

CRISIS MANAGEMENT: IS IT POSSIBLE TO SOLVE ORGANIZATIONS' PROBLEMS BY LEAN SIX SIGMA?

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“If you over-react to a crisis legislatively it generally ends in disaster.” ~ Thomas Watson Jr

Abstract.

The purpose of this paper is to discuss a research on the crisis management and is it possible to solve organizations' problems by Lean Six Sigma as well as to recommend guidelines for future work. The conclusions drawn from the conducted research, the presented arguments, methodology, results and guidelines can be structured in the following main directions according to the objective and tasks set: 1) some theoretical aspects of crisis management and Lean Six Sigma are analyzed; 2) procedure for reaction for business organization in case of crisis has been developed; 3) some guidelines based on Lean Six Sigma for improving quality attributes in business organization are suggested.

Key words: *Crisis Management, Lean Six Sigma, Quality Management System.*

1. Introduction

The term “crisis” has occurred at first in the medicine and later in the psychology for explaining the critical process in the human body or psychological state of the personality. In 17th and 18th Century, the crisis is starting to be associated with political and economic situation as mentioned by Marinov (2009): “*Crisis management as technology has occurred in the middle of the 90's and the specialists who practice and specialize in this field are quite few in the world*”.

Nowadays, most of the companies are not adequately prepared for a crisis. Crisis management and risk management are both instruments for prevention and reaction of threatening or dangerous situation, but they are not synonyms.

Bulgarian books and papers dealing with these related topics can be divided into two main groups focused on: 1) risk and 2) crisis. For example, on one hand, in his book Pavlov

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(2013) gives a framework for risk management, Kirova & Sheludko (2015) apply data envelopment analysis in risk assessment, Kirova & Velikova (2016) analyze risk management method in the case of small photovoltaic plants, Kirova (2012) use graphical presentation of risk assessment in management decision making process. On the other hand, Papazov & Mihaylova (2012) emphasis on systematic planning tools for strategy rethinking of SMEs in hard times, i.e. crises. The same authors apply “Blue Ocean” tools for strategy rethinking of SMEs based on a case from the Bulgarian knitwear industry (Papazov & Mihaylova, 2016).

Venette (2003) fairly notes that: “*crisis is a process of transformation where the old system can no longer be maintained*”, while risk according to ISO 31000 (2108) is the “*effect of uncertainty on objectives*” where “*effect is a deviation from the expected*” and “*objectives can have different aspects and categories, and can be applied at different levels*”.

The difference between risk management and crisis management is that the first one marks the possible methodologies through which the management could avoid the crisis. On the opposite side is the crisis management drawing attention in the definition of how could be reacted, when the crisis comes, to this process effectively. The decision in this process could be taken immediately before, during or after the crisis in the company is a fact.

How could management diverse the incident from the crisis? Is it able to define it correctly in a situation with “as soon as possible” code? This publication is aiming to identify how could be recognized the crisis in the first step before to come in the organization and how could be maintain the process with the highest level of efficiency and effectiveness. The management skills and techniques required to found the most effective method how to be solved the problem and how to be changed the situation in the most adequate for the company direction. Lean systems and Six Sigma are not anti-crises instruments just because more than management does not recognize the benefits, which these systems give to the organization in the uncertainty. This paper marks some issues, which have to use as guidelines during crisis.

2. Theoretical background

Crisis management requires careful and thoughtful planning for a disaster that might not even be predictable given to the history or complexity of business (Waryjas, 1999). Many organizations must begin by overcoming the blindness that overconfidence can create. Fink (1986) surveyed 500 CEO’s for his book “Crisis Management” and found that 89% of those who responded felt that crises in business were inevitable. Of that same group, 50% admitted they did not have a plan for dealing with crises but 97% still felt confident they would respond well in a crisis. This overconfidence is created in part by the success that most top managers experience in their careers.

The significant elements of the crises for every company are: 1) short decision time; 2) surprise; 3) threat for the organization. Therefore, the need for change is the primary factor, which could improve the situation and to solve the problem within the organization. It is important to be noted that crisis is common including the consequences, which could be necessary for the stakeholders or third parties connected with the organization. The

difference between crisis than incident is the final phase where the management must decide under pressure and demands from the reaction.

Therefore, it is crucial to be marked the activities which are the most important for the company as a reaction in the solving the problem. There are two hypotheses: *H1: The situation could be staying an incident if the reaction is adequate to the customers' demands and market's expectation* or *H2: The situation can become a crisis if the management's behavior, decision, and reaction are not honest enough or adequate to cover all side effects staying as a root cause for the problem.*

As per the research of Widera (2018) the publications dealing with performance measurement in crisis management within Scopus results more than 500 hits based on the criteria: (“performance measurement” OR “effectiveness”) AND (“crisis management” OR “disaster relief”). Comparing the number of relevant sources per year, it becomes obvious that there is an ongoing increase of results starting in the early 2000s with a peak in 2006, which is two years after the major South-East Asian tsunami disaster. Since then, publications have increased even more with a maximum of more than 50 sources in 2013.

Crisis management is area, which became to be more and more researchable by the scientist, business organization and students. Far or less the unpredictable uncertainty is something, which the experts are trying to explore in different areas. From the opposite side, Lean Six Sigma is a management program that provides tools that help manufacturers obtain efficient, streamlined production to coincide with ultimate high quality products. Lean Six Sigma quality control can be successfully brought into the well-established models of “Lean manufacturing”, bringing efficient, streamlined production and high quality product together. The DMAIC (**D**efine, **M**easure, **A**nalyze, **I**mprove and **C**ontrol) methodology included in Sigma Six system helps to be checked and controlled the major topics where the risk could be transformed in the uncertainty and crisis.

In fact, what is Lean Six Sigma? This methodology developed by “Motorola” aims to minimize costs by reducing the process variation. This has to be achieved through continuous improvement. Lean Six Sigma process targets to compete with the market on a structural basis. The most important is that Lean process and Sigma System were based on figures and motivated data-driven decision. As J. D. Hayworth says: “... *The numbers don't lie...*”.

As per Stefanov et al. (2004) Six Sigma methodology includes four necessary steps for implementation of the methodology:

- Step 1. Development of strategic objectives for organization and business process, and segmentation of strategic goals. Management selects representatives, who are responsible for every single business process. They are appointed and are so-called “project champions”.
 - Crucial part of the implementation process of the Six Sigma methodology is to be clearly formulated the company vision and to be defined the management expectation. On this step has to be planned the targets for the key process within the company. Measurement criteria have to be synchronized with the customer demands. Performances bonuses are connected with the results within the team (Figure 1).
- Step 2. Project champions select the candidates who are the best for “Black Belt” and “Green Belt” Sigma representatives.

- Step 3. Group meetings. The group representatives are regularly working together where is used the DMAIC method for systematical improvement of the company results.
- Step 4. Through continuous improvement, the company is selecting the best performance practices and is marking the direction of the organization based on the statistical data files. This process of benchmarking is working through the copying of the best practices within the company, and the result is self-training and sustainable corporative environment.

When, for example, a risk assessment during evaluation stage identify that there is a risk of one in one thousand that specific daily process could create incident or accident with high company impact, the most of the Quality Management Systems responded: “The risk is very low!”. It is true that the possibility that this accident will happen is unlikely.

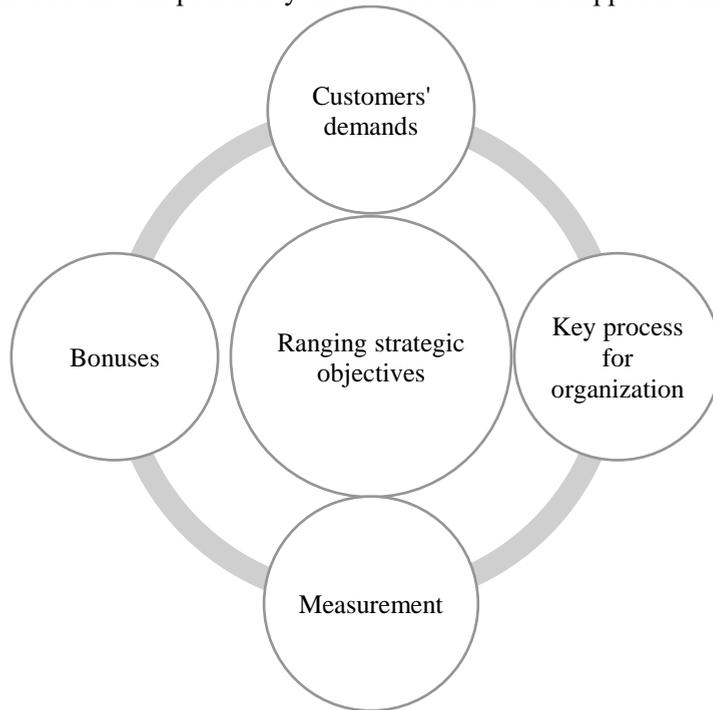


Figure 1. Development of strategic objectives

At the same time if the statistical data are $1000/365 = 2.7$ years this whole thing to happen, even only just once. Alternatively, even better every 2.7 years this will create an incident for which the business is not prepared just because the risk evaluation is underestimated. That is where Lean Six Sigma comes as an advantage for crisis control. The standard deviation “Sigma” is presented in Table 1.

Table 1. Six Sigma concept in numbers

| Sigma | % Good | % Defects | Defects per 1 million |
|-------|--------|-----------|-----------------------|
| 1 | 30.9 | 69.1 | 691 462 |
| 2 | 69.1 | 30.9 | 308 538 |
| 3 | 93.3 | 6.7 | 66 807 |
| 4 | 99.38 | 0.62 | 6 210 |
| 5 | 99.977 | 0.023 | 233 |

| | | | |
|---|---------|--------|---|
| 6 | 99.9997 | 0.0003 | 3 |
|---|---------|--------|---|

As a rule, most of the companies are applying Sigma 3 level, which means that most of the organizations are working under normal limits of 93% with average risk from defects, crisis, accidents or incidents up to 7%. Six Sigma standardization is allowing only 3.4 non-conformities on every 1 million. Factually, this is almost “Zero Tolerance” defect policy. The quality approved products should be 999 997 pieces on every 1 000 000 pieces.

If Lean Six Sigma is used as a severe scale philosophy and in a professional manner, it is even much more than a cost-cutting tool. Companies where the management waste much time for “fire extinguishing” of emergency will develop a new vision for “prevention from fire happening”.

As per the philosophy of Lean Six Sigma, “fire emergency actions” are considered as unproductive time due to the reason that they did not have any production benefit. As per Lean process view to minimizing the damage after a crisis is un-remunerative and therefore categorized as “waste”.

Today, systems for TSM (Total Safety Management) together with TPM (Total Production Maintenance) are playing an utterly essential role. The both are not enough for the organization to reach the acceptable level for crisis coordination and crisis maintenance. The goal is to help the organizations to reach the highest level of management behavior in practice and to avoid (or at least to minimize) the consequences from mistakes.

As per Stefanov et al. (2004) “Lusser’s Law” is indicating the reliability of the product and the correlation with the risk level (quality level) of the product (Table 2).

Table 2. Lusser’s product law ($R = r^n$)

| Reliability of factor (r), % | 99.999 | 99.99 | 99.90 | 99.00 |
|------------------------------|-------------------------------|-------|-------|--------|
| Number of factors (n) | Reliability of product (R), % | | | |
| 10 | 99.99 | 99.90 | 99.00 | 90.44 |
| 100 | 99.90 | 99.01 | 90.48 | 36.60 |
| 250 | 99.75 | 97.53 | 77.88 | 8.11 |
| 500 | 99.50 | 95.12 | 60.75 | 0.66 |
| 1000 | 99.01 | 90.48 | 36.79 | 0.0004 |

The main aim of the Lean Six Sigma system is to minimize the defect level near to the „Zero Tolerance” defects. The Lusser’s law is showing that even when the every from the details is produced with high level of quality and reliability, the total level of quality of the product is becoming lower.

The methodology for identification of the risk during a crisis is including the following steps:

- Definition of initial position of the company and need for action (1);
- Analysis of process-relevant channels and potential disruptive factors (2);
- Issuing a reorganizational concept with ad-hoc measures (3);
- Guidance in implementation of reorganization and consolidation process (4).

The concern “Johnson & Johnson” spent more than 100 million dollars for recall and relaunch of Tylenol in 1982. The company chairman James Burke was widely admired that he was under complete control during the crises. The news shared that he was sincere about the company steps with the media and pull the Tylenol capsules off the market. Johnson &

Johnson registered a rise of their turnover up to 500 million USD after the crisis in 1982. The company is very different today. The company survived through such an important situation (crises with Tylenol in 1982 registered 7 dead people) mainly because of the properly oriented management with investing in company reputation.

- In every risky situation for the organization, it is important how to **react without wasting excessive time** on getting 100 percent accuracy on the cause of the crisis. This may prove impossible, in any case.
- Access the situation from **inside and outside**.
- **Identify and analyze** the impact on the stakeholders, customers, employees, media;
- Take direct actions to **prevent the damage** spread (including H&S issues, company reputation, and financial indicators)
- **Act immediately**. Develop a crisis team and crisis management procedure before the crisis. Do not waste time to develop “new paths” in the unsecured situation with potential damage to the organization.
- Help and encourage the decision maker to solve in the basis the problem. Be careful about taking an emotional decision or to by **over-reacting** to the situation (media, news, and financial loss).

3. Practical application and discussion

3.1. Results based on good practice

In May 2018, a medium-sized Greek transport service provider for the Coca-Cola concern met the crisis in front of the problem coming inside the organization. Coca-Cola management complaint against the freight forwarding drivers because they are not just taking a break in the rest zone of Coca-Cola factory and instead of that, they are coming with big bags to take free drinks from the Coca-Cola refrigerators. It is an official Coca-Cola policy to be placed fridges with free drinks in the rest areas. They are free of charge for internal of external employees as well. The employees of the freight forwarding company are taking free beverages for their home, which is against the ethical expectation of the concern. Coca-Cola management claimed that they would stop the contract with the freight forwarding company due to the unethical behavior of their employees. The crisis is coming from inside. How to react and could be adequately used the Quality Management System tools in aspect to avoid any reputation risk or to avoid falling into the crises.

Joseph Hall says: *“A reputation once broken may possibly be repaired, but the world will always keep their eyes on the spot where the crack was.”*

The crisis management were aware of the high-level of importance during such an incident and reacted immediately. The company was ISO 9001 certified and follows strictly Health and Safety Management Standards (OHSAS 18001/ISO 45001). After this risk concerning the situation, the company decided to be implemented additional initial and periodical training for **ethical behavior** against the business partner’s standards for all their employees. The HR department replace all employees working with Coca-Cola brand and change them with new people passed the ethical training and Code of conduct awareness. It was sent an official letter to Coca-Cola management describing the steps, which the company was taking after their claim without to mark public that the drivers are removed

from the courses concerning Coca-Cola transportation. The most of the business partners did not want to hear that someone is “fired”. The crises solution is not to be over-reacting. The company has not to be trying to adjust the behavior for the crisis; It must be prioritized in preliminary how could be solved the problem in general. What is the template? Who is responsible? Why? What is the time for a reaction? If the decision is coming too late, it is possible for the results to be even worse than if not the best-taken decision but at the right moment. Therefore, if the company is staying in front of the coming storm, it is potentially possible for the stakeholders, competitors or even the employees to act at the same time and to take a decision.

Especially focused are several well-known models, which are the topic in the Quality Management Systems. This policy practiced for the first time organizations following the principles of the “Japanese Quality Award”. As far as Lean Six Sigma conception is concerned, it is debating whether it is one of the models for Total Quality Management or is a slightly different approach that is even more than the Quality Management System.

3.2. Applying Lean Six Sigma in crisis situation

In September 2011 year, a big Retail Hypermarket entered in a crisis with high reputation risk because of their sub-suppliers. One of the food supplier producing fish canned food danger the reputation of the company because of mold in the food. The product was not labeled as Retailer’s own brand, but the customers were angry because they bought the food from the supermarkets. Several customers claimed against the mold in the canned, which caused nausea and diarrhea to their children. The product was correctly stored without any temperature storage requirements. Six children were in the hospital with food poisoning. Some of the customers filed a complaint in the Bulgarian Food Agency and the Commission for Customer Protection. This product was relatively well bought because it was in the discount period (week of the fish products). In every 15 minutes were bought more than 15 canned products with mold in every of the 61 of the Retail shops in the country. The company reputation risk was becoming higher every minute. How can be solved the problem? Could be used Lean Six Sigma correctly?

Factually, the company was developed and nominated in place crisis team with a written procedure for the crisis, and at the same time, the management team part from the crisis committee was in a good leadership position. The company was able to take off all dangerous canned food for 23 hours. After applying, the methodology of Six Sigma was minimized the time of reaction in every Retail shop to 8- 16 minute. The company developed internal Lean methodology to react immediately and to maintain properly the crisis based on the crisis action plan below (Table 3).

Dedicated crisis team together with the Six Sigma Black Belts define, measure, analyze, improve and control the process and implement emergency alarming system via mobile phone application for notification in case of crisis. The time for taking off the dangerous products from the Retails shops reaches up to 23 hours because most of the Store managers did not have permanent work place and they did not read the email regularly. After implementation of the phone application, all store managers received notification with emergency code for crisis reaction. In the code is included the product description number of the dangerous product and the managers have between 8 and 16 minutes to take off the product from the Selling Store area.

The most important for the management was that they act accordingly to the situation in aspect to prevent the customer health and safety and to avoid any reputation damage. The implemented HACCP (Hazard Analysis and Critical Control Points) system, ISO 9001 system, IFS Food Standard (International Featured Standard) was synchronized correlatively with Lean Six Sigma together to help a crisis team. Most of the written procedures were adequately working in the company and even in crisis; the management could react with minimum “waste” time just following the markers. Based on the control points of Six Sigma methodology the management start the crisis management and improve the time for reaction from 23 hours to 16 minutes.

Table 3. Crisis action plan template

| No | Crisis action plan | Person responsible |
|-----|--|------------------------|
| 1. | Identification of the danger product – labeling, storing, lot number. Defining the problem lot or single product. | Retail manager |
| 2. | Taking off the risky products from the shopping area | Retail manager |
| 3. | A crisis team is informing the producer immediately; Crisis team is informing the member board immediately. | Crisis team |
| 4. | Analyses from the dangerous products are sent to an external laboratory for the third-party result. Third-party authorization body provided measurement results. HACCP team analyzes them. | HACCP team |
| 5. | At least once per year in the company is simulating a crisis. The written record is kept and performed for review by the management. Improvement of the crisis performance. | HACCP team |
| 6. | Every client is allowed as per Bulgarian legislation to aim a claim against the product following the requirements of Ordinance for protection of the customers. Complaints could be made through the communication channels with the company as well. | Quality department |
| 7. | Analyze the customer’s claims if the described problem is corresponding with the real situation in the company. Cross-check. | Crisis team |
| 8. | In case that the production, which is dangerous for the health and the life of the customers are already sold, the company is informing the customers that they buy back the “dangerous” products. | Retail management team |
| 9. | A crisis team is informing the Government authorities for potentially dangerous products. | Crisis team |
| 10. | The crisis products are stored in a quarantine area with special labeling. Controlling them not to be used for any activities. | Retail management team |
| 11. | Crisis team requires from the producer technological production cards, transportation cards, delivery cards, and lot investigation. Control them effectively and periodically. | Crisis team |

3.3. Discussion

Every crisis is an opportunity to show commitment to the customers, brand promise and institutional values. To show involvement in stakeholder’s interest, it is mandatory to generate crisis leadership. Since pressure is high inward and outward the organization during the crisis, leaders who perform well under pressure and uncertainty are the best leaders. To define the critical control points (CCP) in the vision and company behavior is the right way to act before the competitors, applying Lean Six Sigma. In periods of crisis, new ways of thinking or modern technologies are entering the companies and clash the old-fashioned views, models, and ideologies. In the last number of crisis management tips, the skills to be predicted, analyzed and managed the real risk are expected by the managers. The goal, in the long-term period, is to be resolved the numerous problems, which arise in a situation of sharp conflict or crisis.

As Marinov (2015) mentions: “*The crisis focus has to be over the benefits, which could be taken for the organization after the crisis.*”.

The problem is not to be predicted the risk, the lack of response to that prediction or misinterpretation is a warning. The risk can never be prevented entirely. Six Sigma is talking in statistical language using “probabilities” and “certainties”. Many of the employees do not think in that direction, they misunderstand or misinterpret the statistical data outcomes. Company’s response to a statistical warning of the risk of one in one thousand is usually an interpretation, similar to “the chances that it will happen are highly unlikely”. It is usually considered a risk too small to pay attention to. However, it should ring a red-hot alarm bell.

A smarter for the organization approach would be to consider that within a thousand days this **would** go wrong at least once. The correct response should be to questions: What is the level of preparedness in that one-in-a-thousand-incident? What has to be done during such a crisis? How can be ensured that the reputation risk for the company is kept to a minimum?

Alternatively, in Lean Six Sigma language - How can be ensured that the company revenue reached above the acceptable level? All resources and energy spent on anything other than the company business is in these situations “waste”. The consequences for weak prepared organizations are in many cases disastrous. In order to keep resources spent on solving a crisis incident to a minimum, a company that takes Lean process, Six Sigma and Crisis Management seriously, will make sure that a profound vulnerability audit takes place on a regular basis.

Crisis Implementation Plans, Disaster Incident Response Planning, and training have to be frequently performed and voluntary within the organization. The management has to be trained in crisis management fundamentals and receive regular training. All these points will minimize the effects that Lean Six Sigma categorizes as “The Hidden Factory”.

4. Conclusions

In the paper was observed how could be managed the crisis and how could be implemented Lean Six Sigma system in this situation. Some theoretical aspects reviewed on the literature references, where the crisis theory was widely analyzed. Procedure for reaction in crisis developed and applied effectively in the major Retail Company. As a summary of the above crisis, prevention is not new, neither the combination with Lean Six Sigma.

Lean system and crisis management were implemented in different business sectors, but remains a significant topic in the financial and commercial branch. It is recognized mostly by the commercial organizations and categorized as expensive nonsense. The reason that companies ignore it is that it is intellectually challenging to spend resources on something “that might happen”. Most of the company managers are more comfortable living in a world of certainties, than in the world of probabilities. Unfortunately, the world we live in is intended as world of probabilities. People got to be prepared for it. That is the starting point for investment in crisis prevention and crisis scenarios.

Based on the presented literature analyzes, theoretical and practical examples it was found that the crisis managed through the Lean Six Sigma in every small and medium sized organization gives a real results and is transforming the situation in competitive advantage

showing to the customers and the stakeholders good business behavior, transparency, ethical attitude and minimum time waste. Statistical data analyze help to be improved the critical points within the organization and the data marked the most sensitive operation within the activity where is possible to occur any crisis.

There was established that the big advantage of LSS in crisis prevention is that they are powerful tool set in the identification of the risk. Once when the risk is identified, Six Sigma is a strong methodology to drive process improvements that will minimize the risk.

There was established that to invest in properly crisis management program is a step in the direction to be more innovative and business pro-active. Every company could be a leader only when the same knows how to maintain effectively the risky situations.

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