Technical Note

A review of customer relationship (CRM) implications: benefits and challenges in construction organizations

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Abstract

The management philosophy, namely, Customer relationship management (CRM) has been widely accepted and successfully applied across a range of sectors. However, there has been very little research efforts in the field of CRM in the construction industry. This paper provides a review of the CRM philosophy and technology, and considers the implications; benefits and challenges to construction organizations at a strategic business and operational level. Given the generally unstable economic and highly competitive marketplace, implementation of CRM throughout the lifecycle of assets may provide for more effective management of existing and prospective clients. The CRM approach would seem to be compatible with general trends in the construction industry towards more collaborative working and the paper provides that both the philosophy and technologies can be integrated with current initiatives such as building information modeling (BIM). Construction clients in the public and private sector are diverse in nature, complex in their buying processes and at varying levels of knowledge of the Industry. In addition to seeking value for money from their projects and assets, they have become more concerned about sustainability and environmental impact. It has been recognized that management of a broader range of business and project level stakeholders is necessary.

1. Introduction

It is the contention of this paper that customer (or client) relationship management (CRM) is about managing existing client, and prospective client, interactions at a strategic business and project level. In addition, the CRM philosophy and technologies can be implemented throughout the whole lifecycle of assets. As a management philosophy and set of tools, CRM has been successfully applied across a range of sectors which have been seen to recognize the need for CRM approaches to take into account an increasingly wider range of critical business and operational stakeholders.

CRM has been widely accepted across various industries such as logistics enterprises, as well as academia since the late 1990s [1, 2].

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However, there has been very little research efforts in the field of CRM in the construction industry, particular on the relationship marketing of customers behavior [3, 4], whereas the others were focused on telecommunication industries [5, 6]. In reality, the philosophy, tools and techniques of CRM in construction has both strategic and operational consequences.

This paper provides a review of what CRM is and how the philosophical approach, strategies and technologies may bring about positive changes at a business and operational level in construction organizations. The paper identifies a number of possible obstacles to implementing CRM and areas that would seem to require further research.

2. The Construction Client: Characteristics & Priorities

A customer (also known as a client, buyer, or purchaser) is the recipient of a good, service, product, or idea, obtained from a seller, vendor, or supplier for a monetary or other valuable consideration [7, 8]. Customers, clients and buyers in construction may be any of the large and diverse range of private and public organizations, from government departments, large private corporations, individual customers, contractors, consultants, specialist suppliers.

In effect, most of the construction supply chain engaged at different stages during the life of physical built assets and facilities, are both involved in supplying products and services, and are also customers/clients themselves. Clients may only approach the Industry once in a life-time or may be a regular procurer of construction services. The clients' level of knowledge of construction and its practices may be nonexistent or very sophisticated. The client in construction can be very complex in its buying processes and has increasingly become more demanding. Whether the client is public (government) or private their priorities and expectations change over time. Public and private clients in parts of the world have been seen to be becoming more concerned about sustainability and the impact of their business activities on the economic, social and environmental life of the societies in which they operate. In addition to growing demands for greater accountability, better corporate governance and social responsibility, there is increased interest in the activities of developers by the public. This has lead to development of more effective management of a wider range of critical stakeholders of development projects.

The construction client may be the owner, or prospective owner of public or private assets which can range from housing and properties, to large scale infrastructure such as highways, airports, mass transit, utilities i.e. water, electricity, healthcare facilities, telecommunications, waste disposal etc.

Classification of the public and private clients is vital for CRM in terms of managing and regulating their characteristics along the project life cycle. The characteristics are different due to their policies and project implementation, For example, the public clients focus on public accountability whereas the private clients aim to maximize their profit [9], Fig. 1 illustrates the key characteristics of public and private clients in the construction industry.
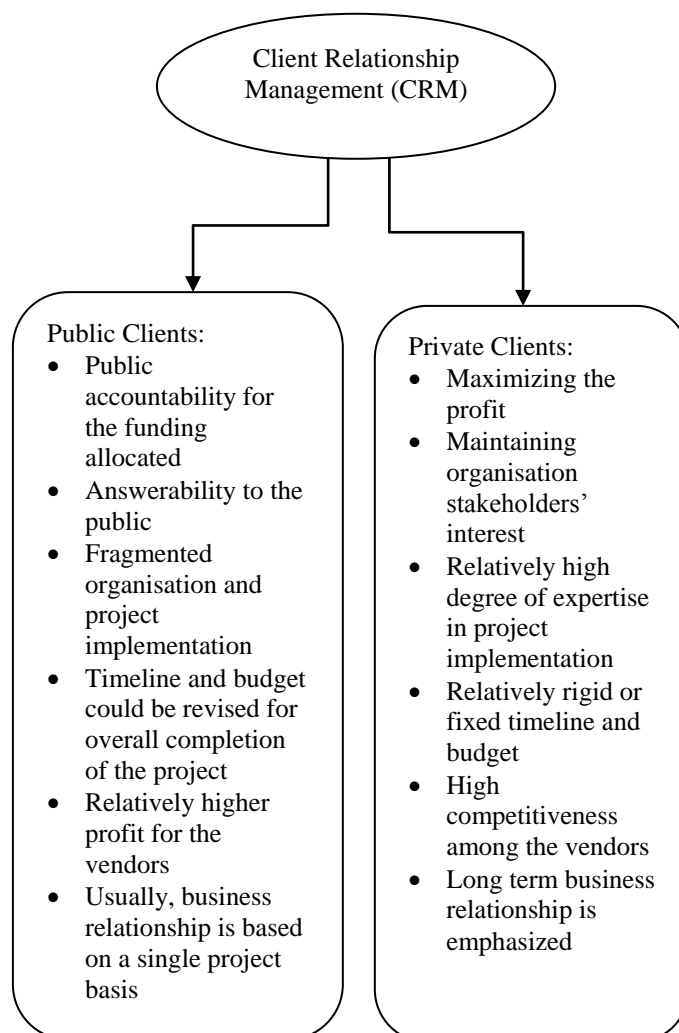

Fig. 1 Framework for Characteristics of Private and Public Clients

Both types of clients will be engaged in the whole-life management of these assets including, planning, design, construction and acquisition, operations, maintenance, renewal and rehabilitation, replacement or disposal. The basic premise of infrastructure asset management is to intervene at strategic points in an asset's normal life cycle to extend the expected service life, and thereby maintain its performance. Typically, a long life cycle asset requires multiple intervention points including a combination of repair and maintenance activities and even overall rehabilitation.

3. Benefits of Applying the CRM Philosophy & Technology

The construction industry has suffered from a bad reputation, partly due to traditional practices and procedures that have largely failed the Industry's clients. This reputation for delayed projects, cost overruns, poor quality of workmanship, a lack of after-care, bad safety and environmental performance has led to major national initiatives in a number of countries to change the sector from top down. CRM as a management philosophy and set of strategic and operational tools may bring about further change at the level of the construction firm. Project performance could be improved significantly when good relationship management is secured between the client and the vendor [10].The CRM approach may go some way to improving relationships with existing clients. Key client marketing and service has been recognized as essential in retaining those customers who make repeat purchases of construction services and products.

The CRM technologies, if implemented properly may improve data gathering and analysis on critical client relationships which will improve both strategic and project level decision-making. The era of the "social customer"[11] refers to the use of social media (Twitter, Facebook, LinkedIn, Yelp, customer reviews in Amazon, etc.) by customers in ways that allow other potential customers to gain insight into the experiences of current customers with the seller's products and services. This shift increases the power of customers to make purchasing decisions. Whilst this trend may be more applicable in mass consumer markets, the impact and influence of social networks in the business-to-business and industrial marketplace should not be underestimated. Laney [11] used the term 'Extended Relationship Management' (XRM). He defined XRM as the principle and practice of applying CRM disciplines and technologies to other core business stakeholders, including primary partners, employees and suppliers as well as other secondary allies such as government, press, and industry consortia.

CRM is practical in this IT era of the 21st century because forum and exchange of information are active through the social media [6]. This would seem to create a great platform for the vendors to maintain the existing clients' relationship as well as to attract the new clients. Client learning is the key to long-term and successful relationships with the vendor [12].

3.1. CRM development strategies

A successful CRM strategy development process should focus on addressing the position of where we are now and also what do we want to achieve in our business [21]. To respond to these questions, there should be a big picture of the business environment that is able to work together with required analysis tools as illustrated in Fig. 3 [22]. The analysis process starts from the inner layers and ends with the outer layers of industry and the macro-environment. As the Fig. 2 presents, three main strategies are: SWOT Analysis, Industry Analysis and PESTEL Analysis.
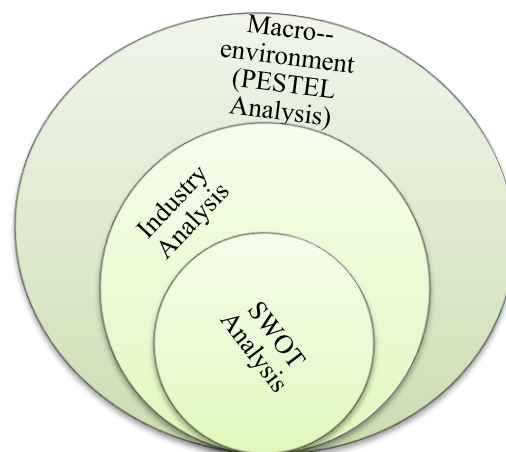

Fig. 2 Layers of the business environment [22]

3.1.1. SWOT analysis

This is the first analysis could be applied as CRM strategy. SWOT stands for strengths, weaknesses, opportunities and threats. Without assessing each of the key areas of SWOT analysis, no effective strategic plan can be formulated. SWOT addresses the key issues from the strategic capability of an organization and the business environment that are most likely to impact on strategy development [22].

3.1.2. Industry analysis

Industry Analysis is a tool for market assessment and designed to provide means to understand the complexity of a particular industry. Within industry analysis the political, economic, social, technological, environmental and legal factors that influence the industry's development process are reviewed [23]. The structural analysis of industries include the five competitive forces of descriptions of rivalry among existing competitors, the threat of new entrants, the threat of substitute products or services, the bargaining power of suppliers , and the bargaining power of buyers [24].

3.1.3. Pestel analysis

PESTEL model identifies how future environments in the politic, economic, social, technology, environmental ('green') and legal aspects might influence the organizations. This analysis identifies main drivers of change by means of a broad data base [22]. Moreover, PESTEL analysis can be further explained into the component as follow [25]:

Political future: political parties, legislation, relations with the government, government ownership, etc.

Socio-cultural future: change in lifestyle, values, and attitudes to work and leisure, green issues, education and health, demographics, income distribution.

Economic future: Gross Domestic Product (GDP) and

GDP per capita, inflation, interest rates, currency fluctuations, investment by state, cyclicality, energy costs.

Technological future: government and investment policy, new research initiatives, new patents and products, speed of change in technologies, level of expenditure on R&D, development in other industries.

Environmental future: green issues, level and type of energy consumed, waste and its disposal.

Legal Future: competition law and government policy, employment and safety law, product safety issues.

For a successful developing of a CRM strategy, it is critical for companies within the construction sector to have a comprehensive image of their pre-development and post-development environment. Since, the surrounding environment of construction companies (its size, geographical condition, technologies and many other critical factors) can considerably vary from each other; it seems impractical to develop a specified and detailed CRM plan of work for the whole construction sector. However, the key sectors with similarities like infrastructure or housing companies might design a suitable model to fulfill their business requirements and

this is a demanding field of study for the future researches of construction organizations.

3.2. CRM models

CRM concept investigates in both business to business (B2B) and business to costumer (B2C) core organizations and several models for CRM strategy have been developed. Though some of these models implicit and require some descriptions [26, 27], others are more explicit [28-31]. An explicit CRM strategy model clearly illustrates the CRM process in terms of stages and activities. As a holistic view on the previous literatures [32, 33], a general model of CRM comprises of a set of six key mutually dependent criteria (Fig. 3).

- A costumer database;
- Analyses of the database;
- Tools for targeting the customers;
- Relationship platforms;
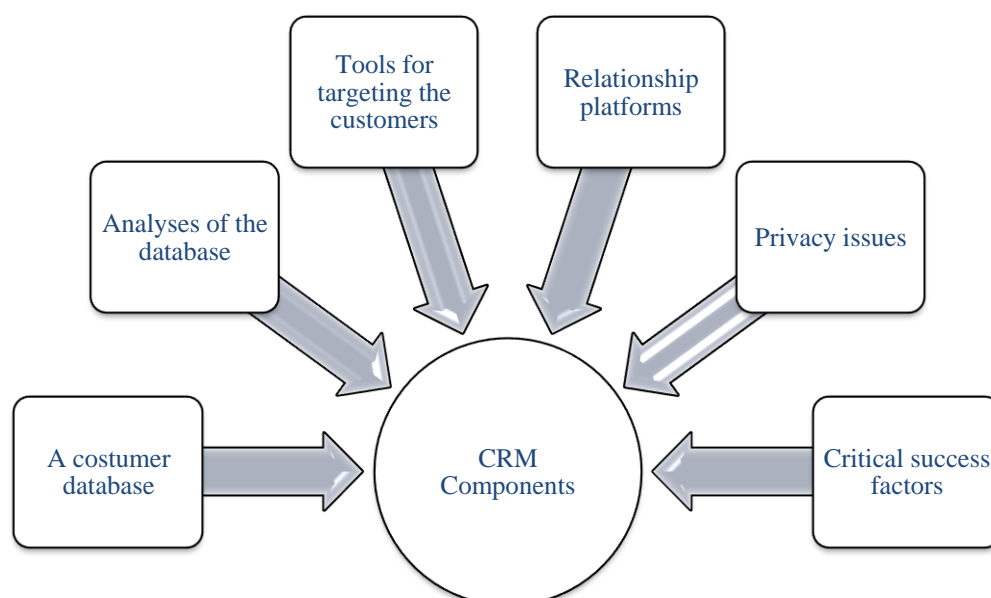- Privacy issues; and
- Critical success factors.

Fig. 3 Customer Relationship Management main components

3.2.1. A costumer database

A fundamental step to establish a CRM strategy is the formation of a customer database [34]. However, collecting a comprehensive data base is not easy for most of industries and Fig. 4 illustrates classification of the businesses in difficulty of having interaction with their customers [33]. The upper right-hand quadrant firms such as banks have more direct customer interactions and consequently constructing a database is a relatively easier job. The lower left-hand quadrant firms because of having less frequently interaction with their customers have the most difficult job to collect their customers' data.

Automotive manufacturers and construction sector are the typical examples. The other two represent intermediate situations.

Data warehousing is an IT solution for having a comprehensive database [35]. In general terms, the objective of data warehouse is to establish a repository of the data generated by the systems of a company, making them accessible and easy to read to other people and systems [36]. Data warehousing technique assists organization to have a classified database regarding to the specific requirements of that organization, for example on the area of contract administration [37, 38].
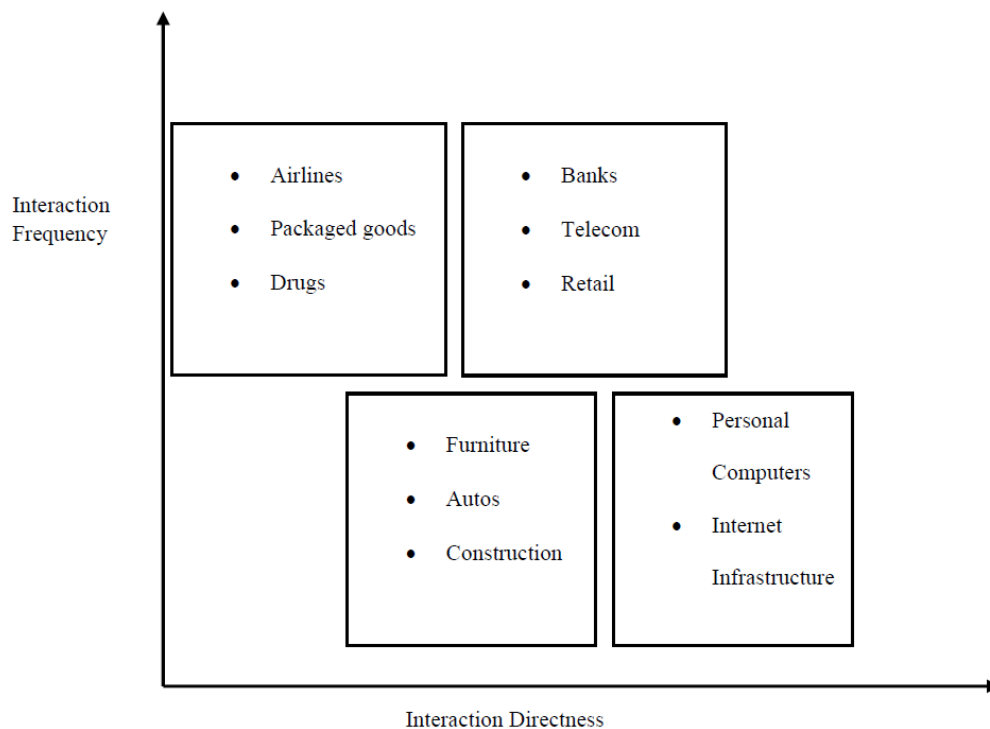
Fig. 4 Customer interaction profile regarding to various organizations [33]

3.2.2. Analyses of the database

Once the data warehouse is established, making sense of the large amount of data obtained becomes the next challenge. At this stage, the data mining concept comes into place. Along with growth of information volume, data mining sorts and gives meaning to all information, both chronological, and complex, allowing it to be shared with the concerned parties within the company [36, 39]. It is crucial for a CRM strategy to identify the most profitable customers and direct their attention to attract those customers. It is possible to recognize the most profitable and potential customers by analyzing the data regarding product purchase or service providing history of the company. Depending on the company's main objectives, the selection criterion for the most profitable group would vary. In addition, it gives opportunity of enhancement to the company by analyzing past complaints and problems. The advances in database technologies are crucial to the functionality and effectiveness of CRM systems such as data warehousing and data mining [40].

3.2.3. Tools for targeting the customers

Building long-term relationships in CRM is another key issue. Media is known as mass marketing approaches that are suitable for making awareness; however, having impersonal nature makes them poorly-suited tools for CRM. On the other hand, internet recognizes as an economical method facilitate individual relationship building with customers. For example, e-mail is a very cost-effective approach to customer retention [41]. Using personalized e-mails is a popular approach in the Internet-

based direct marketing for targeting customers for CRM purposes [42]. Companies can send very sophisticated targeted e-mails including video, audio, and web pages. Common social networks and direct contacts are the other channels to target the costumers [11].

3.2.4. Relationship platforms

Relationship platforms focus on enhancing the customer satisfaction level such as customer service, loyalty programs, customization, rewards programs and community building [31]. Having relationship with customers should be sustained and direct emails are the effective delivery mechanism to create it. Providing customer satisfaction in higher levels and sustainable relationship is the overall goal of relationship programs. Investigations indicate that customers are looking for their expectation of product performance at higher levels as this expectation grows due to competition, marketing communications, and changing customer needs [43, 44].

Furthermore, there exists a strong and positive connection between profit and customer satisfaction [45]. Thus, constantly measuring of the satisfaction level and lunching relationship programs helps managers to provide performance beyond targeted customer expectations. In addition, listening and adapting to preferences of individual customers of a company provides a higher propensity to keep them and improve their loyalty [46].

3.2.5. Privacy issues

The CRM systems depend upon a database of customer information and analyzing of that data provides more

effective relationship-building activities and targeting of marketing communications. However, there is a concern about the manner that the collected data will be used and how the company will preserve their personal and private information. For instance, unwanted emails and feelings of violation are the main privacy issues [47].

In "Opt-in" concept customers must consent to the collection and use of personal data. This provides more control for customers over their own information and helps to build confidence. Nonetheless, from the organization's perspective, substantially reduction in the volume of information is the unpleasant consequence of this method.

3.2.6. Critical success factors (CSF)

CRM projects have a low success rate and introduces a measurement tool that uses critical success factors as the basis for scoring. The proposed tool is developed with the contribution of a group of advisors that is formed by both academicians and professionals [48]. There are 13 critical success factors within three main areas of technology, human and process aspects.

The identified CSFs are: senior management commitment, creation of a multidisciplinary team, objectives definition, inter-departmental integration, communication of the CRM strategy to the staff, staff commitment, customer information management, customer service, sales automation, marketing automation, support for operational management, customer contacts management and, information systems integration.

Öztayşi and others (2011) introduced a process based measurement tool which focuses on the critical success factors (CSF) within CRM components [49]. The tool is developed by means of exploratory factor analysis and based on the responses from various industries (manufacturing, information technologies, tourism, service, retail, finance, and logistics). The proposed process based model addresses seven main CSFs which are:

- attaining information and evaluation of the potential customers;
- capturing and managing the potential customers' information;
- production/service customization;
- increasing the relationship with the high value customers;
- enhancing the customers to make referrals;
- termination of not profitable customers; and
- getting in interaction with the lost or inactive customers.

4. Strategic & Operational (Project) Level CRM Implications

For any size of firm a CRM plan is required to obtain the funding, resources, and company-wide support. Writers have identified three strategic factors in the successful implementation of a CRM system at the business level: processes, people and technology [11, 13]. Under each, the benefits need to be defined, risk assessment conducted and costs established.

Business Processes: these lie at the core. CRM is about making the organization more client-centric, enabled by technology that consolidates and intelligently distributes pertinent information about clients, sales, marketing effectiveness, responsiveness, and market trends. The firm needs to analyze its business processes before choosing a technology platform. Senior management need to determine the types of client information that are most relevant, and how best to employ them [11.]

People: For CRM to be effective, an organization must convince its staff that the new technology will benefit employees as well as clients. Senior executives need to be strong and visible advocates. Collaboration, teamwork, and two-way communication should be encouraged [13] including the provision of appropriate capability and capacity within the human resource portfolio – this may necessitate individual specific or general employee training programs.

Technology: In evaluating technology, key factors include alignment with the company's business process strategy and goals, including the ability to deliver the right data to the right employees and sufficient ease of adoption and use. Platform selection is best undertaken by a carefully chosen group of executives who understand the business processes to be automated as well as the software issues. Depending upon the size of the company and the breadth of data, choosing an application can take anywhere from a few weeks to a year or more.

According to Trepper [14], CRM technologies are divided into three types; Analytical, Operational, and Collaborative. Analytical CRM mainly focuses on analyzing customer data. The data is stored in a data warehouse, which includes the information about the company that will provide value to the customers [15]. The data can be collected from customers, from internal company sources and from third-party sources. The data warehouse plays an important role in CRM since it can enable the analysis of customer behavior. If the data gathered is not integrated properly, it can damage the relationship between the company and the customer. CRM integrates data with business action. It is very important for management to analyze the past data in order to help forecast the future performance of the customer [16]. From the above it can be stated that the need for the Analytical CRM approach is to be able to make better assessment of customers. This assessment helps the organization in customer targeting, marketing and planning. The management can motivate their customers by designing new products better aligned to customer requirements as a result of this marketing activity..

Operational CRM involves a process of automating aspects of the business i.e. customer service, sales force automation, management order, service field and marketing automation [16]. In order to have success in this field, the company should focus on the requirements of the customer and the employees should have developed the right skills to satisfy the consumers. To increase the efficiency of the interaction with the customers this CRM should consists of client-facing request that combines mobile-, front- and back offices.

Collaborative CRM mainly focuses on communication between customer and companies. The one-way interaction between customer and company should be replaced by two-way communication where the customer is involved with issues affecting behavior of purchases. CRM should produce a task that involves an interaction between a dealer and consumer [17]. From the above discussion, it can be understood that Collaborative CRM can raise their effectiveness in success by fulfilling the necessities of the customer. For example: Electronic communication. Movements towards a more collaborative relationship are seen in Integrated Project Delivery (IPD) projects and other relational contracting methodologies.

From the above discussion on CRM technologies it can be understood that Analytical Customer Relationship Management analyzes data of the customer by making use of many tools like On Line Analytical Processing (OLAP) and data mining. Operational CRM automates business processing and Collaborative CRM automates communication between company and customers.

4.1. An integration of CRM with whole-life asset management

During each of the phases of the life-cycle of an asset, clients/owners will engage the services of specialist design, construction and engineering organisations. CRM strategies and technologies may assist in ensuring that the clients and owners deliver the sustained service performance and long-term efficiency at all stages of the life of the asset.

From the perspective of the specialist service provider; designers, engineering consultants, project and/or facilities managers, ensuring sustainable relationships will help to confirm longer-term networks of clients and may also identify prospective clients and business opportunities.

4.2. CRM and BIM

A building information model (BIM) carries all information related to the built asset, including its physical and functional characteristics and project life cycle information, in a series of "smart objects". The related information can be stored and managed in a well-designed BIM database [18]. For example, an air conditioning unit within a BIM would also contain data about its supplier, operation and maintenance procedures, flow rates and clearance requirements [19]. It creates a comprehensive model of the building which contains most of essential data in its life-cycle.

The success of CRM depends on a customer-focused strategy that is often implemented by reengineering current customer interaction processes and sometimes designing entirely new processes [20]. In terms of being more customer information centric, companies should analyze client experiences and problems, then respond and support their needs. CRM requires the perfect alignment with ever-changing customers' needs based on integrated and reliable customer information.

A CRM system can provide clear communication and

traceability of customer requirements,; they can be implemented in the pre-construction stages of BIM such as planning and designing processes. This allows the development of a Project Information Management (PIM) system by which salient data is aggregated and made available to project stakeholders throughout the entire building lifecycle. The scope of data can be comprehensive, including all procurement and supply chain management data such as contact details within supply chain companies. It means that, the embedded quality of design aligns with the client demands. Furthermore, in the post-construction stage, BIM technology can provide a better model for facilities management in order to satisfy the client.

In collaborative CRM, the interaction between customer/client and company should be two-way communication. The 3D component of BIM provides a very understandable model of the final product for the client in comparison with the traditional 2-D CAD model. The client can investigate and assess the building from many aspects and put its comments on it.

A wide array of software systems exist from MNC scaled solutions such as http://www.salesforce.com to free and open source solutions provided by http://www.adempiere.com/ADempiere_ERP.
Furthermore, the boundaries from CRM systems to ERP systems are increasingly overlapping, with either system providing some functionality of the other. This enhances the trend towards PIM, BIM and the growing body of data available as needs dictate. Ultimately this can be accessed by asset management software such as http://www.oniqua.com/.

4.3. Integrated framework of CRM and BIM

Construction industry is suffering a bad reputation from the quality aspect of its products. Along with the given general description about CRM and BIM, this paper targets to outline a basic integrated framework in order to enhance the quality of the buildings in macro level and in a customer-centered manner as illustrated in Fig. 5. As its name implies, the data collection process refers to those activities which are trying to capture information about customers and the construction industry. Moreover, the costumer and industry information is classified into three types, including information of the customer and industry; information for the customer and industry; and information by the customer and the industry. First, "of-the-customer and industry" information includes personal and transaction data about a customer as well as project information such as design, structure, mechanical and electrical, etc. Second, end-product, services and organizational information that are perceived useful by customers and the industry is referred to as "for-the-customer and industry" information. This type of information is presented through diverse communication media (BIM) so that all the project stakeholders (including customers in asset management level) acquire and process it to make more informed decisions. The third type is "by-the-customer and industry" information. This is the non-transactional feedback

information that includes complaints, propositions, claims, future developments of BIM, etc. This could avoid any risks

in the future in terms of relationship, management and overall implementation [50].
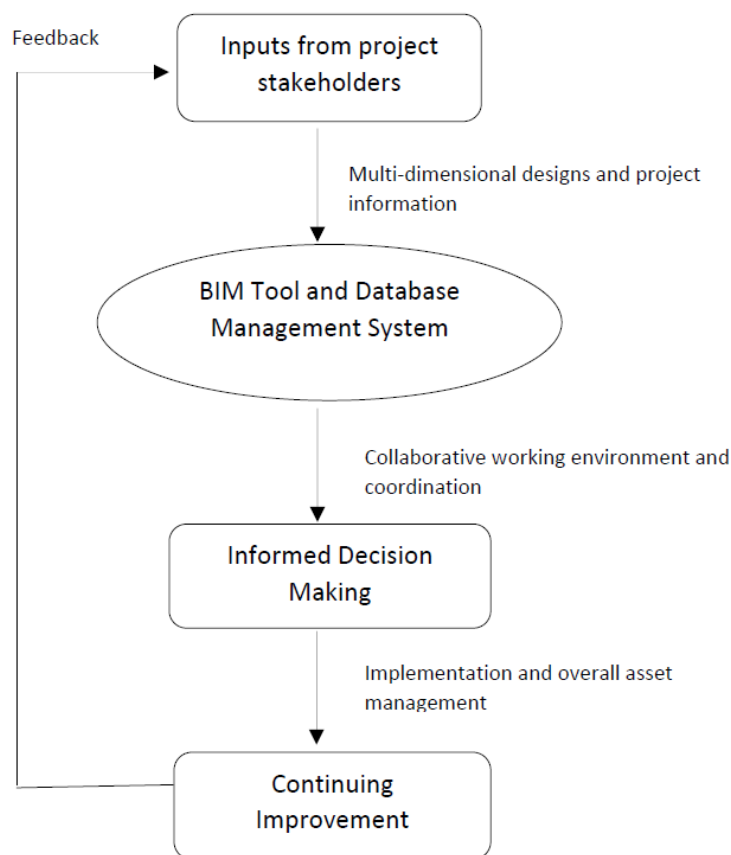

Fig. 5 Integrated Framework of BIM and CRM

The intelligence generation process attempts to convert data that has been amassed into actionable intelligence. BIM has the capability to store massive amount of data in a model. Along with other types of information, a BIM model can include survey information and photo [51]. The collected information from customer can be imbedded in a model which has already stored all information of throughout project life-cycle and makes it much easier for experts of different fields to conduct a comprehensive analysis on them. In order to fulfill the last step of knowledge management, various expert committees can be developed such as architecture, civil, and etc. in order to analyze the customer feedbacks and comments about the related fields. In addition, provided analysis can also be implemented in the model which allows conducting further investigation in the future by means of head or other experts of the company. The knowledge management process is highly dependent upon the technological and human resources of a firm. From the technology aspect, CRM technology provides firms not only with the database technology needed to store vast amounts of customer data, but also the necessary tools to derive and disseminate actionable intelligence from it [52, 53].

5. The Future Challenges & Opportunities

The traditional construction organization is generally preoccupied with day-to-day, operational and short-term matters. Approaches to managing construction have lacked strategic planning at a business level due to the project based nature of the Industry. Senior managers are unable to see beyond the next job. Increasingly there has been recognition that organizations need to focus on the development of a range of services which may be offered to clients including design, construction, operation, facilities management etc. in other words a whole-life management of assets. The CRM approach and technologies would seem to have application in helping to refocus organizations and supporting business and project managers with the data they need.

More collaborative working, especially through widespread use of BIM, and the development and nurturing of long-term relationships between the stakeholders of construction has been seen as the way forward in an Industry plagued with legal disputes, claims and generally dissatisfied stakeholders. More effective collaboration between the business stakeholders and parties of projects would seem to integrate well with the CRM philosophy.

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Recent developments in construction including increased interest in stakeholder management and social responsibility, would suggest that these "extended relationships", (beyond the client and construction team) are increasingly seen as essential in delivering value and successful projects.

Some obstacles to effective implementation may include the following:

- Large quantities of complex data on clients and relationships could be difficult to manage by ill-trained users.
- Unless there is senior management sponsorship and active involvement in CRM it is unlikely to be successful. Relevant stakeholders need to be convinced of the benefits of implementing CRM.
- CRM technologies may only be partially implemented due to managers picking and choosing those interfaces that may appear to be easier to operate etc. Poor usability may be one of the biggest challenges.

A number of questions that deserve further investigation include the following:

- What is the level of awareness and implementation of the CRM philosophy and technologies?
- How widespread are CRM technologies being used by different construction related organizations?
- What benefits and problems have been experienced in implementing CRM in construction business at a strategic and project level?
- Given the increasing use of BIM in the industry, how can CRM be integrated and developed further?
- How can CRM approaches be aligned with management of extended relationships with a broader range of parties of construction businesses and projects?
- What are the characteristics of CRM for the public-private partnership type of client?

6. Conclusions

This review paper has provided an overview of CRM and its applicability in construction. It has highlighted strategic and operational implications, development strategies, critical success factors, challenges and opportunities in its implementation from various perspectives. An integrated framework was formulated between CRM and the current trend of BIM. The paper has also considered a number of areas for further research.

The principles of CRM, taking a bigger world view of "extended relationships" with business and project stakeholders, would seem to fit the overall trends of the construction industry today. At a time of great economic upheaval and high levels of competition, CRM integrated with a whole-life cycle asset approach, collaborative working and more effective stakeholder management may offer a sustainable competitive advantage in the construction marketplace. It would help in dealing with the unfamiliar or new challenges in the current changing working environments.

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