates suppliers are very much a simple affair.

Collaborating closely with IT professionals, these organizations, in phases, will design and develop various integrated software applications to capture and build their organizations' information systems resources. In order to develop product differentiation and create competitive advantage over their competitors and add value to their customers, UAE dates industry must be able to access sufficient resources for timely decision making (Turban and Aronson, 2001). Be it a projection of a future demand against expected supply of dates or tracking of a dates consignment delivered to a client; their current heavily manual operations will not be able to provide the competitive edge (Porter, 1998). Similarly, while readily available off-the-shelf enterprise integrated packages will shorten the transformation cycle, without customization capabilities, it cannot provide differentiation in services nor enhancing value adding activities to their customers (Porter, 1998). UAE dates industry must be able to capture and make various types of information readily available dynamically.

The proposed IS/IT plan must identify appropriate technical architecture that is suitable in supporting the organization’s business strategy. Such architecture must consider the entire organization’s current and future requirements as a component of a larger system. While the previous section proposed web services architecture as its larger system, its intention is to prepare UAE dates industry to be in-line with the country future ICT infrastructure. It will optimize the projected IS/IT capabilities, particularly creating opportunities to achieve competitive advantage in B2B and B2C business environments. Nevertheless, the general mentality is to develop the transformation in phases and test the effectiveness of each implementation to ensure that the investment will yield its expected benefits for that phase. Failure in any may revamp the entire initiative or redirect to other alternatives. The danger is to be trapped into islands of automation (Wilson, 1996) emphasizing the immediate needs of individual department without the appropriate interface to integrate other various
departments together. Individual dates factory must avoid blurring the original vision of the overall organization wide strategic needs and plans.

A misconception on the overall investment costs as discovered in the above survey, all dates factories must recognize that their investments are beyond the acquisition cost of software, hardware and end-users training. It should also include the entire project life cycle as well as the need to factor compounded running costs over a period of time. These factories must be exposed to the various costs involved in IS/IT project development life cycle as well as the various operating costs after the project completes. Appropriate costs and benefits analysis for the entire initiative must be considered to provide the accurate picture on the actual investment against its tangible and intangible benefits.

The design considerations must include maintainable information systems that recognize human factors in adapting to the new changes in operations as well as in using the proposed system. In addition, in-depth appreciation on capabilities in providing maintenance support and controlling of both software and its related hardware must also be considered. Most off-the-shelves packages will force organization to adapt to the software functions instead of vice-versa. Dates factories end-users must be involved in the whole transformation in order to cushion the impact of changes in their work environment. While their IT literacy has to be improved through appropriate training plan, their acceptability to the new system of doing things will also determine the success or failure of such initiative. The dynamic nature of current business environment forces consistent changes to a developed application systems. Without appropriate maintenance support to address such changes, the developed system may be a legacy in no time. In contrast, request for changes must also be controlled to ensure system integrity in terms of quality, reliability, responsiveness and conformance to set rules and standards (Alter, 2002). This will ensure system availabilities as and when necessarily needed.

**Discussion: the anticipated constraints**

The above discussions methodologically established the basis for this research. On one hand, it highlighted UAE future ICT infrastructure and the projected return in investment for organization optimizing ICT within their operations. On another, through empirical evidences, it stressed the existing incapacity of UAE dates industry to optimize such advances in the planned ICT. Emphasizing supply-chain concepts and principles to elevate UAE dates industry status in becoming an economy contributing industry, an architecture based on web services SCM model is proposed. The goal is to leap the industry to be in par in the future by optimizing the planned ICT infrastructure, in particular B2B as well as B2C. However, the previous section cautioned such ambitious proposal by highlighting the challenges UAE dates industry will face in moving towards its IS/IT strategic improvement. While the proposed solution is in-lined with the projected ICT advances country-wide, there are immediate pitfalls that must be considered.

The most pressing will be implementing a paradigm shift in such a traditionally conservative business practices. Instilling a computerized environment away from once a heavily manual labor intensive operation will be a big challenge in itself. In addition, elevating workers’ IT literacy will be an uphill task. With an imbalance in educational distribution among its worker with only 5 percent are IT trained, as
compared to the remaining with only high-school certificate or less, training even a fraction of such labor force will be costly and time consuming. Unless a fundamental change in the employment contract is considered, it does not guarantee that these trained workers do not leave the organization. Despite appreciation on benefits derivable from IS/IT implementation, among the six factories, only one is prepared to implement and yield actual benefits from such IS/IT initiatives. While all are confident and willing to invest in IS/IT, the true cost of ownership (tangible as well as intangible costs) of such initiative must be made known and managed from the beginning. In addition, the projected cost and benefits analysis must be drawn up and made aware to the top management. While all factories are able to sustain and perhaps, increase their share of profit from such business venture, the existing sales volume for most private factories are not comparable to the government owned establishment. As such, these factories may not be able to afford cost escalation from such investment that commensurate with the advancement and sophistication in technology. Hence, leading to either their reluctant to computerize or cautiously investing in a much smaller scale. The latter will not yield true and immediate benefits from such initiatives. In this case, if the UAE Federal Government deem great economic potential from such industry, its intervention may be necessary to inject sufficient funds to elevate and make haste progress for such factories. In turn, it will introduce different sets of constraints to this discussion.

Conclusion
The future challenge for this research is to collaborate with one of the dates factory and guide them in implementing the above initiatives. With the current status quo, the government factory in particular, is in much better position than others. Upon appreciating the above challenges, the government factory must be guided to define and decompose the various components that form its business and IS/IT strategic alignment (Figure 6). Its business strategy must identify the organization vision and formulate it into a viable future organization strategy. This is followed by a plan to implement that strategy as well as to evaluate its performance. In adjacent to this, a framework for integrating IS/IT strategy must also be planned to map the formulated business strategy. Currently, the industry is inundated with numerous approaches in IS/IT strategic planning. The chosen initiatives must significantly turnaround dates factory from achieving operational efficiency to effectiveness and subsequently strategic advantage. While computerization leads to efficiency, dates factory needs leading edge technology, such as the proposed dates factory SCM model to move from effective operation to strategic advantage. The main intention is to “lock-in” both its customers as well as its suppliers to its business. Dates factory may need to adopt various IS planning processes of bottom-up, top-down or even an inside-out to achieve its vision. Since, these initiatives are the first for UAE dates factory, adopting an action research approach will help to further evaluate and formulate an improvement to any of the above proposed recommendations. As such, helps to guarantee a more effective solution to the identified problem. This will ensure a successful elevation of the factory’s status to be an economy contributing industry.

This paper investigated, through a survey, the alignment of the dates industry’s business strategy against the current capabilities of ICT within UAE. It examined the dates industry’s awareness and optimization of IS/IT and the industry capabilities to
automate its operations. It also identified challenges face by dates industry in adopting IS/IT within their operations. While other factors must also be considered, UAE dates industry needs a paradigm shift in their business operations and organizational culture in order to optimize the use of ICT and become an economy contributing industry. Perhaps 6 factories may be too small to cause an economic impact. However, if all privately owned factories pursue the UAE Government dates factory’s initiatives on operational dynamism and effectiveness through computerization, supported by a highly competitive strategic plan, the probability of elevating the overall total sales can be sufficiently significant to cause an impact to the overall UAE economy. The extensive investments to create digital economy by Dubai Government and the forecasted return in investment by Madar group are sufficient to emphasize the importance of ICT in ensuring an industry competitive advantage. Dates industry must computerize to initiate efficiency in operations before achieving competitive effectiveness through strategic planning of its business and aligning that to its IS/IT optimization. While it is essential to elevate IT literacy within its organization and its supplier, appreciating and adopting supply chain conceptual principles and management approaches will ensure value-adding activities to its suppliers as well as customers. This will further enhance the possibility of initiating the dates industry as one of UAE economy contributing industry.

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