

Does the Deepening Integration Between the Six Sigma Paradigm and Total Quality Management Improve the Organizational Performance?

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Abstract:

Several research studies have demonstrated the positive impact of both total quality management (TQM) and six sigma methodology on organizational performance outcomes. Given the growing prominence of TQM and 6 sigma in the local administration. The purpose of this paper is to help in providing a better understanding of the relationship between the integration of the six-sigma approach with the total quality management practice (TQMP) and their impact on organizational performance. The study is primarily based upon the secondary data. For this extant literature related to the topic from different databases, websites and other available sources were collected. To answer the research questions, a literature review was conducted. The articles were selected from evidence-based scientific databases such as Emerald, Sage Premier, ScienceDirect, Springer Open, and Google Scholar. we searched relevant literature using specific keywords, e.g., “Total Quality”, “Total Quality Management,” “Six-Sigma,” “Organizational Performance,”. nineteen scholarly articles were selected by using exclusion and inclusion criteria and screening the relevant articles.

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I. INTRODUCTION

Although total quality management (TQM) has been widely adopted in the last 50 years, scholarly and anecdotal evidence has not found a universally positive association between its implementation and organizational performance gains (Jayaram, Ahire, and Dreyfus, 2010). Instead, research has suggested that a number of contextual factors drive the relationship between TQM and performance (Jayaram *et al.*, 2010). Indeed, ‘moderating factors explain the lack of evidence of a significant relationship between some quality management practices and performance’ (Nair, 2006:971).

Statement of problem:

TQM primarily focuses on increasing efficiencies and improving processes, particularly when implemented in manufacturing organizations. That is, ‘quality’ in the TQM context connotes “cost reduction’ rather than ‘quality improvement’ in the conventional sense’. Accordingly, we test the proposition that TQM will find the greatest opportunities for internal fit—and, by extension, positive performance—in organizations where activity system elements (Siggelkow, 2002) are oriented toward a ‘cost leadership’ strategic position. and from this perspective, the research problem can be formulated as follows:

- To what extent does the Integration Between the Six Sigma Paradigm and Total Quality Management influence to the Organizational Performance improvement in the local’s administrations?

2. Research questions:

This article focuses to answer the following questions:

- What is the meaning of the total quality management practices?
- What are the various models of TQM implementation?

- What are the main similarities, differences and relationships between TQM and 6 Sigma?
- What is the relationship between TQM and organizational performance?

3. Research hypothesis:

- The connecting between the total quality management practices and six sigma approach increase the level of the organizational performance.

4. Research objectives:

This paper focus to:

- contribute to facilitating the successful adoption and implementation of the total quality management practices in the local's administration.
- outline the six-sigma concept, benefits, methodology as well as difficulties on TQM implementation.

5. Methodology:

The study is primarily based upon the secondary data. For this extant literature related to the topic from different databases, websites and other available sources were collected. A systematic review of the collected literature was done in detail.

II. LITERATURE REVIEW

1.1 The Historical Development of TQM:

The term TQM, is widely used and developed around the world. it mentioned that the concept of total quality was developed through the huge evolution of quality took place in the United States. According to Zairi (2007) TQM was “coined” in the first instance in the US military. Defenders of TQM diffused the concept through business consultancies in Western countries, and its influence spread from manufacturing to the construction and service industries and

finally to education (Ishikawa, 1985). Feigenbaum (1993 in Hossain et al., 2010) identified the following six phases in the evolution of quality:

1.1.1 Operator Quality Control

Operation quality control existed before the 19th century. During that period, each worker or group of workers was responsible for the manufacture of products, so in this way, the quality of a product could be better controlled because the workers focused on their work only.

1.1.2 Foreman Quality Control

Mass production was the main reason for the emergence the foreman quality control, which was developed between 1900 and 1918. Mass production is characterized by the division of labor, specialization of skills and standardization. The classical management approach known as the scientific management method was initiated by Fredrick Taylor and became very popular. The foreman grouped the workers performing similar tasks under his/her supervision and he/she took full responsibility for the quality of all works done by the group.

1.1.3 Inspection Quality Control

The phase of inspection or testing quality control was developed during the World War I. By World War II, the manufacturing system had become more complex and large numbers of workers were reporting to each foreman who could quite easily have lost control of the work. As a result, it was necessary to engage full-time quality inspectors. Quality inspection was adopted to separate non-conforming parts, and so the term "quality" meant inspection, and usually quality inspected during the production process itself

In this era of mass production, all finished products were examined for defects to ensure quality. they stated that quality management started with simple inspection-based systems in which the product is inspected and compared with specified requirements to check its

conformity. This means, quality measurement at that time focused on the inspection process by eliminating bad products, and depended on random inspection.

1.1.4 Statistical Quality Control

During the period between 1937 and 1960, statistical quality control reached its peak. There became an increased need for quality inspection in the late mass production era because the volume and variety of components increased dramatically. Owing to the huge costs involved in quality inspection, Taylor's scientific management approach became inappropriate. Statistical quality control concentrated on statistical tools and made the quality inspection department more efficient contributing most in sampling inspection rather than complete inspection. Its slow growth was not due to its development of technical and statistical ideas material control, design control and business ability.

1.1.5 Total Quality Control (TQC)

The TQC phase started in the 1960. Feigenbaum was the first expert who used the TQC term. He considered that "control must start with the design of the product and end when the product has been placed in the hands of customers who remain satisfied". There are many elements such as supplier development relationships, people empowerment and teamwork that are considered as a part of the TQM concept, but not included in TQC.

1.1.6 Total Quality Management (TQM)

TQM evolved in the 1980s and began to have a major impact on management and engineering approaches to long-term success through customer satisfaction. It is based on the participation of all members of an organisation in improving processes, products, service and the culture in which they work. Garvin (1984) outlined the evolution of TQM as the outcome of four major eras of development. He illustrates the evolutionary process where quality

has moved from an initial stage of inspecting, sorting and correcting standards to an era of developing quality manuals and controlling process performance. The third stage regards comprehensive manuals including areas of an organization other than production, and the use of standard areas of an organization other than production, and the use of standard techniques such as statistical process control (SPC).

1.2. Benefits expected to be realized from TQ and TQM:

include the following:

- improving the quality of products and services to meet customer needs;
- increasing the productivity of manufacturing processes and commercial businesses;
- reducing manufacturing and service costs;
- determining and improving the marketability of products and services;
- reducing consumer prices of products and services;
- ensuring on-time deliveries and availability;
- assisting in the management of an enterprise.

Total quality as a strategy can bring better quality, price, delivery, sales, growth and profitability, leading to economic prosperity.

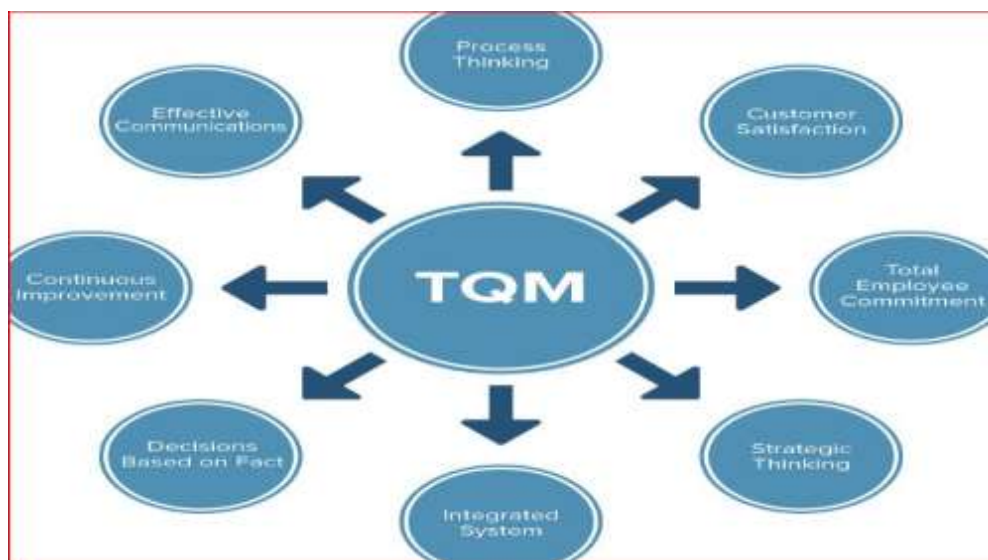
1.3.TQM practices:

Research on quality management (QM) and TQM has come out with a number of dimensions on TQM. For example, in a study conducted by Ooi et al. (2011) with the aim to explore the relationship between TQM practices and customer satisfaction and service quality in Malaysian small service organizations, the study developed a research model consisting of six TQM practices. They were: leadership, strategic planning, customer focus, human resource focus, information and analysis, and process management.

Samat et al. (2006) identified, validated and tested seven constructs of TQM through an empirical survey of 175 service firms in Malaysia. The results

showed that employee empowerment, continuous improvements, information and communication, have positive effects on service quality.

Figure 01. Total Quality Management Practices (TQMP)



Kumar et al. (2011) identified management commitment; customer satisfaction; continuous improvement; teamwork; employee's empowerment; training; feedback; and effective communication as few success factors for both manufacturing and service industries.

Moreover, from the extant literature review, it was found that different studies have provided different sets of practices, but no study has identified a common set of practices for successful implementation of TQM for better results (Talib et al. 2011). This study utilizes 17 TQM practices identified by Talib et al. (2011) for service industries and through the extant literature review which are frequently occurring in the TQM literature. The detailed description of each TQM practice can be found in Talib et al. (2011).

1.4. TQM Factors:

Factors here can be defined as a set of latent variables which cannot be measured directly. For example, Supplier quality management is a critical factor which is not directly measurable. To measure this factor, we have to use some variables such as company's long-term cooperative relation with supplier, feedback on the performance of supplier product etc. These variables are expressions of Supplier quality management. For field study, each variable is measured with an item in a scale. The item in scale should sufficiently span the scope of the construct for the content validity (Lawshe, 1975).

Literature review shows that Anderson and Schroeder (1994) made the first effort of synthesizing a theory of quality management from research base on Delphi method, carried out both on academic and on managers closely related with quality and using questions related to Deming's 14 principles. They proposed seven concepts: forward-looking leadership, internal and external cooperation, learning, administrative processes, continuous improvement, employee's performance and customer satisfaction. However, this work is not generally accepted because it suffers from an absence of systematic scale development, content validity and empirical validation. In this research study, the critical factors developed by Das et al. (2006) have been followed. According to the literature study, the following factors were identified based on content validity:

- I. Top Management commitment
- II. Supplier quality management
- III. Continuous improvement
- IV. Product innovation
- V. Benchmarking
- VI. Employee involvement
- VII. Reward and recognition
- VIII. Education and training
- IX. Customer focus
- X. Product quality

1.5. Total Quality Management Models:

According to effective and basic factors of Total Quality Management and their relationship, some models and patterns are designed which using them can be a useful guide for establishing and running Total Quality Management in organization. As in conditions, some models are the prerequisite and basic condition of running TQM. The most important patterns that describing effective and basic factors of Total Quality Management are as bellows.

1.5.1 Malcolm Baldrige Total Quality Management Model:

Balding Total Quality Management model us one of the famous one, presented in 1987 and it aim is guarantee quality as a main component of competition and understanding necessities of better performance in organization. This model consists of 7 components and their relationships are shown in the following charts (Rao & Lawrence,1996).

the top manager leader in this model is presenting a clear image of customers qualitative values, merging these values in management system and responding social responsibilities. from data and analyze point of view, the aim of using data is directing top quality and improving completion performance. However, the information must be enough to be a suitable support for management decisions about improving attention to customer, products, services and internal processes. Quality strategic planning need setting and merging qualitative necessities in all working units. In human resource management, emphasis is on using staff capabilities completely to follow organization qualitative goals and providing a suitable environment for cooperation of all staff in organization's grow and improvement. By process management, we mean setting and directing systematic processes used in higher levels of quality and performance. Main components of process management include designing, process quality management in all working parts, improvement of quality system and quality evaluation. Qualitative and operational results deal with reformation in quality levels and operational performance, current quality and performance level with respect to other competitors. Paying attention to customers include relationship with customer, knowing his needs and main factors of

competition include methods of determining customer's satisfaction and comparing these aspects to other competitors.

1.5.2 Total Quality Management model of (P.R.T.M):

P.Robin, Tood and Ms, Grath in their model evaluated the reasons of TQM failing in organization and reported the successful factors as follows: staff cooperation, staff delegation, team working or emphasis on processes, external patterning of processes, role of top management in quality, clear and rapid reporting and staff empowerment (Pitiglio et al ,1995) In these studies, reasons such as managers and staff resistance against change, unclear scientific goals inside the organization, too much investment with long-term time and unknown returns, also ineffective cooperation of staff and personnel are considered.

1.5.3 Zaeeri's Total Quality Management Model:

Zaeeri, From Malaysia, in book "patterning is the best exercise" explains the basic and effective factors in Total Quality Management for comparison in international level. He in this book express that these factors are applied in organizations and in different levels. Basic factors of Total Quality Management from Zaeeri point of view are as follows: (Zaire & Hassan,1986) Management commitment, Customer focus, Supplier Relation, Training, Employee focus, Quality Measurement, Process Improvement, Zero Defects.

1.6. TQM and Organizational Models:

Quality management is rather practically oriented. In an effort to bridge the gap between TQM practice and management theory, Spencer (1994) examined the relationship of TQM to three types of organizational models in management theory: mechanistic, organismic, and cultural. In short, the mechanistic models can be regarded as approaches in which efficiency, conformity, and compliance are

important. Spencer (1994) defined TQM as a spiritual descendent of the mechanistic model to emphasize the evident mechanistic influence on TQM. An example of this influence is the concept of “management by fact” in TQM and in mechanistic models more generally. The organismic models can be characterized as contingency approaches, indicating that the organization’s situation dictates the correct management approach.

Spencer (1994) found that many TQM ideas were associated with such organismic models, because managerial measures on quality management are to be tailored to the individual organization. The third organizational model, the cultural model, resembles a more constructivist approach. The cultural model, for instance, aims for constituent satisfaction rather than customer satisfaction. Organizations are seen “as a collection of cooperative agreements entered into by individuals with free will”. Such a model thus broadens the traditional customer focus in quality management into a stakeholder focus.

1.7. Difficulties of TQM implementation:

The implementation of TQM programmes seems to require very radical reforms, sometimes insurmountable, in basic organizational areas such as culture and leadership styles. Some empirical research carried out from the point of view of “Organizational Ecology” shows that innovations – for TQM this means innovation in organization management – affect key organizational aspects such as strategy, structure and culture, these being specifically the aspects which offer the main risks to survival. There can also be some opposition to adopting these innovations, even if their expected values are positive for the organization (Singh, Tucker, & House, 1986).

Other authors (see Carman, 1993) point out that many organizations will show some resistance to trying out basic reforms – even if improvement in organizational performance or fulfilment is expected from them – either due to their reticence to taking risks, their expectations that the strategies followed at present will bear fruit a

little later or their fear of facing the mess brought about by such a change.

An analysis founded on the “Resources-based Theory” also corroborates the former idea of implementation difficulties, suggesting that many companies which are potential adopters of TQM programmes may find it difficult to imitate these programmes due to various factors which include the social complexity of certain organizations, the uncertainty about the cause-effect relationship between implementing TQM and the organizational performance (causal ambiguity), the time required to understand and assimilate the new programme and its subsequent cost, and so on (Barney, 1986). Besides, many managers may not make up their minds to implement TQM in their organization on the grounds of shortage of human and/or financial resources. They may understand the advantages of employees’ empowerment, quality teams, suggestion systems and training programmes, and so forth, but might find them completely impossible to implement in their company with the resources that are available there.

In this sense, Young (1992) adduces that companies are not very likely to adopt certain practices related to Total Quality both successfully and in the short term if the following situations coincide: (1) Employees that are not really disciplined in their work. (2) Absence or lack of orientation towards teamwork. (3) Lack of cultural or demographic homogeneity. (4) Preference for fixed working rules and little initiative. (5) Poor opinion or acceptance of training. (6) Staff members generally unaccustomed to relating salary and fulfilment of the company’s performance or results.

2. TQM and Six Sigma:

2.1 Six Sigma Concept:

The Six Sigma is a methodology that blends together many of the key elements of past quality initiatives while adding its own special approach to business management, and the main goal of Six Sigma is to reach 3.4 defects per million opportunities over the long term. The Six Sigma methodology focuses on customer knowledge by

translating customer needs and expectations into areas for improvement.

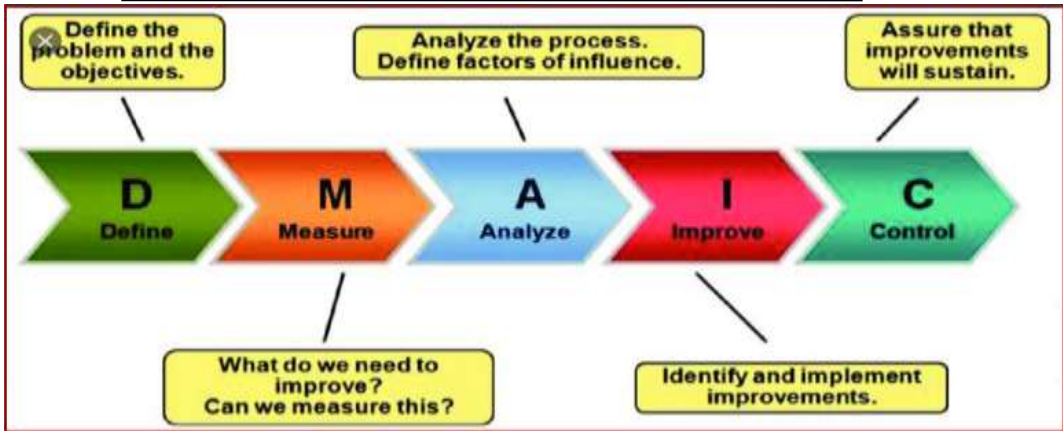
The Six Sigma is a statistical concept that measures a process in terms of defects. Achieving Six Sigma means the processes are nearly perfect. In its business use, it indicates defects in the outputs of process, and helps organization understand how far the process deviates from perfection. Six Sigma has been considered as a philosophy that employs a well-structured continuous improvement methodology to reduce process variability and drive out waste within the business processes using statistical tools and techniques (Antony and Bañuelas, 2002).

The term Six Sigma is more related to eliminating the defects, and if the organizations understand the concept very well, so these will lead to detects defects and hence increase their profits. In a study carried out Banuelas, Antony (2004), one of their conclusions was that the Six Sigma has been embraced in many companies as the new business strategy. It is focused on improving processes by eliminating variation using a well-structured methodology.

2.2 TQM vs. Six Sigma:

In a study conducted by Antony (2007), it is discussed whether Six Sigma is a management fad or a fact. Antony's conclusion found that Six Sigma will be around as long as it continues to yield measurable bottom-line results in organizations. Although the number of applications of Six Sigma in manufacturing companies has gone down a great deal, Six Sigma in other areas such as finance, healthcare, IT and banking has gone up significantly in recent years.

Figure02. six sigma DMAIC process



The Six Sigma methodology consists of five phases, which are known as (DMAIC):

- **Define** the projects, the goals, and the deliverables to customers (internal and external)
- **Measure** the current performance of the process
- **Analyze** and determine the root causes of the defects.
- **Improve** the process to eliminate defects.
- **Control** the performance of the process.

There is logic behind the five phases, as Six Sigma involves a number of statistics and equations, but it is not a statistical program; rather it shows how to use statistics and how to understand their value, in order to make rational and measurable decisions about business processes. Many organizations worldwide (manufacturing companies, service-oriented companies, small and medium-sized enterprises (SMEs) have implemented Six Sigma and achieved remarkable improvements in their market share, customer satisfaction, product reliability and service quality with impressive financial savings (Harry and Schroeder, 2000). On the other hand, some researchers have opposed the Six Sigma; Gardner (2002) opposes the Six Sigma's define-measure-analyze-improve-control incremental approach to the radical approach of reengineering.

The major difference between Six Sigma and Total Quality Management (TQM) is that Six Sigma incorporates control phase with ongoing checks in order to ensure that once improvements are

achieved, they are not a one time or temporary phenomenon, but maintained over time. According to Scarnati and Scarnati (2002), Six Sigma is an industry standard for defect free products. The Six Sigma can be used to improve an existing process to create a new product or process.

2.3 QUALITY MANAGEMENT AND SIX SIGMA:

It is a business management plan which intends at enhancing the quality of processes by reducing and ultimately removing the variations and errors. Motorola introduced the concept of Six Sigma in 1986, but was Jack Welch popularized it, which included the policy in his business processes at General Electric. Quality plays a significant role in the success of a company. Six Sigma make sure better quality of goods by eliminating the imperfections in the systems and processes. It is a process which supports in enhancing on the whole system and processes by recognizing and ultimately eliminating the obstacles which might prevent the company to arrive at the perfection levels. Companies applying Six Sigma generate particular levels for workers inside the organization. These levels are termed as: —Green belts, —Black belts and so on. Persons qualified with any of these belts are specialists in six sigma process. As per Six Sigma any process that does not direct to client satisfaction is termed as a defect and has to be abolished from the system to make sure better quality of goods and services. Each company struggles hard to sustain outstanding quality of its product and the process of Six Sigma make sure the same by eliminating different errors and defects which arrive in the path of client pleasure. Six Sigma was originated in manufacturing processes but at the present it discovers its use in other areas as well. Appropriate resources and budgets required to be allocated for the accomplishment of Six Sigma in companies.

Figure 03. six sigma methods



Two Six Sigma methods are:

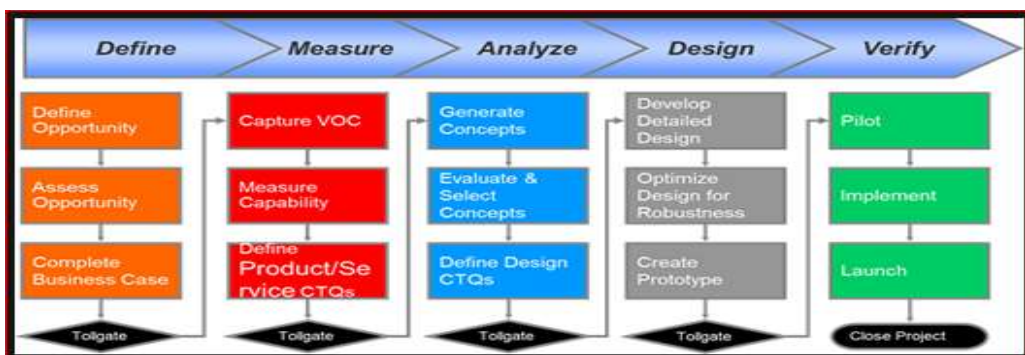
- ❖ DMAIC
- ❖ DMADV

Existing business practices are taken care by DMAIC. Creating new strategies and policies are taken care by DMADV (Saxena& Rao,2019).

2.4 FIVE PHASES OF DMADV:

D - Defining the Problem. Various problems which need to be taken care of are evidently defined in the primary phase. Responses are obtained from clients as to what they experience about a specific good or service. To comprehend problem part and their root causes responses are cautiously observed.

Figure 04. Six sigma DMADV process



M – Gauge or measure and find out the main points of the existing process. Employees collect relevant data once the problem is identified, which would provide an insight into present processes.

A - Analyze the data. The information gathered in the next stage is meticulously confirmed. The root cause of the imperfections is cautiously considered and examined as to discover out how they are influencing the whole process.

I - Improve the existing processes depending on the study and examination done in the prior stage. Attempts are done to generate novel projects which would make sure better quality.

C - Control the processes so that there are no further defects (Saxena& Rao,2019).

III. CONCLUSION

Kaizen is explained as a constant attempt by all employees to make sure enhancement of all system and processes of a particular company. Japanese people give much importance to the process of Kaizen. It helps Japanese companies to outperform all other rivals by following definite set strategies and conventions to get rid of imperfections and make sure long-term higher quality and ultimately client satisfaction. —Change is for good is the basic principle of Kaizen. Kaizen denotes —continuous improvement of processes and functions of an organization through changell. Kaizen brings nonstop little enhancements in the whole processes and ultimately aspires to company's success. Japanese believe that several small incessant changes in the policies and systems bring efficient results than a small number of major changes. Kaizen process targets at nonstop enhancement of procedures in manufacturing sector as well as in all other departments as well. Realizing Kaizen tools is the liability of every member who is directly connected with the company. Every person, irrespective of level in the hierarchy requires contributing by adding in little upgrading and modifications in the system.

Six Sigma has the following main components (Saxena& Rao,2019):

- Teamwork
- Personal Discipline
- Improved Morale
- Quality Circles
- Suggestions for Improvement.

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