Studying the effect of Six Sigma implementation on services quality of employees in Imam Sajad educational therapeutic hospital of Yasouj

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Abstract

Purpose of the current query is to investigate effect of implementing Six Sigma on services quality of employees in Imam Sajad hospital educational therapeutic of Yasouj. Research independent variable is Six Sigma and its six components and dependent variable is employee service quality. To extract conceptual model, theories and models related to previous researches and issues have been broadly investigated. This dissertation is applied one in terms of purpose and in terms of data collection and nature, it is correlation-descriptive research and it is one of the field and library branches. For this purpose, among the personals of Imam Sajad hospital of Yasouj in a total number of 550 persons, the researcher has determined 225 individuals via Morgan's table as a sample size and has distributed questionnaires based on stratified sampling and then simple random sampling (Convenience). In this query, 2 questionnaires of Six Sigma principles and service quality enhancement have been employed. Validity of questionnaire was obtained via content validity and its reliability was verified through Cronbach's alpha. To analyze data, Pearson's correlation test and 2-variable regression in SPSS software version 22 have been exploited. Research results imply that in 0.95 confidence level, Six Sigma and its components are positively and severely affecting on staffs' service quality. That is, the more appropriate and desirable Six Sigma and its components are, the more increase is in utility of staffs' service quality.

Keywords: Six Sigma, DMAIC Cycle, paying attention to customer (patient), employee service quality, Imam Sajad educational therapeutic hospital of Yasouj.
Introduction:
Current developed world have placed service and industrial organizations in a sea of competition and turbulence. An organization can survive from massive wave derived from exiting from competition arena which proportionate its productions with society's needs, created changes and customers' demands. In the past, service and productions were individually done by people who have awareness of respective area, while in today's modern era, products and service production based on mass production and just in time has been meant among a vast scale of customers. Just in time in this broad scale decrease professionals' real contacts with users and presence of this feature refers to more complicated management of people and processes and capability to provide organization's services continuously and with the minimum variance in regard with customer's satisfaction (Nadkarni, 2003).
In the turbulence of this change, hospitals also haven't been saved. In one hand, special nature of medical services and lack of enough knowledge among customers to assess services which causes even a tiny mistake in curing patients will impose very serious consequences and burden cost upon consumers and in another word, emerging quality conceptions and increasing patients' and customers' awareness toward given services will cause competitive organizations will encounter challenges including decreasing horrible consequences of health services, progress in service quality and reduction in cost. So that, these organizations are forced to use different managerial techniques and approaches in order to overcome mentioned challenges and increasing service quality (Chassin, 1998).
Along past 30 years, considerable increase in medical costs has obliged researchers and owners of medical jobs to inspect ways to promote operational efficiency or loss of costs of this sector. These changes are in fact an underlying challenge which needs proper decision making to manage it correctly (Ainparast, 2007).
In the past decade, Six Sigma has been addressed as a systematic and powerful approach to achieve enhancement in health and therapeutic service quality; cost reduction; decrease in medical errors; improvement in patients' satisfaction; increase in resources' productivity and overcoming mentioned challenges (Pexton, 2005).
Motorola Company in the late 80s employed a kind of reengineering in TQM which is eventually led to proposing Six Sigma sketches. The initial idea of this method has been attributed to Bill Smith, quality and reliability senior engineer of Motorola Company. Bill Smith is popularized as the father of Six Sigma (Nejat, 2006).
Case study in this dissertation is Imam Sajad educational therapeutic hospital of Yasouj which has several severe weaknesses in health and treatment sector. A great deal of these patients in this city due to various reasons, have referred to the hospitals in adjacent cities (Shiraz and Isfahan) to enhance their treatment. Hence, main question in this query is that what is the effect of Six Sigma on employees’ services quality in Imam Sajad hospital in Yasouj City?

Theoretical basics of Six Sigma
The Six Sigma is a philosophy of continuous improvement and steps toward being perfect in all activities. Six Sigma is a system which determines where we stayed; where we want to be; how to get that destination and how to progress along the way (Eckes, 2005, translated by Malekzadeh, 2006). Six Sigma approach is governed via recognizing customers' needs; orderly using of facts; statistical analyses; continuous attention toward management and
empowerment and reviewing over business processes. Hence, Six Sigma by emphasize on management can be a suitable tool for organization and enhance organization's effectiveness and efficiency, because Six Sigma in his initial steps is making attempt to increase and enhance effectiveness and efficiency simultaneously (The same reference).

**Theoretical basics of employee service quality**

Quality in health and treatment sector is to do right things correctly at the first time and doing them better for the next time (Mosadeghrad, 2004). Quality of healthcares is degrees of services given to people and communities which probably increase desirable results and it is according to modern professional knowledge (Chassin, 1998). The concept of quality roots in the work of industrial experts. Importance of quality has been addressed from 1950. First attempts have concentrated over production sector and next encompasses services sectors. The most famous and key leaders of quality theory who have the fundamental influence in world's today industry are Karazbi, Deming, Joseph Juran and Ishikawa (Mosadeghrad, 2004).

**Literature review**

Du Pree et al (2010) in a query entitled "Progress in patients' satisfaction by controlling pain using Six Sigma tool" came to this conclusion that Six Sigma DMAIC method can lead to enhance patients' satisfaction successfully and cause measurable improvements in trend of patients' satisfaction by controlling pain. Also, DMAIC’s control phase let ward’s capabilities progress be included in daily operations.

Gamerdinger et al (2008) have conducted a study aiming to assess results of Six Sigma performance projects in a huge hospital complex. Project team has obtained desirable results after implementing Six Sigma. The result of this study was decrease in hospitalization period of acquired Pneumonia patients from 5.9 days to 5.1 days; financial saving derived from decrease in hospitalization period more than 300 million USD and loss of death in acquired Pneumonia patients from 6.7% to 3.5%.

Tanner et al (2007) in a study have inspected applications of Six Sigma in health and therapeutic industry and considered achievements derived from Six Sigma implementation as reducing unnecessary admissions in emergency ward; reduction in accommodation in emergency ward; decrease in waiting time before surgery, decrease in medical errors and subsequently enhancement in patients' satisfaction.

Pentcost (2007) in a paper entitled "Improving healthcare quality" articulated that Six Sigma is the most known mean in medical science for quality control and performance enhancement.

**Research conceptual model**

In this model, effect and relation of Six Sigma and each of its 6 components (Real concentration on customer, management based on facts and information, concentration on processes, functional management, infinite participation and cooperation, movement toward excellence (zero error) and failure (error) bearing) which have introduced as independent variables on staffs’ service quality are expressed.
Research methodology
This dissertation in terms of purpose is considered applicable research one and in terms of nature and methodology, it is placed in correlation-descriptive category. On the other hand, researches due to this fact that they are done in one or more periods, can be split into 2 kinds of longitudinal and cross-sectional researches. Current study due to this matter that has been conducted in a certain time interval, in terms of time horizon is cross-sectional. Research in terms of subject domain is to study effect of Six Sigma implementation on employee service quality. Spatial domain is Imam Sajad educational therapeutic hospital in Yasouj City and in terms of time domain, data collection time has been the first six months of 2015.
Statistical population includes all of employees working in Imam Sajad hospital of Yasouj who are 550 persons. Due to this statistical size, sample size is determined based on Morgan’s table about 225 persons.

Since, hospital is a service organization and has various wards; in this regard researcher has distributed questionnaires based on stratified sampling and then random sampling (Convenience).

**Questionnaire reliability and validity**

Researcher has used standardized questionnaire to do his survey that totally includes 74 questions (36 questions for Six Sigma questionnaire and 38 questions for questionnaire of service quality enhancement). All of these questions are standardized and have been designed and employed based on 5-points Likert scale. Thus, measurement tool used in this dissertation has a suitable validity and in fact, validity has been obtained in a content form.

To determine reliability, questionnaire has been experimentally distributed among 30 persons and Cronbach’s alpha was verified.

**Research hypotheses tests**

**The main hypothesis**: the Six Sigma has an effect on employee service quality in Imam Sajad hospital of Yasouj.

\[ H_0 : \beta = 0 \]
\[ H_1 : \beta \neq 0 \]

<table>
<thead>
<tr>
<th>F</th>
<th>DW</th>
<th>P</th>
<th>Adjusted ( R^2 )</th>
<th>( R^2 )</th>
<th>R</th>
<th>sig</th>
<th>t</th>
<th>Standard coefficient</th>
<th>Non-standard coefficient</th>
<th>Variable</th>
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<tbody>
<tr>
<td></td>
<td>(2165/608)</td>
<td>0</td>
<td>0/906</td>
<td>0/907</td>
<td>0/952</td>
<td>0/000</td>
<td>4/231</td>
<td>0/073</td>
<td>0/310</td>
<td>Constant coefficient</td>
</tr>
</tbody>
</table>

Table 1: Regression model fitness results for the main hypothesis

Rejecting \( H_0 \) and verifying \( H_1 \)

Test result

Standardized coefficient (Beta) of variable of Six Sigma on employee service quality is 0.952 and significance level (sig) of t statistics is equal to 0.000. Therefore, \( H_0 \) is rejected and \( H_1 \) is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based on the effect of Six Sigma on employee service quality is verified.

**First sub-hypothesis**: Real concentration on customer has an effect on employee service quality in Imam Sajad hospital of Yasouj.

\[ H_0 : \beta = 0 \]
\[ H_1 : \beta \neq 0 \]
Table 2: Regression model fitness results for the first sub-hypothesis

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>DW</th>
<th>P</th>
<th>Adjusted R²</th>
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<td></td>
<td>Beta</td>
<td>Standard error</td>
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<tr>
<td>Constante coefficient</td>
<td>0/000</td>
<td>8/014</td>
<td>0/076</td>
<td>0/610</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Real concentration on customer on employee service quality</td>
<td>1677/255</td>
<td>2/189</td>
<td>0/882</td>
<td>0/883</td>
<td>0/939</td>
<td>0/000</td>
<td>.954 40</td>
<td>0/939</td>
<td>0/020</td>
<td>0/821</td>
<td></td>
</tr>
</tbody>
</table>

Rejecting H₀ and verifying H₁

\[
H_0 : \beta = 0 \\
H_1 : \beta \neq 0
\]

Standardized coefficient (Beta) of variable of Real concentration on customer on employee service quality is 0.939 and significance level (sig) of t statistics is equal to 0.000. Thus, H₀ is rejected and H₁ is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based the effect of real concentration on customer on employee service quality is verified.

Second sub-hypothesis: Management based on facts and information has an effect on employee service quality in Imam Sajad hospital of Yasouj.

Table 3: Regression model fitness results for the second sub-hypothesis

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>DW</th>
<th>P</th>
<th>Adjusted R²</th>
<th>R²</th>
<th>R</th>
<th>Sig</th>
<th>t</th>
<th>Standard coefficient</th>
<th>Non-standard coefficient</th>
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<td></td>
<td></td>
<td>Beta</td>
<td>Standard error</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0/000</td>
<td>7/040</td>
<td>0/104</td>
<td>0/731</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>.457 829</td>
<td>1/772</td>
<td>0/787</td>
<td>0/788</td>
<td>0/888</td>
<td>0/000</td>
<td>.800 28</td>
<td>0/888</td>
<td>0/027</td>
<td>0/784</td>
<td></td>
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</tbody>
</table>

http://www.ijhcs.com/index.php/ijhcs/index Page 2502
Standardized coefficient (Beta) of variable of Management based on facts and information on employee service quality is 0.888 and significance level (sig) of t statistics is equal to 0.000. Hence, $H_0$ is rejected and $H_1$ is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based on the effect of Management based on facts and information on employee service quality is verified.

**Third sub-hypothesis:** Concentration on processes has an effect on employee service quality in Imam Sajad hospital of Yasouj.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized coefficient (Beta)</th>
<th>Test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration on processes</td>
<td>0.889</td>
<td></td>
</tr>
</tbody>
</table>

Standardized coefficient (Beta) of variable of Concentration on processes on employee service quality is 0.889 and significance level (sig) of t statistics is equal to 0.000. Hence, $H_0$ is rejected and $H_1$ is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based on the effect of Concentration on processes on employee service quality is verified.

**Forth sub-hypothesis:** Functional management has an effect on employee service quality in Imam Sajad hospital of Yasouj.
$H_0 : \beta = 0$

$H_1 : \beta \neq 0$

Table 5: Regression model fitness results for the fourth sub-hypothesis

<table>
<thead>
<tr>
<th>F</th>
<th>DW</th>
<th>P</th>
<th>Adjusted R²</th>
<th>R²</th>
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<th>Sig</th>
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<th>Standard coefficient</th>
<th>Non-standard coefficient</th>
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<td></td>
<td></td>
<td>Beta</td>
<td>Standard error</td>
<td>B</td>
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<tr>
<td>0/000</td>
<td>6/988</td>
<td>0/117</td>
<td>0/820</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6/988</td>
<td>0/117</td>
<td>Consta nt coeffici ent</td>
</tr>
<tr>
<td>609/143</td>
<td>/969</td>
<td>0/731</td>
<td>0/732</td>
<td>0/856</td>
<td>0/000</td>
<td>/681</td>
<td>24</td>
<td>0/856</td>
<td>0/031</td>
<td>0/762</td>
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<td></td>
<td>1</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Functional management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rejecting $H_0$ and verifying $H_1$

Test result

Standardized coefficient (Beta) of variable of Functional management on employee service quality is 0.856 and significance level (sig) of $t$ statistics is equal to 0.000. Therefore, $H_0$ is rejected and $H_1$ is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based on the effect of Functional management on employee service quality is verified.

**Fifth sub-hypothesis:** Infinite participation and cooperation has an effect on employee service quality in Imam Sajad hospital of Yasouj.

$H_0 : \beta = 0$

$H_1 : \beta \neq 0$

Table 6: Regression model fitness results for the fifth sub-hypothesis

<table>
<thead>
<tr>
<th>F</th>
<th>DW</th>
<th>P</th>
<th>Adjusted R²</th>
<th>R²</th>
<th>R</th>
<th>Sig</th>
<th>t</th>
<th>Standard coefficient</th>
<th>Non-standard coefficient</th>
<th>Variabl e</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Beta</td>
<td>Standard error</td>
<td>B</td>
</tr>
<tr>
<td>0/000</td>
<td>5/057</td>
<td>0/100</td>
<td>0/504</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5/057</td>
<td>0/100</td>
<td>Consta nt coeffici ent</td>
</tr>
<tr>
<td>1041/319</td>
<td>1/857</td>
<td>0/823</td>
<td>0/824</td>
<td>0/908</td>
<td>0/000</td>
<td>/269</td>
<td>32</td>
<td>0/908</td>
<td>0/026</td>
<td>0/848</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Infinite participation and</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Rejecting $H_0$ and verifying $H_1$

Standardized coefficient (Beta) of variable of Infinite participation and cooperation on employee service quality is 0.908 and significance level (sig) of t statistics is equal to 0.000. Therefore, $H_0$ is rejected and $H_1$ is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based on the effect of Infinite participation and cooperation on employee service quality is verified.

**Sixth sub-hypothesis:** Movement toward excellence and failure bearing has an effect on employee service quality in Imam Sajad hospital of Yasouj.

$H_0 : \beta = 0$

$H_1 : \beta \neq 0$

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-standard coefficient</th>
<th>Standard coefficient</th>
<th>Beta</th>
<th>Standerd error</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement toward excellence and failure bearing</td>
<td>0/000</td>
<td>8/179</td>
<td>0/102</td>
<td>0/830</td>
<td>Constant coefficient</td>
</tr>
<tr>
<td></td>
<td>2/025</td>
<td>0/84</td>
<td>0/85</td>
<td>0/86</td>
<td>0/000</td>
</tr>
</tbody>
</table>

Standardized coefficient (Beta) of variable of Movement toward excellence and failure bearing on employee service quality is 0.886 and significance level (sig) of t statistics is equal to 0.000. Thus, $H_0$ is rejected and $H_1$ is verified. In another word, null hypothesis is rejected in 95% confidence level and opposite hypothesis which is based on the effect of Movement toward excellence and failure bearing on employee service quality is verified.
Research practical recommendations

- In implementing Six Sigma approach, regarding customer has the highest priority. Results obtained from this survey reflected that concentration on customer compared with other Six Sigma’s principles has a severe impact on staffs’ service quality. So, it is worth hospital authorities paying attention to this issue and building an appropriate context for customer (patient) satisfaction.

- DMAIC technique is accounted as one of important techniques of Six Sigma. This mean in fact detects root of blunders and issues and collects required information for measurement and then takes an action to resolve problems and progress them. This technique can be broadly applicable in hospital. In fact, by implementing this tool, many of problems relevant to therapeutic and administrative performance in the hospital are specified and defined. Accordingly, we step toward investigating and modifying them in regard with enhancement and improvement. Ultimately, it will lead to high profitability and drop in organization’s costs.

- Authorities have to clearly and accurately determine and define tasks and responsibilities of each of staffs in different hospital wards. In this case, treatment personnel know their duties better and do them faster.

- It is worth that authorities replace prevention with reaction toward problems. Therefore, based on this principle, many of future problems will be prevented and doctor and nurse are able to prepare themselves for each probable danger.

- Presence of entire managerial information system is required to enhance treatment quality. This information can consist of work domain and volume, hospitalization, bed occupancy rate, patient accommodation time, surgery methods, patient’s satisfaction, employees’ competence, hospital financial performance and etc. Accessibility to this information, if it is complete, summarized, precise and correct, can considerably help management to identify hospital weak points and strengths. By detecting these points and doing preventions, we avoid future predicaments.

- Authorities are making attempt to form employees as a team and solve problems and works in a group. In this case, they are making errors less.

- It is better authorities assign people who are interested in their jobs and compliance with their experts and spirit, they are tolerant and precise. Because, medical and paramedic professions are dealing with human life and the tiniest blunder might lead to death.

- If payments such as salary, promotions are done based on criterion of employees’ performance, employees are more encouraged to effective implementation of service quality process in the organization, so it is suggested that hospital authorities take effective steps in regard with meeting justice in payments and optimizing reward system.
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