IMPLEMENTABILITY OF CRM IN AEC/FM DOMAIN: A CASE STUDY

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ABSTRACT

This paper represents a case study which was prepared in collaboration by Siemens Business Accelerator – Turkey, The Project Management Center (Istanbul Technical University – ITU) and Institute of Informatics (ITU) given to the Ministry of Trade and Industry of Turkey. These types of research studies are encouraged in Turkey by the government to increase the communication and collaboration between universities and commercial life. The main scope of this research is to test the implementability of Customer Relationship Management (CRM) solutions which would be established for the Turkish Construction Sector in order to construct the bridge between Architecture, Engineering and Construction (AEC) and Facility Management (FM) processes. Main objective of this research project is to define a meta-model for integrating FM processes within a framework which is dependent on the service call requests from building users in order to track the final quality and "as built" performance of the "finished" building in terms of the physical structure of the building. In this paper we will first elaborate on the barriers in front of the implementation of a CRM solution for AEC/FM industry. We will also propose a benefit system for the actors defined as the users of the system within a process model framework. We will detail out the testing procedures for the implementability of the model. The final solution (under development) will be used to run a real business among the concepts developed.

KEY WORDS

Customer Relationship Management, Facility Management, Construction Project Organizations, Process Model

INTRODUCTION

Customer Relationship Management is a rising paradigm in many industries. The main reason which makes it very popular is the sophisticated Information Technology (IT) support at the background which is facilitating to develop long term strategies for enterprises to survive in contemporary marketing environments. Although it is mainly related with parties (human) and relationships, the way that relationship managed by the support of Information and Communication Technologies (ICT) makes the difference. In order to benefit from CRM

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solutions there are some prerequisites. In this paper we will discuss those prerequisites and test their applicability for the AEC/FM domain within a business model.

METHODOLOGY

The first part of the paper gives brief information about CRM and relevant ICT support. We also try to map those solutions to the ICT solutions available for AEC/FM domain. At the second part of the paper we elaborate on a business scenario and analyze financial opportunities and define benefit mechanisms related with our model. We will discuss the success factors for the model in the last part of the paper.

WHAT IS CRM ?

It is possible to define CRM as a "Marketing Activity", as a "Total Quality Management (TQM) initiative", as a "Knowledge Management (KM) initiative", as a "Strategic Management Tool" or as a "set of IT tools". Each definition helps us to visualize a different view of CRM and the combination of those views gives us the big picture. Before giving an answer to this question we would like to give the answer to the question: "Who are customers? (Varey 2002)"

- not producers, not citizens, but 'us' brought to life in our everyday talk
- the final arbiter of product quality, thus to be understood and responded to
- an accomplice of managers wielding power over employees
- a conduit for employees' self-expression, with consequences for their identity and emotional well-being
- a buyer, or beneficiary, or audience, or co-producer (resource)
- overall customers are actors in relation to employees and managers.

CRM as a Marketing Activity

The idea that organizations can satisfy their own long-term objectives, such as profitability, by coordinating and focusing all their activities on identifying and satisfying customer needs and wants is called as "Marketing Concept". This concept requires that one transaction triggers other (Nikels & Wood 1997)". To enable continuous transactions between customers as well as partners, marketing management benefits from "**up-selling**" (selling additional products relative to the main product) and "**cross-selling**" (selling promotional products not relative to the original product). Which makes CRM ICT so important for marketing is that it is like a magic wand to discover the "**opportunities**" of up-selling and cross-selling (Goodway 2001).

CRM as a TQM Initiative

When we bring together CRM & TQM the first word to put in the place is the "Organizational culture" which is defined as the pattern of shared values and beliefs that influences employee attitudes and behavior. Total Quality Management is defined as a

concept which puts quality at the heart of every organizational operation, because quality is defined as satisfying the needs of both internal and external customers (Nikels & Wood 1997). There are some Meta aspects of organizational culture which are principal such as a commitment to the company policies and behavior, being customer focused, etc. There are also some typical aspects of organizational culture which are under change in terms of continuous improvement of people, processes and products. CRM ICT helps to reengineer internal processes and facilitate "Change Management" towards total quality.

CRM as a KM Initiative

CRM is a knowledge management activity. CRM is a gate for transforming tacit knowledge into explicit knowledge. It facilitates to keep track of KM processes to extract know-how, know-what and know-why related with business processes and products (Table 1).

KM Develops and Evaluates…	By Addressing Such Questions as…	In order to…
…Knowledge Stock	…Know How	…Increase external performance
…Knowledge Flow	…Know What	…Increase internal performance
…Knowledge Use	…Know Why	…Increase quality of life

KM focal points, questions and goals (Fahey et. al. 2001)

CRM as a Strategic Management Initiative

Strategy is a broad plan used to guide the decisions and actions of everyone in an organization. Because CRM is strictly related with parties, CRM needs a paradigm shift in organization behavior. It is also a strategic management initiative. CRM ICT provides valuable assistance for every strategic management school. Relevant processes depend on ten schools of strategic management based on Mintzberg (Mintzberg et al. 1998).

CRM as a Set of ICT Tools

CRM with the extensive support of IT at the background is a major enabler of interoperability. CRM is the major driver of many software technologies in use today. This is also why the name of CRM is called with the name of IT solutions developed for it. Because of this confusion during the early stages of CRM many businesses simply jumped onto the CRM bandwagon taking it as a set of IT solutions without aligning their corporate goals with the CRM implementation, and those CRM projects failed one by one over time.

Technologies behind CRM enable effective B2E, B2B, and B2C integration. IT for CRM can be configured within various levels. For a Small to Medium Enterprise (SME) a simple contact management solution may be enough while for a global company, all functionality of back office integration, service management, call centre applications, data warehouses, supported by various Business Intelligence applications are required.

For a complete CRM solution a demonstrable knowledge of Networking, Data Centers, SQL, System Design, Systems Analysis, Software Development & Object Oriented Modeling and Programming, various server technologies in conjunction with contemporary web technologies, communication and network protocols, APIs, standards such as EDI are

required. For that reason a systems integrator support as well as professional consultancy services is required for CRM projects.

From a technology perspective, CRM involves capturing and integrating all customer data from anywhere in the organization, analyzing and consolidating it into information and then distributing the results to various systems and customer contact points across the enterprise. This approach goes beyond merely automating customer contacts with front-office applications in marketing, sales, call centers and customer service.

What's needed is enterprise architecture for business intelligence that integrates all of a company's systems, including CRM, e-business and ERP, around a data warehouse and analytical tools. This approach can create a complete view of the customer, providing direct feedback to operational systems and offering executives the decision support they need to make better and faster decisions. The challenges of implementing such architecture are best met by enterprise storage, defined as consolidated, scalable storage able to support multiple operating systems and servers, (including mainframe, Unix and Windows based platforms), on a single storage platform. Characterized by intelligent software functionality, enterprise storage can be centralized in a data center or be distributed across the enterprise via an enterprise storage network. Just as CRM helps companies create customer-centric business architecture, enterprise storage provides a robust technical foundation for an information-centric infrastructure.

Definition of CRM

Customer Relationship Management is a knowledge driven competence strategy which focuses on the fulfillment of changing and advancing customer needs and wants in today's globalizing world (CS6, Yilmazkaya, 2005). Taking this definition as a base and depending on the analysis of CRM we add our definition of CRM: "*Customer Relationship Management is a knowledge driven strategy for Total Quality Management, to enable sustainability of enterprises in contemporary marketing arena with the extensive support of ICT available*" In this definition we assume that TQM includes customer oriented thinking and contemporary marketing arena is the entire world which is under the unpredictable effect of globalization.

CRM CONCEPTS AS FACILITATORS FOR PROJECT MANAGEMENT

One of the basic problems of design build phase of construction projects is to establish coordination between parties and provide effective communication and collaboration between business actors to facilitate knowledge capture to prevent conflicts during the project (what integration searches for). The outcome is effective use of resources, prevention of delays, reduce in cost, and gathering valuable know-how for future designs. CRM ICT searches for the same functionality through customer interaction. Because customers are not only the ones who are buying the manufactured product but everyone who is benefiting from the system (employees, partners, suppliers, etc.); PM may benefit from certain modules of CRM ICT such as "issue tracking" and "contact management".

CRM CHALLENGES AND CONSTRUCTION PROJECT ORGANIZATIONS

The main challenge of CRM projects is to synchronize information which is retrieved from different channels of communication. These communication channels may be telephone calls, e-mails, chat, written correspondences, etc. Maintaining the concurrency of customer interaction data as well as making it readily available for the on-line use of business actors is a complex task and requires to implement some state of the art IT solutions (such as voice recognition, intelligent interpretation, artificial intelligence for classification and first call resolution - FCR, etc.) While these tasks can be handled with well defined business processes for SMEs, as the size of the enterprise increases, sophisticated IT support becomes mandatory.

Other challenge of CRM projects is the requirement of interoperability between heterogeneous systems. Usually it is preferred to update the entire IT infrastructure with a complete solution for best results. But financing such a big investment is not easy (Software license fees alone have proven cost prohibitive for SMBs. Traditional enterprise CRM products delivered by Siebel, PeopleSoft and SAP can be very complex and cost anywhere from $5,000 to $15,000 per user. Even applications from traditional mid-market vendors, such as Pivotal and Onyx, can cost at least $2,000 per user) so integrators also provide middleware solutions supported with partial integrated CRM modules which would establish interoperability between different departments of the company and try to eliminate glue processes over time.

The challenges between interoperability solutions for CRM and Construction IT (Specifically for Design & Build Project Management processes) are similar. Only factor which makes them different is that CRM solutions are one time investments which lifespan is at least five to ten years, and at the end of the useable life (as well as during use) minor upgrades are enough to establish the sustainability of the solutions. Return on Investment (ROI) is possible to calculate and benefit from the system can be easily measured by use of specific CRM metrics.

CRM based complexity issues, such as configuration, customization, integration and ongoing maintenance and support, provides barriers to entry for SMBs and AEC/FM firms. Also, traditional enterprise CRM vendors are pushing applications to the SMB market that are more appropriate for companies with thousands of employees. However for PM, the construction organization is a one time – limited period establishment with limited resources. It is obvious that even the PM phase would benefit from interoperability solutions of CRM but it is not feasible within contemporary Construction Project Organizations (CPO).

CRM is a data hungry process. The business intelligence mechanisms are highly dependent on statistical research (datamining, text mining, etc.) over customer interaction data. In order to obtain real benefit from CRM for construction sector it is again not logical to implement CRM solutions for a single CPO. In other words, although CRM concepts and techniques have the potential to facilitate interoperability, current business models for CPO provide barriers for deployment of such solutions.

Two opportunities exist to implement CRM in construction sector. The first opportunity is to merge “the capability of tracking communication data from different channels within one pool” into existing construction IT software solutions. A second opportunity extends this

potential functionality to the use phases of buildings. This may be established through Facility Management. This second opportunity also has the potential to promise interoperability "between" projects. These two opportunities basically address to use "issue tracking" functionality in today's CRM ICT solutions for construction sector.

A new actor: FM Integrator Agent

Issues may occur both in design build and use phases of buildings. Within design build phase it is possible to track knowledge flow initiated by "internal customers" and within use phase it is possible to track knowledge flow initiated by "external customers". Because it is not feasible to handle the appropriate technical infrastructure for a single construction company, our proposal is to place a new actor (an integrator agent) which would make the investment, own and manage the enterprise storage, and organize its stakeholders (contractors, sub-contractors, facility management, architects, engineers, etc.) under one roof. In the following chapters we will discuss the functions and responsibilities of this new actor and test the feasibility of the proposed system within a business scenario.

IMPLEMENTABILITY OF CRM IN AEC/FM DOMAIN

To test the implementability of CRM solutions in AEC/FM domain, we begin with determining the requirements. These requirements are elaborated under four topics

- Requirements related with processes (business culture)
- Requirements related with technology (hardware and software)
- Requirements related with organization (number of employees and roles)
- Financial Requirements

PROCESSES RELATED REQUIREMENTS

Our business model depends on an e-business scenario. We assume that all the essential communication and relations will be managed via web enabled technologies. Initial partners who will be coordinated by the "Integrator Agent" are:

- Service and Maintenance firms (either individuals or companies)
- Architectural design offices
- Engineering design offices
- Sub-contractors

These actors should be chosen by the "Integrator Agent" based on their skills, actual IT capabilities, and customer potential. The prerequisite for process based integration is to define some standardized codes and procedures for carrying out the work. Possible tools include:

- Data capture forms
- Checklists for carrying out various tasks
- Communication standards between internal and external customers (Standard phrases to use during relationship processes; i.e. to begin with "Thank you for contacting us" with each message. These phrases' functionality goes beyond politeness, these also act as "mark-ups" in communication for automated interpretation of responses)

The basic *procedural* requirement is "Education" of parties. The "Integrator Agent" will be responsible to help its stakeholders to get familiar with the new codes of work and help them to reengineer their business processes.

TECHNOLOGY RELATED REQUIREMENTS

For the parties who are doing the actual work (in the FM cluster) it is enough to have a desktop computer which has an internet access. For design offices additional middleware solutions which would integrate into CAD programs via plug-ins might be needed. These plug-ins are to be provided free of charge by the integrator agent (or the software provider partner). The integrator agent will be the owner and manager of IT infrastructure. Thus these agents should:

- Have a working knowledge of project management, and preferably have the hardware/software required to run the software in-house, including a self hosted Web Server.
- Should endeavor to achieve a comprehensive and current understanding of any technical aspects involved in the support of FM services.
- Authorized technicians are required to register with IAI to establish and maintain their certification hence we assume those agents would also have a function to widespread the awareness about interoperability.
- The minimum hardware requirements may change depending on the size of the company and its strategic plans. Implementation of the solution will be consisting of a "Call Centre and a "Shared" Internet Portal. The model is intended to be applied to the lifetime of buildings and enable on-line real time dynamic data sharing between maintenance progresses of FM and the Building Information Model (BIM) which was the subject of design as a knowledge creation activity. An initial budget of $30 to $100 thousand is needed for investment in hardware and non-CRM supplementary software.

ORGANIZATIONAL REQUIREMENTS

Regarding our analysis a minimal CRM implementation for a SMB class FM Integrator Agent Firm requires 4~6 employees for initiation of the business who would be responsible with the following functions:

- Customer contact point(s) (i.e. "call centre staff")
- Consultancy services (Architect or engineer, would be involved with educational services as well; a background in PM would be beneficial)
- Management & maintenance of the IT infrastructure (IT specialist or software provider partner)

FINANCIAL REQUIREMENTS

To test implementability, financial factors have the priority. The money flow has to be modeled within a realistic business scenario. We used Rapid Prototyping approach to develop a model business scenario. We used a bottom-up approach to model money-flow which depends on some case studies (CS1-5). We tried to keep resources at their least level (the worse scenario). We assume that all IT investment is leased. Details of the financial analysis of incomes can be examined in table 1:

FORECASTING	(for residential buildings, living area is approx. 150 m2 - $100~$300/ m2 construction cost)			
EARNINGS				$1,00 = 1.35 YTL
Earnings from Maintenance Services (FM):				
	A Firm **Short term services** 30 min - 120 min	B Firm **Middle term services** 120 min. – Half Day	C Firm **Long term services** Half day and more	
Service cost per (to) user YTL	30 - 150	150 - 500	500 - 5000	
Average (A)	**100**	**250**	**2000**	
Response capacity of a FM firm (C)	8 Services/day	20 Services/week	5 Services/month	
Possible income:	800 YTL/day	5000 YTL/week	10000 YTL/month	
Cost detail of one service:				
Material (M)	28,13 TL	70,31 TL	562,50 TL	
Workmanship (w)	26,25 TL	65,63 TL	525,00 TL	
Profit [(M + W) * %40]	21,88 TL	54,69 TL	437,50 TL	
VAT [%18]	13,75 TL	34,38 TL	275,00 TL	
Agent Commission [A * %1]	**1,00 TL**	**2,50 TL**	**20,00 TL**	
Reduced - Adjusted Average Service Cost per user (Including Commission)	**91,00 TL**	**230,00 TL**	**1.820,00 TL**	
Adjusted Cumulative Service Detail	Daily Total	Weekly Total	Monthly Total	
Material (M)	225,00 TL	1.406,25 TL	2.812,50 TL	
Workmanship (w)	210,00 TL	1.312,50 TL	2.625,00 TL	
Profit [(M + W) * %40]	175,00 TL	1.093,75 TL	2.187,50 TL	
VAT [%18]	110,00 TL	687,50 TL	1.375,00 TL	
Total Commission [A * C * %1] (X)	**8,00 TL**	**50,00 TL**	**100,00 TL**	
Adjusted Sum (Including Commission)	**728,00 TL**	**4.550,00 TL**	**9.100,00 TL**	**MONTHLY TOTALS:**
Request Distribution in One Month (Y)	**50%**	**35%**	**15%**	**%100**
Correlative "Service Calls":	**120**	**28**	**1**	**149**
Monthly Commission Income (X*Y*Monthly Unit (Day/Week/Month)):	**120,00 TL**	**70,00 TL**	**15,00 TL**	**205,00 TL**

(This is average income from "one" FM firm for 149 service requests/month ~ 5 services/day)

All values (Material – Workmanship distrubitions and market prices), in Table 1 are collected from case studies and various Real Estate & FM reports and these are valid for use in Istanbul / Turkey market. There are bigger opportunities in USA and Europe markets since those maintenance costs are much more higher because of workmanship. We prefered to

keep commissions constant depending on (A) value. But it is possible to decrease cost values depending on market share and continous and consistent demand for services. Our reduced and adjusted values are experimental in that sense but we are also working on an algorithm to extract scientific results.

Customer Profiling

For CRM projects the first and the most essential step is the identification and profiling of customers. Base level customers for our business scenario are parties who has Internet access and are living in houses which have a construction cost of $100/m2 (the minimum realized cost in "standard quality" mass housing projects in Turkey) and higher (CS1, 1999). There are 10'000'000 internet users in Turkey (overall) and we assume we may reach to 50'000 customers (over a population of 15'000'000) at the end of the first year which is the %1.3 of the population of Istanbul (Considering that each customer represents a 4 people family at average). We forecast that there will be 500.000 potential customers over a 70'000'000 population (aprrox. %3.6 considering that each customer represents a 5 people family at average) as the business grows throughout Turkey.

Development of Business and Costs

Depending on rapid prototyping, expected growth patterns and relative annual incomes are elaborated in Table 2:

End of	N of Customers	N of Service Requests	N of FM firms (partners)	Total Annual Income
First Year:	50.000	125.000	23	172.268,91 TL
Second Year:	200.000	600.000	112	826.890,76 TL
Third Year:	500.000	1.750.000	327	2.411.764,71 TL
Fourth Year:	1.000.000	4.000.000	747	5.512.605,04 TL
Fifth Year:	1.500.000	6.750.000	1261	9.302.521,01 TL

As listed in Table 2, at the end of the first year, the expected income from the business is about $130'000. Overall costs are (Both direct and indirect costs + investment + leasing) are expected between $400'000 ~ $500'000 at the end of the first year. For the SAN-TEZ case the Ministry of Trade and Industry promises to fund %70 of those expenses so the financial responsibility of Siemens Business Accelerator (SBA) is about $110'000. The forecasting shows that the Return on Investment (ROI) will be established in the first quarter of the second year. Even without any support or funding from the government, the forecasting shows that at the end of the second year, it is very likely that this business will survive and gain sustainability with its own resources.

CONCLUSIONS

A key challenge for SMBs is finding the right solution set that can deliver the requisite functionality to enable them to compete with large-enterprise counterparts. However, complete CRM solutions for the SMB market—with enterprise-class capabilities at a price SMBs can afford—are only now becoming available. A CRM strategy for an SMB has many of the same desired outcomes as in a large enterprise, including improved customer selection,

acquisition, retention and expansion. Therefore, the key business drivers are similar, specifically:

- Manage the customer lifecycle from first contact to contract to cash to service
- Become a more customer-centric organization
- Create seamless processes and open communication among company employees for better management and control of information
- Nurture customers' growing expectations for differentiated services

FM integration promises many opportunities to make CRM tools and concepts available to use by AEC/FM actors. Expected benefits and outputs with such link are:

- Design templates (sharing of 'state of the art' solutions which has meausreable optimum parameters in terms of the standards in use, workmanship, material, tools, time, cost, etc..
- Depending on design templates, promotion and marketing of industrialized building parts. Encouraging the use of new technologies and systems, thus facilitating construction excelence
- Performance analysis of building entities as well as parties who take part in production. (By analyzing issues encountered during use phases we beleive that it would be possible to track – or at least collect cues about – the skills, experience and commitment to quality of production teams; if it is possible to have access to the relavant building information model)
- Analysis of supplier relevant performance problems (It is very common that performance pitfalls of building entities may be relevant to some underlying material – ie. lately delivered concrete – material performance in terms of on-time delivery, guarantee terms & conditions, suppliers' attitude to solve problems can be tracked both in FM phase while providing service and maintenance and design build phase if there is acess to BIM, and if access to "extended BIM relevant PM information" is available)
- Collecting statistical data relevant to building entities and relevant materials thus have an opportunity to compare them based on real performance values.
- Updated testing procedures.
- Real data about energy efficiency and exploring new parameters about environmental management and sustainability.
- Facilitating to develop recycling systems for building product
- Contribution to the evolvement and development of standards in use
- Determination and testing of realized maintenance periods for certain building entities and relevance to the typeof metarial, supplier, product group, etc.

- Knowledge Management and Know-how sharing.
- Development of Use and Maintenance manuals.

Direct implementation of CRM in construction sector concerning "design build" phase is not possible. But through alternative business scenarios it is possible to establish a link between CRM and construction IT solutions. AEC/FM actors may benefit a lot from such interoperability if this link can be established (elaborated on a separate paper).

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