Measuring System Performance of an ERP-Based Supply Chain

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Abstract

Metrics, the process for capturing, measuring, reporting, and assessing performance of activities, has received attention recently. The development of a metric approach to identifying potential operational problems becomes very important, especially for popular enterprise systems. The purpose of this paper is to consider an integrated method, total-related-cost measurement, to evaluate the performance of a three-echelon enterprise resource planning (ERP) based supply chain system. To establish the validity of this integrated method, a simulation experiment is conducted to see whether this total cost approach is responsive to such variations in operating environments as lead time variation or cost structure differentiation. Research results show that the performance of an ERPbased supply chain is significantly affected by the lotsizing rule selected. We provide a general guideline to establish such an integrated performance measurement for ERP-based supply chain operators to better capture the system performance attributed to the use of ERP.

1. Introduction

As enterprise resource planning (ERP) becomes popular, software vendors keep adding management modules to ERP. A virtual supply chain can now be established to implement a broader scope of ERP through the Internet. Incorporating ERP in supply chain management is supposed to further enhance the effectiveness of delivery scheduling, inventory control, and transportation modal planning and hence increase distribution productivity among channel members. Successful implementation of ERP has been publicized by such software vendors as SAP, J.D. Edward, Baan, and Oracle. However, Sodhi (2001) recently criticized that the current practice of ERP is limited to transaction processing rather than planning in enterprise systems. Also, there are nightmarish tales regarding the failures of ERP applications such as the widely-reported snuffs of Nike and Cisco.

Although successful users enjoy considerable cost savings, it is actually very difficult to quantify all the benefits, tangible or intangible, of implementing this enterprise system. An appropriate measurement of ERPbased supply chain is needed to better understand these mixed results. Metrics, the process for capturing, measuring, reporting, and assessing performance of activities, has received attention recently. The emergence of new approaches that emphasize the use of metrics as predictive indicators of problems, rather than as an outcome, has contributed to the research interest in this area. The major purpose of this paper is to propose an integrated approach to measuring the system performance of a three-echelon ERP-based supply chain system. To establish the validity of this integrated method, a simulation experiment is conducted to see whether this total cost approach is responsive to such variations in operating environments as lead time variation or cost structure differentiation. We will provide a general guideline to establish such an integrated performance measurement for ERP-based supply chain operators. It should also help ERP users cope with adopting this integrated approach under various operating environments. Attempts to answer the following research questions should enhance the understanding of performance measurement problems in ERP-based supply chains.

- 1. How can an ERP-based supply chain system be measured in a more comprehensive manner?
- 2. Given different degrees of variability in delivery time and cost structures in supply chains, how does an ERP system with the use of a certain lot-sizing rule respond to lead time uncertainty or cost structures in terms of this proposed integrated metric?
- 3. Given a different configuration in the supply chain, how does the variation in delivery time affect the system performance of an ERP-based supply chain?

The related studies in ERP-based supply chains are briefly reviewed next. The rationale of the proposed integrated approach is then discussed. The environmental variables examined in the simulation experiment are defined along with the description of the simulation model. After the major hypotheses are stated, the research result is presented. The major findings, including guidelines for implementing the total cost approach, are summarized in the conclusion.

2. Related Research

A supply chain can be simply defined as the inclusion of manufacturers, suppliers, transporters, warehouses, retailers, and customers to fulfill a customer request (Chopra and Meindl 2001). Due to the changing technological environment, supply chain management (SCM) faces new levels of complexity. The significance of the interaction between the supply chain function and other organizational functions has been long recognized (Bowersox 1974).

Advances in information processing and computer technology have brought about the development of numerous practical planning models for managing a supply chain system. Distribution requirements planning (DRP) is a notable one but has not been adopted widely due to the size and complexity of supply chains (Masters, Allenby, LaLonde, and Maltz 1992). Just like material requirements planning (MRP), the origin of ERP, practitioners are ahead of academicians in the design, development, and deployment of ERP systems. In the early stage of developing MRP, several well-known practitioners such as Orlicky, Wright, and Plossl contributed to the wealth of technical and practical aspects of implementing MRP systems. Now ERP had become a comprehensive planning mechanism in supply chain operations. An ERP-based supply chain can attain most of the advantages of MRP and DRP by incorporating the modules of MRP and DRP. Nevertheless, ERP practitioners focus on trumpeting the major benefits of implementing ERP systems (Atkinson 2001, Campbell 2001, Stevens 2001).

Geoffrion and Krishnan (2001) recently considered supply chain operation as one e-business area in which operations research models can be applied. Sodhi (2001) then suggested that optimization modeling could be an important part in Internet-enabled supply chains. He illustrated a supply chain for an electronic firm that utilizes an optimization-based planning module in their supply chain system. Kreskinocak and Tayur (2001) identified three components in a supply chain: sourcing or procurement, manufacturing and distribution, and inventory disposal. Then they maintained that collaborative supply chain management could make the dream of virtual integration of supply chain members into a reality.

Cooper, Lambert, and Pagh (1997) provided a comprehensive overview of SCM. Lee pioneered several important studies to revive research interest in supply chain operations in the early 1990s. Lee and Billington (1992) first identified the pitfalls and opportunities in managing inventories in supply chains. Then Lee and Billington (1995) utilized a Hewlett-Packard (HP) case to develop an initial analytical model to examine the material flows in a decentralized supply chain. Later, Lee, Padmanabhan, and Whang (1997) dealt with an information distortion problem, termed "the bullwhip effect," in a supply chain. They also analyzed four sources of the bullwhip effect and proposed methods to mitigate the detrimental impact of information distortion. Lee and Whang (1999) then pointed out a problem in which individual supply chain members attempt to optimize their own performance metric at the expense of overall system performance. They discussed alternative performance mechanisms that consider cost conservation, incentive compatibility, and information decentralization. Recently, Lee, So, and Tang (2000) tackled the issue of the value of information sharing in a two-level supply chain. They found that the value of information sharing in demand requirements can be high when demands are significantly correlated over time.

Cachon and Lariviere (1999a) took a different approach, game theory, to comparing two different inventory policies in terms of total supply chain costs in a two-stage serial supply chain. Cachon (1999) examined the demand variability and retailers ordering policies in a supply chain involving a supply and N retailers. He found that reducing supplier demand variability, leading to lower inventory with scheduled ordering policies, can reduce total supply chain cost. Shortly after, Cachon and Lariviere (1999b) considered two ordering tactics, manipulable and truth-inducing mechanisms, by retailers to a single supplier that involved the potential information distortions in an information-sharing supply chain.

Chen (1999) considered the delay in information and material flows in a supply chain in which all channel members are affiliated with the same company. Baiman, Fischer, and Rajan (2001) studied the relationship between product architecture, supply chain performance metrics, and supply chain efficiency. Chen, Federgruen and Zheng (2001) recently considered a similar comprehensive measurement, total profit, to advocated coordination mechanisms for a two-level decentralized supply chain. They showed that the channel wide optimal profits can be achieved by periodically charged fixed fees and a nontraditional discount pricing scheme in a decentralized system. Corbett and DeCroix (2001) considered a similar comprehensive measurement, joint profit, to analyze several "shared-savings" contracts currently in use for such indirect materials as chemicals purchasing.

It should be noted that SCM is not synonymous with ERP. ERP is just a part of SCM technologies. There are alternative methods, such as optimization models suggested in Sodhi (2001), to deal with operational scheduling and inventory control in supply chains. However, the relative lack of academic research in ERP does not mean a shortage of interest or no need to examine ERP systems. Actually, ERP inherits most operational problems associated with MRP and DRP. For example, the recent surprise of \$2.2 billion of inventory write-off by Cisco System can be attributed to a major forecast error made by their top management in their highly touted supply chain operations.

In this paper, we study one of the operational problems in an ERP-based supply chain - the measurement of system performance. The total-cost approach has long been advocated in theories of system management. Numerous MRP- or DRP-related studies adopted this integrated method to measure system performance. Most comparative lot-sizing studies in MRP focus on the total cost that typically consists of carrying cost and set-up cost (e.g., Kaiman 1969; Berry 1972; Biggs 1979; Wemmerlov and Whybark 1984; Veral and LaForge 1985). Grasso and Taylor (1984) investigated supply/ timing uncertainty in MRP systems measured by total cost including carrying cost and lateness cost. Bookbinder and Koch (1988) conducted the first systematic study to evaluate DRP performance, measured by the sum of inventory carrying cost and set-up cost, in selecting lot-sizing rules in a multi-level DRP environment. Ho (1994) evaluated the impact of frequent engineering changes on MRP system performance in terms of total related cost. Among the SCM-related papers, some forms of integrated approach are advocated to measure the overall performance of supply chain operations (Cachon and Zipkin 1999; Chen, Federgruen and Zheng 2001; Corbett and DeCroix 2001; Lee and Whang 1999).

Using a survey, Stank, Keller, and Daugherty (2001) developed and tested several qualitative performance measures to examine the relationship between supply chain collaboration and logistics performance. We propose a quantitatively comprehensive measure to evaluate the system performance of an ERP-based supply chain system. This metric is expected to help ERP users better gauge the performance of an entire supply chain. We extend the current studies to the following directions.

- 1. Consider an integrated metric to measure the performance of a realistic multi-echelon ERP-based supply chain that extends the total supply chain costs suggested by Cachon and Zipkin (1999) and Chen, Federgruen and Zheng (2001).
- 2. Conduct a large-scale simulation to test validity of this integrated approach. We will first examine how this comprehensive metric responds to uncertainty existing in operating environments. A sensitivity analysis is then used to see how the initial simulation results hold up if some important variables, such as different supply chain infrastructure or different length of delivery lead time, are changed.

3. Integrated Approach

An ERP-based supply chain is illustrated in Figure 1 in which several ERP modules (in the shaded box) are tied to the overall planning (strategic planning, tactical planning, operational planning, and execution) in enterprise systems. It should be noted that customers are an integral part of a supply chain. Also, there are methods to handle inventories throughout the supply chain. MRP/DRP is the model considered in this paper. Alternatively, Sodhi (2001) suggested an optimization-based advanced planning and scheduling model to deal with inventory control and order processing. Furthermore, capacity-planning modules may include requirements resource planning, rough cut capacity planning, and capacity requirement planning to assure sufficient capacity to support the demand forecast.



Figure 1. ERP-Based Supply Chain System

In this paper, we suggest an integrated method, in the form of total related cost (TRC), to better capture the system performance attributed to the use of ERP for the entire supply chain. The development of this total-cost approach is inspired by the criticism made by Lee and Whang (1999) that individual supply chain members attempt to optimize their own performance metric at the expense of overall system performance. The study of metric performance of supply chains has been receiving attention recently. Cachon and Zipkin (1999) also considered total supply chain costs to compare two inventory policies in a two-state serial supply chain. With this coordinated approach, the conflicts among different functional areas or different business entities within the supply chain can be avoided. Chen, Federgruen and Zheng (2001) recently considered a similar comprehensive measurement, total profit, to advocate coordination mechanisms for a two-level decentralized supply chain. Corbett and DeCroix (2001) considered a similar measurement, joint profit, to analyze several shared-savings contracts. For instance, the controversy of who should keep inventories among the supply chain members can be resolved objectively. After carefully considering tradeoffs involved, the acceptable metrics will be communicated to all the departments involved or even channel members belonging to different companies in order to achieve the mutually agreed-upon goals.

Furthermore, organizational conflicts may result when DRP is used as the delivery scheduling method. In many firms, reducing transportation cost by consolidating to a full truck-load, for example, could lead to an increase in inventory and a decrease in customer service level. In other supply chain systems, vendors are forced to keep inventories while buyers are free of inventories. Therefore, in a comprehensive supply chain system with DRP, linkages across function boundaries are encouraged, but organizational support and evaluation procedures need to be established so as to minimize suboptimization of the overall organization objective. Another solution suggested by Vollmann, Berry, and Whybark (1988) for implementing DRP is to train logistics planners who are responsible for checking feasibility of changes, monitoring data integrity, assessing the impact of new situations, and using optimizing decision support systems to handle exceptional situations.

3.1 Total Related Cost

Initial MRP research, mainly in the lot-sizing area, evaluated system performance by inventory carrying and set-up cost (Berry 1972). Subsequent studies extended the performance measures to include stockout cost (Collier 1980), means and variances of lead time errors (Collier 1982), and variability in capacity loading (Veral and LaForge 1985).

A major function for any MRP or DRP system is to deal with the adjustment of open order priorities. This capability, known as rescheduling, can affect the open order priority in terms of rescheduling in, out, or canceling the order. The problem occurs, however, when these rescheduling actions begin to disrupt production scheduling so frequently that the operation system is unable to react. These disruptions can occur as a result of the frequency of these messages generated, the volume of messages generated, or the magnitude of actions required to implement these changes. The rescheduling cost is considered to capture the schedule disruptions in this integrated measure.

Thus, this paper measures the system performance of ERP-based supply chain systems in terms of the TRC, including the rescheduling cost as well as carrying and ordering costs as shown in the following equation. This aggregate measure is used to evaluate the overall performance of ERP-based supply chain systems.

$$TRC = \sum_{i} \sum_{j} H_{ij} + \sum_{i} \sum_{j} S_{ij} + \alpha * \left(\sum_{i} \sum_{j} WR_{ij} \right)$$
(1)

where:

- H_{ij} =carrying cost for the *i*th inventory item in the *j*th period;
- S_{ij} =ordering cost for the *i*th inventory item in the *j*th period;
- WR_{ij} =weighted rescheduling measure for the *i*th item in the *j*th period; and
 - α =weighting factor for rescheduling cost, which is set at \$0.001.

The third component in equation (1) is the rescheduling cost involving the calculation of the weighted rescheduling measure (WR_{ij}), which is explained as follows. In many situations, the number of rescheduling messages may not reflect the actual disruptions. For instance, rescheduling an open order of 500 units for three weeks should be much more difficult than rescheduling an open order of 10 units for one week. Therefore, a weighted value of the number of rescheduling messages generated, which better measures the interruption, can be computed as follows:

where:

$$WR_{ij} = Q_{ij} * NDD_{ij} - ODD_{ij}$$
(2)

- Q_{ij} = the order quantity of the open order of item *i* in the *i*th period to be rescheduled,
- ODD_{ij} = the original due date of item *i* in the *j*th period, and

 NDD_{ij} = the new due date of item *i* in the *j*th period.

Quantity changes in open orders are excluded from the calculation of WR_{ij} . Ho, Carter, Melnyk, and Narasimhan (1986) maintained that quantity changes in open orders should be avoided, if at all possible, because they can easily be handled by rescheduling open orders. Otherwise, the system would be flooded with rescheduled orders with small lot sizes, which would make an MRP system extremely nervous.

Note that shortage cost is not considered in the total cost because rescheduling or expediting is used to achieve a nearly 100 percent service level. Rescheduling cost is the cost trade-off to obtain this service level. Thus, rescheduling cost can be viewed as the cost penalty for expediting orders. That is, the cost of adjusting available capacity due to rescheduling is considered in the cost penalty and can be viewed as a surrogate measure of shortage cost. Furthermore, the weighting factor has been shown to be robust in the measurement of MRP system performance (Ho 1995). Therefore, the value of is set at reasonable level of \$0.001 in this simulation study.

The first two cost components, carrying cost and ordering cost, are self-explanatory. However, carrying costs are considered in a more realistic manner. The value-added factor affects the way item costs are computed as the materials are shipped to lower-echelon supply chain members. Essentially, the value-added factor can be viewed as the transportation cost and material handling cost incurred between supply chain participants. The full value-added approach discussed in Collier (1982) is used to determine the costs incurred at each level in the distribution network in this study. It is assumed that the item shipped from the plant to the warehouses is valued at a nominal unit cost of \$1. Then, three levels of value-added factor (0.05, 0.1, and 0.2) are randomly chosen to determine item costs as shown in Equation (3).

where:

- $C_{j+l} = C_j * (1 +) \tag{3}$
- C_j = the item cost of the channel member at the *j*th level; and
- α = the value-added factor, randomly selected from 0.05, 0.1, and 0.2.

3.1 Illustration of TRC Approach

A three-echelon supply chain system is used to demonstrate the evaluation of an ERP-based supply chain by TRC. Suppose that there are three distribution centers (DC), two warehouses (W), and a plant (P) in this supply chain. We will consider the TRC for the entire supply chain, that is, to keep track of carrying cost, ordering cost, and rescheduling cost incurred at every echelon in the supply chain. The implementation of this total-cost approach is made possible by the recent development of Internet-enabled ERP software. It was a major problem to collect cost data for all levels in the supply chain for most companies with few exceptions of companies such as Wal-Mart using electronic data interchange (EDI) systems. With ERP software by most vendors and prevailing cooperative atmosphere in supply chains, the reporting of cost data becomes more transparent than ever even for different business organizations within the supply chain. There is no doubt that some obstacles still exist, but the cost "transparency" within supply chains has been greatly improved. It is important to take advantages of this overall view to evaluate the entire supply chain, not just a myopic snapshot of a single business unit at a certain level of the supply chain.

Another major advantage of using this comprehensive measurement is to avoid the current practice in which vendors are forced to hold inventories while buyers are bragging about their zero-inventory just-in-time (JIT) systems. Furthermore, rescheduling costs are assessed at any level so long as rescheduling of open orders is necessary. Rescheduling costs can be viewed as the trade-offs of responding to uncertain events occurring within the supply chain. Therefore, the TRC is aggregated to measure the performance for the entire supply chain.

4. Research Design

Adopting the total-cost evaluation criterion, simulation experiments were constructed to examine the impacts of operating environments on the system performance of ERP-based supply chain systems under the operating environments characterized by lead time uncertainty and cost parameters. There were two types of simulation experiments, the base experiment and the validation experiment (Schmitt 1984). A base simulation experiment was designed to achieve the research objectives defined previously. Due to the exploratory nature, a full factorial design was used in the base experiment. Separate sets of validation experiments were also conducted to see how sensitive the results were as obtained by the base experiment responding to the changes in such parameters as the configuration of logistics network, the length of delivery lead time, or cost structures. The factors used in the base experiment and the validation experiment are given in Table 1.

Table 1. Experimental Factors

Base Experiment

Experimental Factors:

Lead time uncertainty (LTU)

Normal distribution with $C_v = 0.2, 0.5, and 0.8$

Lot-sizing rule (LS)

Lot-for-lot (LFL) Economic order quantity (EOQ) Part-period balancing with look-forward/look-backward feature (PPB) Least total cost (LTC) Silver-Meal discrete heuristic method (SM)

Cost Structure ratio (CR)

Ordering/Carrying cost ratios (100:1, 300:1 and 500:1)

Validation Experiment

Length of planned lead time

Supply chain structure

Value-added factor

4.1 Experimental Factors for Base Experiment

FACTOR 1: Lead Time Uncertainty (LTU), defined by the coefficient of variation (C_{ν}) of the deviation of "Actual Lead Time" (ALT) from "Planned Lead Time" (PLT). In our simulations the ALTs are generated as

ALT = PLT *
$$(1 + r C_v)$$
, where $r N(0,1)$ is a
standard normal variate. (4)

Levels of C_v considered in this study are 0.2, 0.5, and 0.8. (In the rare occasions where ALT < 0, we set ALT =

0). Schmitt (1984) used similar C_v s to specify uncertainty levels. Although uncertainties in lead time and demand are still two important variables within the supply chain systems, logistics professionals lately utilize quick response technologies to deal with uncertain events in their operating environments. It is important, however, to examine the effect of this factor that causes schedule instability in ERP-based supply chain systems.

FACTOR 2: Lot-Sizing Rule (LS). Five lot-sizing rules are considered here:

- (1) lot-for-lot (LFL);
- (2) economic order quantity (EOQ), which releases multiples of selected EOQ values;
- (3) part-period balancing (PPB) with look-forward/ look-back feature;
- (4) least total cost (LTC); and
- (5)Silver-Meal discrete lot-sizing heuristic (SM).

Lot-sizing rule is the parameter that must be selected in the MRP or DRP module in ERP-based supply chain systems. These five rules are selected because they are commonly tested in comparative lot-sizing studies (Veral and LaForge 1985). A detailed description of these rules can be found in some past lot-sizing research (e.g., Collier 1980, Wemmerlov and Whybark 1984). There are two distinctive types of lot-sizing rules. No carrying cost is associated with LFL, while carrying cost and setup cost are considered in the other lot-sizing rules. Therefore, LFL is commonly used in most MRP systems due to its JIT nature. Thus, it should be interesting to see how LFL fares with other cost-related lot-sizing rules. Since the intent of this study is not to compare the performance of various lot-sizing rules, some of well-known lot-sizing rules, such as the simple incremental rule (Veral and LaForge 1985), were not included. Therefore, we can view any lot-sizing rule referred in the remainder of this paper as an ERP-based supply chain in which the lot-sizing rule is selected for the DRP system adopted.

FACTOR 3: The Inventory Items' Ordering/Carrying Cost Structure Ratio (CR). This ratio is considered in three levels: 100:1, 300:1, and 500:1. The carrying cost is expressed in \$/unit/period. These levels fall within the range of cost ratio used in earlier lot-sizing studies (e.g., Collier 1980, Veral and LaForge 1985) that demonstrated the relevance of this ratio in studying MRP lot-sizing performance.

A full factorial design is used in the base experiment to study the effects of the environmental factors on the system performance of the ERP-based supply chain, hence 45 environments (3 C_v -levels of lead time uncertainty x 5 lot-sizing rules x 3 cost structure ratios) for ERP-based supply chains using a DRP system are simulated.

4.2 Validation Experiments

Relative to the base experiment, the validation experiment involves a different configuration of the supply chain, longer delivery lead time, and different combinations of the value-added factor. Figure 2 depicts the distribution networks used in the base experiment and the validation experiment. The delivery lead times used in the validation experiment double those considered in the base experiment. The length of planned lead time determines the "rescheduling window," which is the time span in which an open order is subject to rescheduling. A wider rescheduling window means more open orders on the shop floor and magnification of the effect of fluctuating lead times. Five combinations of the cost structure are used in the base and validation experiments. The value-added factors are randomly chosen.



Figure 2. Structures of Supply Chain Used in Simulation Experiments

4.3 Experimental Assumptions and Procedure

In addition to varying several factors described previously, there are important factors that are held constant in the experiments. The following assumptions are made in this simulation study:

- 1. The demand at the distribution center level is normally distributed with a mean of 100 units and a standard deviation of 80 units. The variability ensures a lumpy demand pattern.
- 2. There are no trend, seasonal, or cyclical patterns in the demand requirements.
- 3. There is no safety stock or safety lead time for any channel member.
- 4. There is no beginning inventory for all the channel members from the outset of the simulation. That is, the system starts with an "empty and idle" condition.
- 5. The weekly regenerative DRP system is used in the ERP-based supply chain system.
- 6. The inventory carrying cost is set at 20% of the item cost per year.
- 7. The rescheduling cost is assessed at \$0.001 of the weighted rescheduling measure. As mentioned earlier, the weighting factor has been shown to be robust to the MRP system performance (Ho 1995).

The purpose for making these assumptions is to isolate performance differences between simulation experiments to the particular factor being varied. The simulation starts with the update of aggregating retailers' or customers' demand requirements. The variations in delivery lead time are simulated as a random generation of actual lead times. After the rescheduling logic is applied, rescheduling messages are then generated when the weekly regenerative DRP system is replanned. These rescheduling messages may recommend to move in or move out the due dates of an open order or even cancel the open order. Then, these rescheduling messages should be implemented to meet the revised due dates that lead to the determination of rescheduling costs. The aggregate performance measure, TRC, is collected for the weekly operation for the entire supply chain. The simulation experiment is repeated for the run length. The entire operation is replicated for each combination discussed in the factorial design.

Before the experiment is undertaken, the length of a transient period, the run length, and the number of observations per cell are determined by the pilot studies. Based on the result of the preliminary run, a sample size of five appears to be adequate. After examining plots over time of the differences in terms of the TRC, a run length of 300 weeks and an initialization period of 30 weeks seem to be appropriate.

4.4 Hypothesis Testing

In order to achieve the research objectives defined previously, the hypotheses are stated as follows. Briefly, the first hypothesis examines the main effect of adopting a lot-sizing rule that can be used in an ERP-based supply chain. The remaining hypotheses investigate the interaction effects among experimental factors on the system performance.

<u>Hypothesis 1</u>: For any given operating environment tested, there is no significant performance difference among supply chains using different lot-sizing rules.

<u>Hypothesis 2</u>: There is no significant difference in the system performance of an ERP-based supply chain system using a certain lot-sizing rule as measured by TRC among the individual levels of lead time uncertainty.

<u>Hypothesis 3</u>: For any given degree of lead time uncertainty tested, there is no significant performance difference for ERP-based supply chain systems involving different ratios of ordering/carrying costs in their cost structures within supply chains.

5. Experimental Results and Analysis

We have completed the data collection and data analysis. The final results will be presented at the conference if the paper is accepted. Furthermore, the author will provide the list of references as well.