# THE IMPLEMENTATION OF PROFITABILITY DYNAMICS ON CUSTOMER RELATION MANAGEMENT ENABLERS: A SYSTEM DYNAMICS APPROACH

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## Abstract

This research focuses on the profitability through Customer Relationship Management (CRM) enablers in a production firm. The enablers considered for scenario planning are Customer orientation, Customer centric organizational system, and CRM technology. The research methodology used is in accordance to the System Dynamics principles and cybernetics based feedback control system theory. The data is from a production centre manufacturing electronic products.The results have shown that enhancement of Customer orientation rate has a significant increase on Receivable bills and the higher the rate of increase in customer orientation, the higher will be rate of increase of Receivable bills,but it has no significant influence on Net cash flow, Debt payment and Book Value. Customer centric organizational system and CRM technology have moderate effect on these parameters. The managerial implication of the study would be to invest moderately onCRM enablers rate, but have a long term perspective on investment of business performance in terms of profitability enhancement is the focus.

**KeyWords**: Customer Relation Management, Customer centric organizational system, Customer orientation, System dynamics, Customer orientation, Profitability.

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## 1. Introduction

In the knowledge based economy of today, human resources and their intellectual property is considered to be the most precious among all the organizational assets. There are relational assets such as customer relationships, andintellectual assets such as customer preferenceinformation, which if tapped appropriately, can provide a firm with the competitive advantage. This has been realized by both the production as well as service sectors, but not much has been done to study on how thoseresources can be deployed to match market conditions and contribute to firm's performance (Morgan et al., 2009). Firm's performance could be measured in terms of its market standing, new product development, innovation or profitability.Wang and Feng (2012) argue thatpossession of these resources influences the effectiveness of a firm's capabilities to deploythese resources, which in turn might influence firm's performance. Specifically, they have focused on resources such as customer orientation, customer-centricorganizational system and customer relationship management (CRM) technology and how they canbe deployed to foster superior customer relationship management (CRM) capabilitiesand achieve competitive advantages.Even though the research byWang and Feng(2012) has made a very significant contribution in CRM research, it doesn't specifically address the influence of these parameters of interest on firm's profitability issue and this research uses modeling and simulation to study the influence of these parameters on profitability.

## 2. Objectives of the Study

The main objective of the study is to find out the influence of CRM enablers on profitability of a production firm. The sub-objectives to accomplish this are listed below:

- Identify the variables associated with CRM and production dynamics of a firm and develop the causal and stock flow diagrams based on system dynamics principles.
- Conduct experimental simulation runs using the model and analyze the scenario planning outcomes.
- Draw implication for enhancing the profitability of the firm.

## 3. Literature Review

There is a large amount of literature that examines the role of different factors indetermining the performance (Narver et al., 1990;Molyneux and Thornton, 1992; Doyle et al., 1992; Jaworski and Kohli, 1993; Wensley, 1995; Staikouras&Wood, 2003; and Goddard et al., 2004). Performance in general can be measured in different contexts and one of them could be profitability. There are a large number of studies on profitability but majority of them are on banking sector (Smirlock, 1985; Rhoades, 1985; Berger, 1995; and Goddard et al., 2001). Today, Customer-centered IT-driven strategy and Customer Relationship Management (CRM) have been increasingly adopted by various corporations (Bharadwaj et al., 1993; Peppard, 2000; Xu et al., 2002 and Pan et al., 2006), and the firms have started to invest heavily inCRM (Reinartz et al., 2004; and Rigby &Ledingham, 2004).

CRM strategy is implemented in a typical service industry basically in two phases: the phase of integration of functional resources and capabilitiesneeded to innovate its business processes and the phase of integration of human resource and capability tocomplete its mission of transforming itself into a CRM strategy drivenorganization. While the former consists ofintegrations of information resource, analytical capability, and operationalcapability with a concrete base to run an enterprisewideCRM strategy, the latter brings CRM acculturationthat could hardly be accomplished only with those functional resourcesand capabilities, consequently accepting CRM not as a specifictechnology or technique but as a business paradigm in which peopleshould involve (Kim et at., 2010).In the context of overall performance of a production firm following terms govern the financial dynamics.

**Taxable Income**

Taxable income is generally the gross income or adjusted gross income minus any deductions, exemptions or other adjustments that are allowable in that tax year. Taxable income is also generated from appreciated assets that have been sold or capitalized during the year and from dividends and interest income. Income from these sources is generally taxed at a different rate and calculated separately by the tax entity.

**Net Income**

Rees (1999) proved that the relative weight of the equity and net income coefficients vary across the short time span available with increasing emphasis on net income. Abuzayed et al. (2009) have followed the value relevance literature methodology to test for the difference between book and market values using a variety of indicators including net income and its components. They have found that net earnings (and its components) are value relevant and explain the gap between market and book values.

**Net Cash flow**

There are several variations in Cash flow as such and Fernandez (2007) has made comprehensive study using direct cash flow method for valuing companies by adopting different approaches such as equity cash flow, capital cash flow, adjusted present value, business risk adjusted free cash flow and equity cash flow, risk-free rate-adjusted free cash flow and equity cash flow, economic profit, and economic value added (EVA) and concluded that by and large, all these arrive at same value. However, DCF mainly refers to the intangible assets of the organization which is receiving an increasing importance in the current business scenario. Whether to have a single discount rate for a year or a series of discounted rates varying with the number of years is a question that bothers many, and consequently, the researchers have also used probability-based valuation to incorporate the uncertainty element in their study (Schumann 2006). Computer-aided technology has been applied by the companies for using the option pricing models by Monte Carlo and other simulation approaches.

**Debt**

Causholli and Knechel (2011) examined whether high quality audits reduce a firm's cost of debt and observe that effect of auditor quality is larger for firms in the high tech industry sector. There are series of research in this direction focusing on the influence of audit quality on equity (Beatty 1989, Willenborg 1999) and the influence on debt (Mansi et al. 2004, Pittman and Fortin 2004, Fortin and Pittman 2007, and Kim et al. 2011). There is also a stream of debt related study to find out whether investors tend to reward firms that resist the urge to borrow and operate with debt free balance sheet and penalize firms that have high levels of debt. Zaher (2010) has empirically proved that investments in portfolios of debt free firms tend to generate higher returns than investments in their peers of portfolios of leveraged firms over long and short

periods. All these studies have delineated the fact that cost of Debt has an important bearing on profitability, and its dynamics has to be studied, if at all the overall performance has to be increased in a continual basis.

## Book Value

Book value is the value of an asset according to its balance sheet account balance. The value is based on the original cost of the asset less any depreciation, amortization or Impairment costs made against the asset. Book value is its total assets minus intangible assets and liabilities. However, in practice, depending on the source of the calculation, book value may variably include goodwill, intangible assets, or both (Hermanson et al. 1987). Most of the time the fact that the book value can be tangible or intangible is ignored in financial calculations. When intangible assets and goodwill are explicitly excluded, the metric is often specified to be tangible book value. In the current analysis the Book value is taken as new investment minus the Tax depreciation and refers only to the tangibles.

## Customer Relationship Management

Wang and Feng (2012) have identified the antecedents and consequences of CRM capabilities (Figure1). They have proved through their empirical research that these antecedents and consequences of CRM capabilities are interconnected, which means Customer orientation, Customer centric organizational system and CRM technology are positively associated with CRM capabilities, and in turn, CRM capabilities are positively associated with Business performance. The business performance is defined by them as included: Overall performance, Market share, and Sales growth, Profitability, and Customer satisfaction.

The research gap observed is the lack of study on whether in a given environment of service or production would profitability is influenced by CRM enablers. Profitability refers to the potential of a venture (to be started or in the operational state) to be financially successful. If one set of factors considered for analysis is not likely to be successful or has not been successful, it does not necessarily state to abandon the venture. It may instead be feasible to change operational factors such as pricing or costs.There are three basic situations that can describe a business' financial situation, viz., it can be profitable, it can just break even, or it can operate at a loss. In

most cases, an organization's goal is to make a profit and thus the term profitability is an important measure of firm's performance which is the central theme of this research.

**Resources** **Capabilities** **Performance**
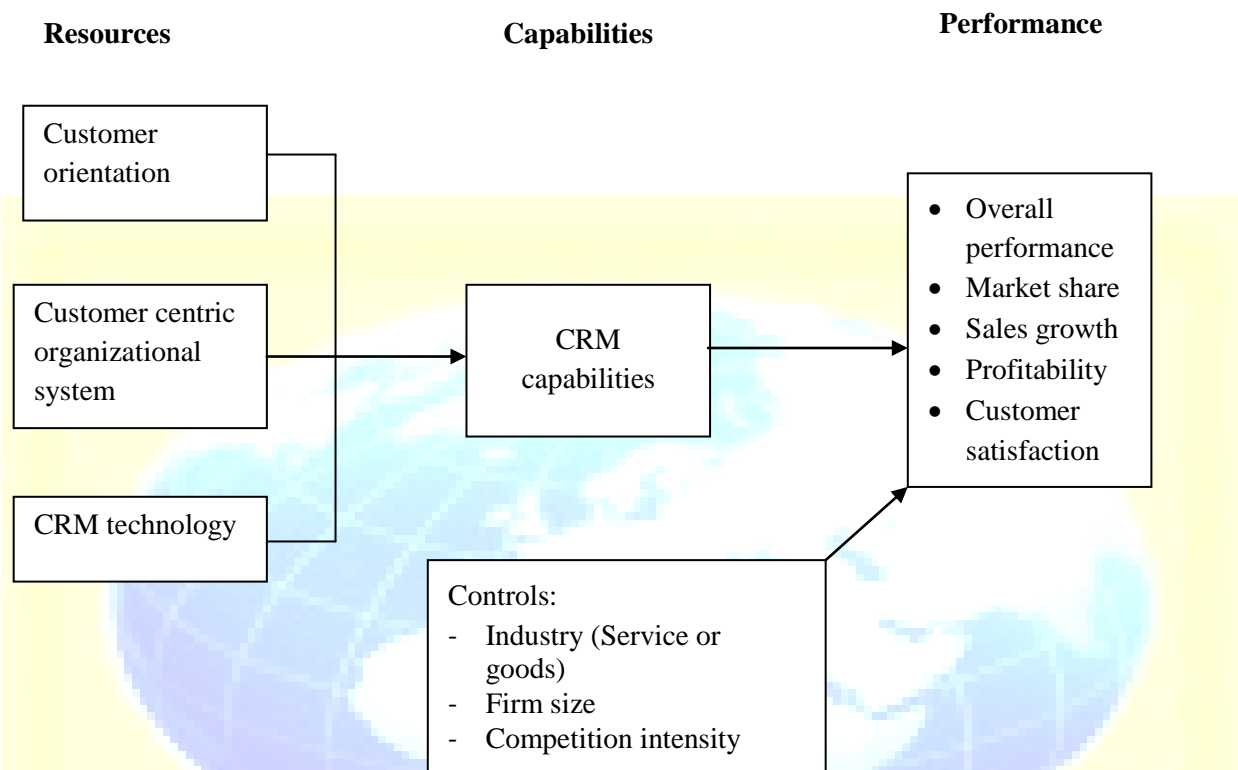


**Figure 1: Antecedents andconsequences of CRMcapabilities (Wang and Feng, 2012)**

Cash flow has an important bearing on profitability. When there is constant or abundant cash flow, it can be difficult to determine profitability. It is easy for a person to make the mistake of linking numerous incoming and outgoing transactions with profit. Spending and receiving money, however, does not mean a business is in a healthy financial state.To determine profitability, it is necessary to access the price of the goods or services being offered. There are several things that need to be considered when prices are established. This includes variable costs such as fuel, labour, and inventory, and it also includes fixed costssuch as mortgage, repairs, and taxes. So, a model which establishes the dynamic relationship between these variables would be very useful in studying the influence of various parameters on profitability.

One measure of profitability is though Profitability index (PI), also known as profit investment ratio (PIR) and value investment ratio (VIR), which is the ratio of present value of future cash flows to the initial investment. Hence, profitability is directly proportional to the cash flow in an organization. This research is an attempt to study the influence of CRM enablers on the profitability of a production firm in terms of the parameters discussed in this section.

## 4. Research Methodology and Model Development

In this paper, the principles of cybernetics as proposed by Wiener (1948) and Ashby (1957) and the System Dynamics (SD) methodology proposed by Forrester (1961), which have been applied by various researchers (Coyle 1977, Mohapatra et al. 1994, Morecroft 1999, Jessen 1990; Reichelt 1990, Richardson and Pugh 1981) in different problem situations was used in developing causal loop diagrams, flow diagrams, and the governing equations. The key steps in the methodology of this paper include: problem identification, cybernetics, model formulation, simulation and validation, and policy analysis and improvement (Sterman, 2000).

The model considers Customer orientation, Customer centric organizational system and CRM technology as the enablers of CRM, which have bearing on the profitability of the firm.The dependency diagram shows the antecedents of CRM capabilities (Figure 2).

Technology orientation rate-----CRM technology

Customer orientation rate-----Customer orientation

System enhancement rate-------Customer centric organizational system
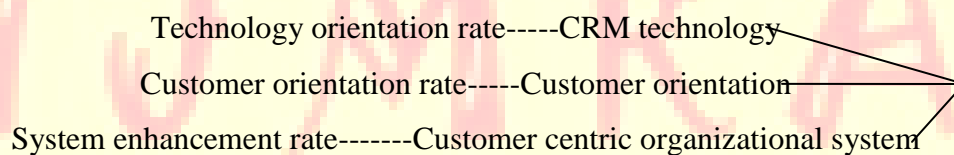
**Figure 2: Antecedents of CRM capabilities**

The system dynamics modelling scenario chosen in this analysis is that of a hypothetical electronic system manufacturer who aims at an expected annual production of about 8000 units in the next five years from a current production of about 1100 units.Revenue for the manufacturer is basically through the production sales. Unit price of sales (US$) is taken for convenience as the simulation figures may be multiplied by the selling price for realistic values. The dynamics involved considersReceivable bills and Pending bills the difference of which is

actual Billings. Variable cost per unit is assumed to be about 60% of the unit selling price. Pending bills will be the actual billing minus the production revenue and Receivable bills is the Billings minus the sum of the receivable cash and losses (with a loss rate of about 6%). The rate of Receivable cash is calculated in terms of the payment delay which is considered slightly over a month. The stock and flow diagram (Figure 3) indicates the interrelationship between the variables of research interest.Some key formulae used in modelling are as follows:

Taxable income = Gross income – (Variable costs + Losses + Interest payments +

Tax Depreciation).

Net income = Taxable income – Taxes.

Net cash flow = Receivable cash + Loans – (New investment + Variable costs + Interest payments + Repayment rate + Taxes).

Debt = Loans - Repayment rate.

Book value = New investment - Tax depreciation.

The enablers of CRM capabilities are governed by the rate at which the organization is adopting towards the customer orientation through training programmes, augmentation of technology to support CRM and the systems to make the organization customer-centric.
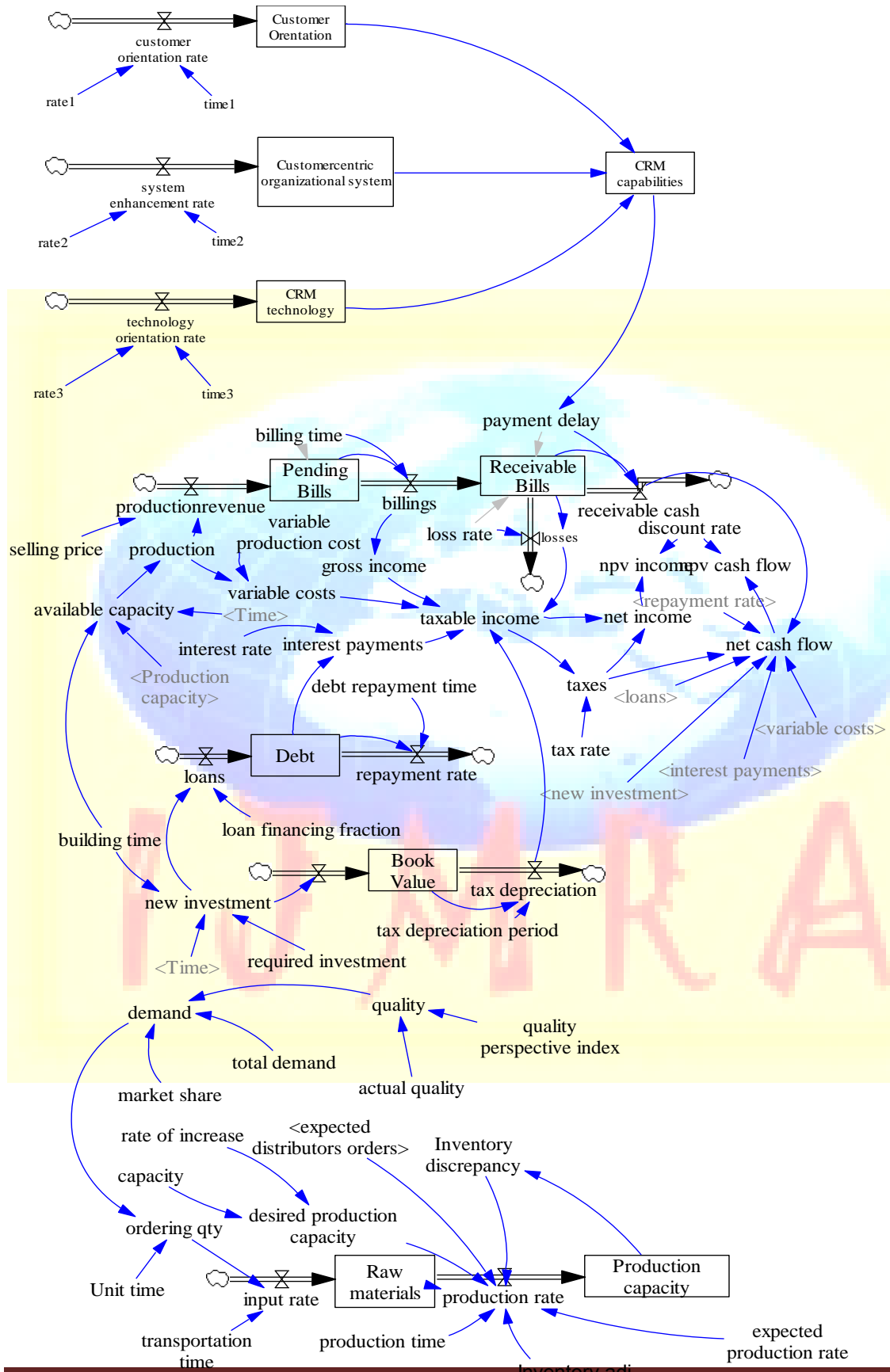
**Figure 3: The stock and flow model of CRM enablers**

## 5. Simulation and Sensitivity Analysis

The scenarios planned for analysis are given in table 1. It is assumed that all the three enablers of CRM can be improved at a rate of increase of up to 80% per year. Modelling and simulation has been carried out suing Vensim™.

**Table 1: Multiple scenario planning and experiments**

|  | Customer orientation rate | System enhancement rate | Technology orientation rate |
|---|---|---|---|
| Scenario 1 | 0.2 to 0.8 | 0.1 | 0.1 |
| Scenario 2 | 0.1 | 0.2 to 0.8 | 0.1 |
| Scenario 3 | 0.1 | 0.1 | 0.2 to 0.8 |

**Customer orientation rate**

Firm can improve the customer orientation by taking acapability view of CRM, developing a valid measurement model of CRM capabilitiesand identifying key resources that are essential to build superior CRM capabilities. It can use the valid metric to collect the information regarding customer satisfaction level and train the human resources for the required competencies so that the tangibles, intangibles, responsiveness, empathy etc. Customer interactionmanagement which includes: customer identification, customer acquisition and customerretention, customer relationship upgrading that includes cross-selling and up-selling, andcustomer relationship win-back that includes re-establishing relationships with lost but profitablecustomers (Wang and Feng, 2012), can also be introduced.The rate at which the firm trains its human resources can be improved from 20 to 80% on yearly basis.

**Customer-centric organizational system**

The firm can adopt the resource-based view by examining empiricallyhow possession of CRM enablers in terms of the right kind of systems. Systems perspective has yielded tremendous results both in service and manufacturing sectors. The entire organization can be considered as a system with inflows and outflow of materials and information. The systems perspective can be introduced department wise or organization wise. Depending upon the resources and expertise

available the rate of adoption of systems approach can also be increased from 20 to 80% on yearly basis.

**CRM technology orientation rate**

This mainly includes information technology (IT) that enables customerinformation acquisitions and analysis.It includes front office applications thatmay support sales, marketing, and service; a data storage and back office applicationsthat may integrate and analyze data about customers. Thus CRM technology mayimprove an organization's ability to sustain profitable customer relationships bygathering and analyzing information about profitable customers, facilitating moreefficient and effective firm-customer interactions, and streamlining product or servicecustomization(Wang and Feng, 2012).The firm may augment the technology in a phased manner depending upon the need and urgency. So, the rate at which this is done can again increase from 20 to 80% per year.

## 6. Results, Discussions and Conclusions

**Receivable Bills**

It can be observed that among the three CRM enablers (Figure4), Customer orientation rate has the highest influence and CRM technology has the least influence. In a span of five years starting from the first year of operation, the receivable bills collection rate increases from US $ 2027 to US $ 3852 when the rate of Customer orientation is increased from 20 to 80%, which means an increase of as high as 90% in Receivable bills can be achieved by this enabler.

**Net Cash Flow (NCF)**

Initially it appears as if there is no considerable change in the three scenarios as far as the NCF is concerned and all the graphs merge and increase exponentially. However, in the scenario 1, under both the extreme values the NCF shows a peculiar behaviour and for a stable NCF 60% rate of increase in Customer orientation rate is recommended. It should be noted that due to the debt, the NCF in the initial years runs negative and it takes about one and a half years to break

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even and later if a 20% increase in Customer orientation rate is adopted the value increases to about US $ 580.

## Debt and Book Value

It can be observed that (Figure 5&6) after the first year of operation the debt will be uniformly reduced in a non-linear pattern and reduces to about 27% by the fifth year of operation. Similar trend can also be observed in the Book value of the company and it reduces to about 64% of the value by the fifth year.

Thus, it can be concluded that the CRM enablers have major impact on Receivable bills but do not have a very significant influence on other financial figures. Some earlier studies by Reinartz et al., 2004 claim that approximately seventy per cent of CRMprojects fail to achieve expected bottom-line improvement in business performance despite the fact that billions of dollars are spend on CRM enablers. The reason could be that these activities may contribute only to the Receivable bills but the net cash flow is a function of several other variables and so is the case with the Book value of the company.

This research has opened a new direction of using systems concept in CRM to enhance profitability. The results are applicable to the production industry and cannot be generalized completely into either manufacturing as a whole or could be extended to service organizations. But the model can be replicated into these environments with minor changes in the dependence diagram. The study also opens a wide scope for future researchers to focus on other dimensions of organizational performance such as Market share, Sales growth, Customer satisfaction and the Overall performance of business in addition to Profitability which was the focus of this research.

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Scenario - 1
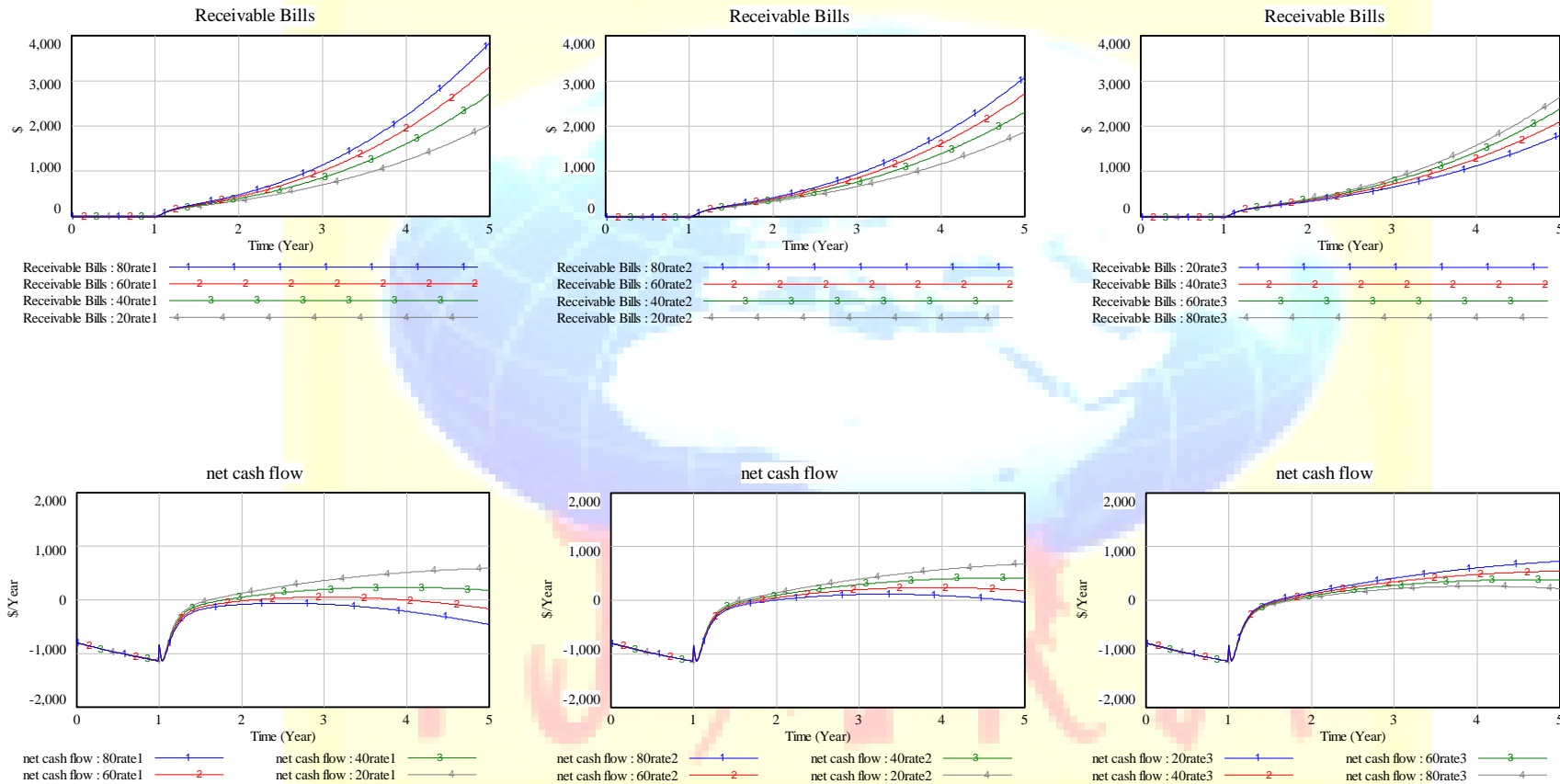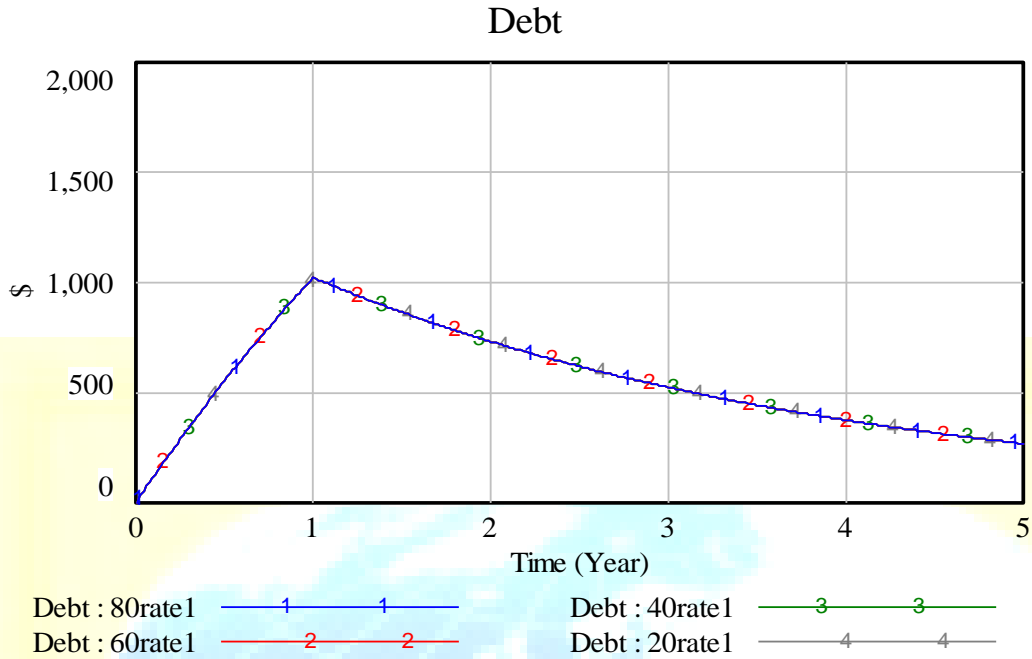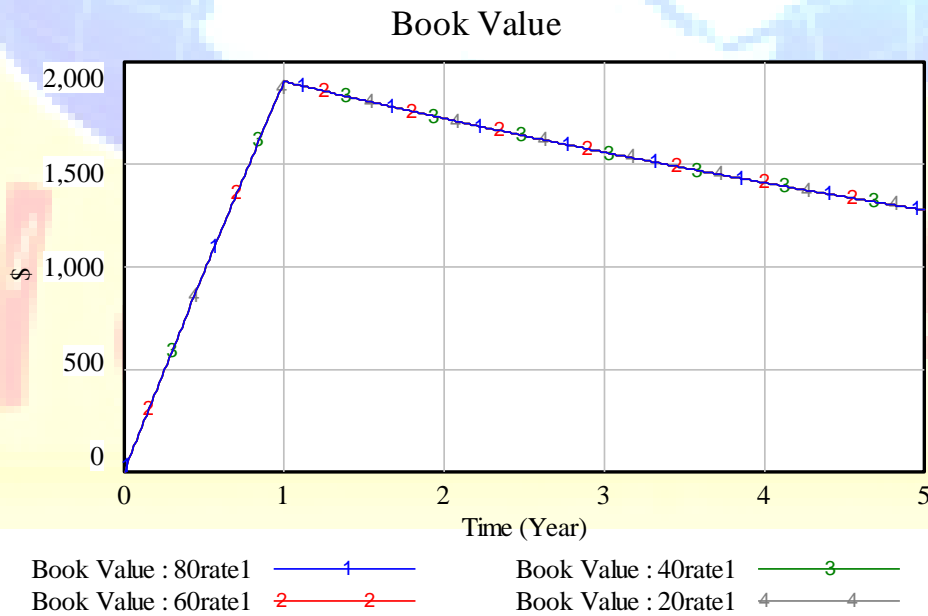
Scenario - 2

Scenario - 3



**Figure 4: Influence of CRM enablers on Receivable Bills and Net cash flow**

Debt



**Figure 5: Influence of CRM enablers on Debt**

Book Value



**Figure 6: Influence of CRM enablers on Book Value**

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