Architecture and Planning Journal (APJ)

Volume 24 | Issue 1
ISSN: 2789-8547

Article 5

March 2018

PERFORMANCE IMPROVEMENT PLAN IN BUILDING PROCESSACCORDING TO QUALITY LEADERS AND QUALITY IMPROVEMENT TOOLS AND TECHNIQUES

Khaled El-Daghar
Assistant Professor, Faculty of Architecture – Design & Built Environment, Beirut Arab University, Tripoli Branch,
k.eldaghar@bau.edu.lb

DOI: https://doi.org/10.54729/2789-8547.1020

PERFORMANCE IMPROVEMENT PLAN IN BUILDING PROCESSACCORDING TO QUALITY LEADERS AND QUALITY IMPROVEMENT TOOLS AND TECHNIQUES

Abstract

The purpose of the study is to apply quality improvement tools and techniques to find out the root causes of performance problems in the building process. Performance refers to the way people do their jobs and the results of their works, seeking to solve a performance problem frequently implement a specific intervention, such as training without fully understanding the nature of the problem, or determining whether or not the chosen intervention is likely to succeed. Performance improvement approaches using a systematic methodology to find these root causes, and then implement interventions that applies to specific performance deficits. Performance improvement indicators / measures in building process involve the ongoing measurement collection and analysis of aggregate data to improve occupancy requirements, expectations, and safety. Based on, reviewing quality leaders' approaches and contributions to performance improvement; quality improvement tools and technique uses show the effectiveness of performance improvement efforts in the building process. The paper successfully proposes a methodology for applying tree diagram as a quality improvement tool that can be used in architecture, to develop a map / plan describes performance improvements in the building process, which will help architects to monitor, improve, and facilitate optimal outcomes of continuous quality improvement, thereby, ensure high building performance

Keywords

Quality, Performance, Standards, Architecture, Plan, Indicators, Improvement, Measures.

PERFORMANCE IMPROVEMENT PLAN IN BUILDING PROCESS ACCORDING TO QUALITY LEADERS AND QUALITY IMPROVEMENT TOOLS AND TECHNIQUES

K. El-DAGHAR[1]

ABSTRACT

The purpose of the study is to apply quality improvement tools and techniques to find out the root causes of performance problems in the building process. Performance refers to the way people do their jobs and the results of their works, seeking to solve a performance problem frequently implement a specific intervention, such as training without fully understanding the nature of the problem, or determining whether or not the chosen intervention is likely to succeed. Performance improvement approaches using a systematic methodology to find these root causes, and then implement interventions that applies to specific performance deficits. Performance improvement indicators / measures in building process involve the ongoing measurement collection and analysis of aggregate data to improve occupancy requirements, expectations, and safety. Based on, reviewing quality leaders' approaches and contributions to performance improvement; quality improvement tools and technique uses show the effectiveness of performance improvement efforts in the building process. The paper successfully proposes a methodology for applying tree diagram as a quality improvement tool that can be used in architecture, to develop a map / plan describes performance improvements in the building process, which will help architects to monitor, improve, and facilitate optimal outcomes of continuous quality improvement, thereby, ensure high building performance.

KEYWORDS

Quality, Performance, Standards, Architecture, Plan, Indicators, Improvement, Measures.

1. INTRODUCTION

Performance improvement (PI) is a continuous process of improving. Performance improvement approaches using a systematic methodology to find the root causes of a performance problem, and then implement an intervention that applies to that specific performance deficit, by measuring and monitoring performance to ensure that the improvements are sustained (Nelson, 2006). Developing a performance improvement programme in the building process can promote a safe environment and improve building outcomes, though, applying performance improvement indicators / measures, in addition to quality improvement tools and techniques, which is considered as; the implementation of quality leaders / pioneers in performance / quality approaches, in order to achieve high building performance.

Performance improvement indicators / measures are the process of obtaining quantitative information about a process to achieve excellent quality. The performance of products or services must be measured and compared with a known standard. For measuring the performance of building

[1] Khaled El-Daghar
Assistant Professor, Faculty of Architecture – Design & Built Environment, Beirut Arab University, Tripoli Branch
E-mail: k.eldaghar@bau.edu.lb

and applying the benchmarking approach, must first establish suitable key performance indicators (KPIs) that are most critical in determining the overall success of the building process. KPIs are compilations of measures / data used to assess the performance of buildings. KPIs play a key role in providing information on the performance improvement of the building process. This information can be collected, through quality improvement tools and techniques. Therefore, it is necessary to understand how to apply it to identify, solve, and improve performance / quality problems (Cox & Issa & Ahrens, 2003).

Quality leader's contributions in quality management / approaches, such as quality improvement tools and techniques help in solving these problems. Deming is one of the most renowned quality leaders in the world, and also, revolutionized quality and productivity of the Japanese industry. Deming is a proponent of PDCA cycle as a quality improvement method for problems solving. Next to Deming's cycle, the equivalent steps for Juran's trilogy, and the 14 points for improvement that described by Crosby. Last, the scientific approaches to problem solving by Ishikawa and Feigenbaum. Each of these quality leaders / pioneers described own quality improvement or problem solving method, nevertheless, these methods are similar in content (Panthi & M. Ahmed, 2008 and Putri & Yusof, 2009).

2. LEADERS IMPLEMENTATION IN PERFORMANCE IMPROVEMENT

Although the origins of (TQM) go back to the 1940 and 1950, Feigenbaum first used the term formally in 1957. More recently, TQM has been developed through a number widely recognized approaches put forward by several "quality leaders", which contributed to performance improvement, such as; Deming, Juran, Ishikawa, Feigenbaum, and Crosby (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009).

W. Edwards Deming

William Edwards Deming (Born in Iowa; America, October 14, 1900 - December 20, 1993) is a prominent consultant, teacher and author on many subjects of quality, and one of the best known early pioneers who is credited with popularizing quality control in Japan in the early 1950s. Deming philosophy emphasizes the systematic nature of institutions, the importance of leadership, and the need to reduce variation in institutional processes, but by maintaining that an institution must adopt the fourteen points of Deming's system, at all levels (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009).

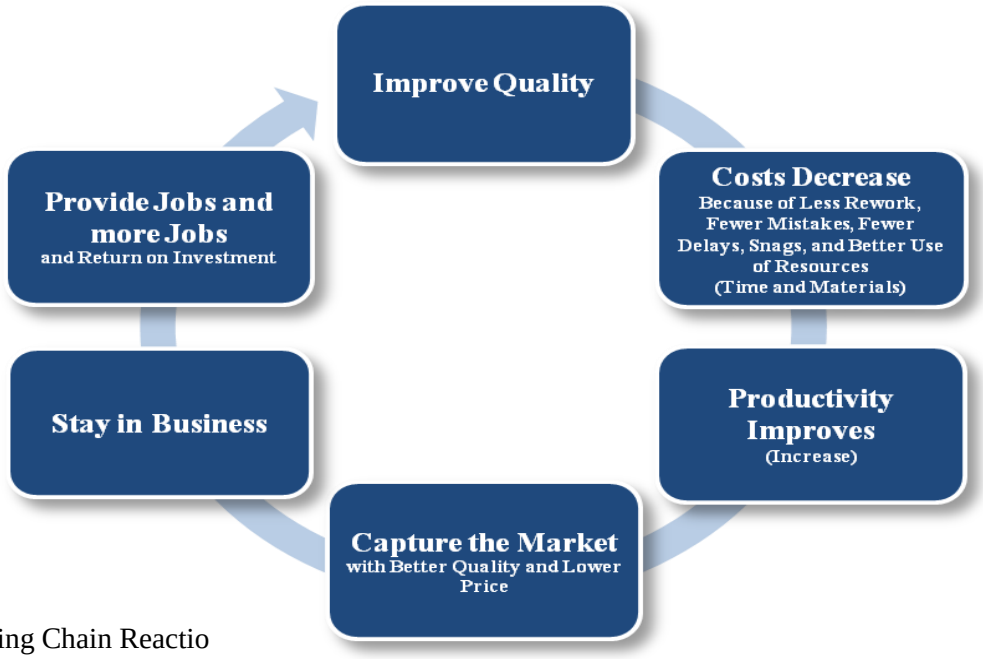

Fig. 1 Deming Chain Reactio

Reference: Updated by the researcher.

Deming believes that quality is to be built into the product at all stages, in order to achieve a high level of excellence. Deming included the managerial dimensions of planning, organizing and controlling, and focused on the responsibility of management to achieve quality, as well as the need for setting goals. Deming also developed what is known by; the Deming chain reaction, which include improved quality, costs decrease, productivity improves, capture the market with better quality and

lower price, stay in business, and resulting in providing jobs and more jobs, to return on investment and long term survival (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009) (See Figure 1).

The cornerstone of Deming's philosophy with continuous improvements is based on statistical process control, which must be implemented where corrective action can be successfully instituted. Top management involvement is a key requirement with proper delegation of quality responsibilities at all levels in an institution. The recognition of training and leadership skills is vital in adopting. Deming's foundation work, summarize in quality, by identifying 14 points for institutions to follow (See Table 1). Deming's 14 key principles could be applied, anywhere, to small institutions as well as large one, to the service industry as well as manufacturing. Deming also stressed that the system of work, which determines how work is performed only created by its managers (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009 and M. Salter, 1993).

Table 1: Deming's 14 key principles for Quality Management
Reference: Updated by the researcher.

Deming's 14 Points	
1- Create constancy of purpose for service improvement	2- Adopt the new philosophy
3- Cease dependence on inspection to achieve quality	4- End the practice of awarding business on price alone; instead minimize total cost by working with a simple supplier
5- Improve constantly every process of planning, production, and service	6- Institute training and retraining on the job
7- Develop leadership in the organization	8- Drive out fear
9- Break down barriers between staff areas	10- Eliminate exhortation for the work
11- Focus on quality and not just quantity; eliminate quota systems if they are in place	12- Remove barriers to pride of workmanship
13- Educate / train employees to maximize personal development	14- Put every on to work on the transformation

Joseph M. Juran

Joseph Moses Juran (Born in Romania, December 24, 1904 - February 28, 2008) is specialized in managing for quality. Juran philosophy for (TQM) is the system of activities directed at achieving delighted customers, empowered employees, higher revenues, and lower costs. Juran believed that main quality problems are due to management rather than workers. The attainment of quality requires activities in all functions of a firm; firm-wide assessment of quality, supplier quality management, using statistical methods, quality information system, and competitive benchmarking are essential to quality improvement. Juran approach is an emphasis on team (QC circles and self-managing teams) and project work, which can promote quality improvement, improve communication between management and employee coordination, and improve coordination between employees. Juran also emphasized the importance of top management commitment and empowerment, participation, recognition, and rewards. Juran developed "Quality Trilogy", by pure representation of managing for quality that consists of three basic quality-oriented processes (Zhang, 2000) (See Figure 2):

Fig. 2 Juran Three Basic Quality-Oriented Processes
Reference: Updated by the researcher.

According to Juran, it is very important to understand customer needs. This requirement applies to all involved in marketing, design, manufacture, and services. Identifying customer needs requires more vigorous analysis and understanding, to ensure that the product meets the customer's needs and is fit for its intended use, not just meeting product specifications. Thus, market research is essential for identifying customer's needs. In order to ensure design quality, Juran proposed the use of techniques including quality function deployment, experimental design, reliability engineering, and concurrent engineering (Zhang, 2000). Juran Trilogy (Quality Trilogy) involves those three areas for quality conversion within an institution, which described as follows (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009) (See Figure 3):

1- Quality planning: It involves a series of universal steps as follows:
   - Determine who the customers are (Internal and external).
   - Determine the needs of the customers.
   - Develop product features that respond to customer's needs.
   - Develop processes that are able to produce those product features.
   - Transfer the resulting plans to the operating forces.
2- Quality Control: This process consists of the following steps:
   - Evaluate actual quality performance.
   - Compare actual performance to quality goals.
   - Act on the differences.

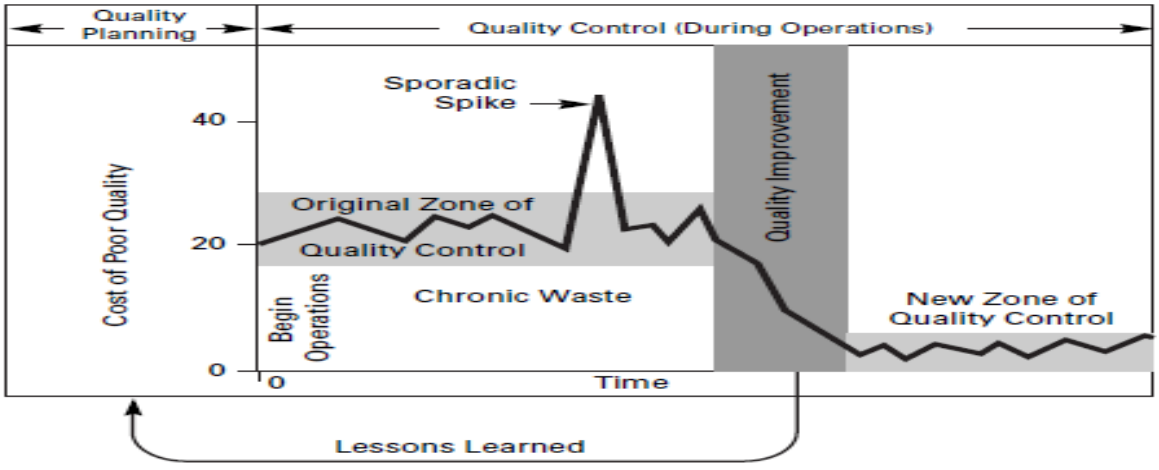

Fig. 3 Juran Trilogy (Quality Trilogy)
Reference: Textile Solutions, 2013.

3- Quality improvement: It consists of a series of universal steps:
   - Establish the infrastructure needed to secure annual quality improvement.
   - Identify the specific needs for improvement projects

- For each project; establish a project team with clear responsibility for bringing the project to a successful conclusion.
- Provide resources; motivation and training needed by teams to diagnose causes, stimulate the establishment of a remedy, and establish controls to hold the gains.

Juran defined four broad categories of quality costs, which can be used to evaluate the firm's costs related to quality. Such information is valuable to quality improvement. The four quality costs are listed as follows (Zhang, 2000):

1- Internal failure costs: (Scrap, rework, failure analysis, and etc.), associated with defects found prior to the transfer of the product to the customer.
2- External failure costs: (Warranty charges, complaint adjustment, returned material, allowances, and etc.), associated with defects found after the product is shipped to the customer.
3- Appraisal costs: (Incoming, in-process, final inspection and testing, product quality audits, maintaining the accuracy of testing equipment, and etc.), incurred in determining the degree of conformance
4- Incurred in keeping failure and appraisal costs to a minimum.

Juran has extended his principles to consider business processes, and has recently developed a concept entitled; managing business process quality, which is a technique for executing cross functional quality improvement (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009).

Kaoru Ishikawa

Kaoru Ishikawa (Born in Tokyo; Japan, July 13, 1915 - April 16, 1989) is a pioneer in quality control activities in Japan, and bases his work on Deming and Juran. Ishikawa has been credited with originating the concept of quality circles and cause and effect diagrams. In 1985, Ishikawa argued that quality management extends beyond the product and encompasses after-sales service, the quality of management, the quality of individuals, and the firm itself. Ishikawa claimed that the success of a firm has been highly dependent on treating quality improvement as a never-ending quest, and a commitment to continuous improvement can ensure that people will never stop learning (Zhang, 2000).

Ishikawa advocated employee participation as the key to the successful implementation of (TQM), and quality circles as Ishikawa believed are an important vehicle to achieve this. Such all other gurus, Ishikawa emphasized the importance of education, stating that quality begins and ends with it. Ishikawa has been associated with the development and advocacy of universal education in the seven quality control tools for continuous improvement process (Ishikawa, 1985) (Zhang, 2000). These tools are as listed below (Soković & Jovanović & Krivokapić & Vujović, 2009) (See Figure 4):

1. Pareto chart.
2. Fishbone / Cause and effect diagram (Ishikawa diagram).
3. Flow chart.
4. Scatter diagram.
5. Check sheet.
6. Histogram.
7. Control chart.

Cause and effect diagram (Ishikawa diagram) in fishbone shape, for instance, showing big arrows as factors of major causes, and smaller arrows connect the sub-causes to major causes (Cause), and all affecting the overall problem (Effect) (Zhang, 2000) (See Figure 5).

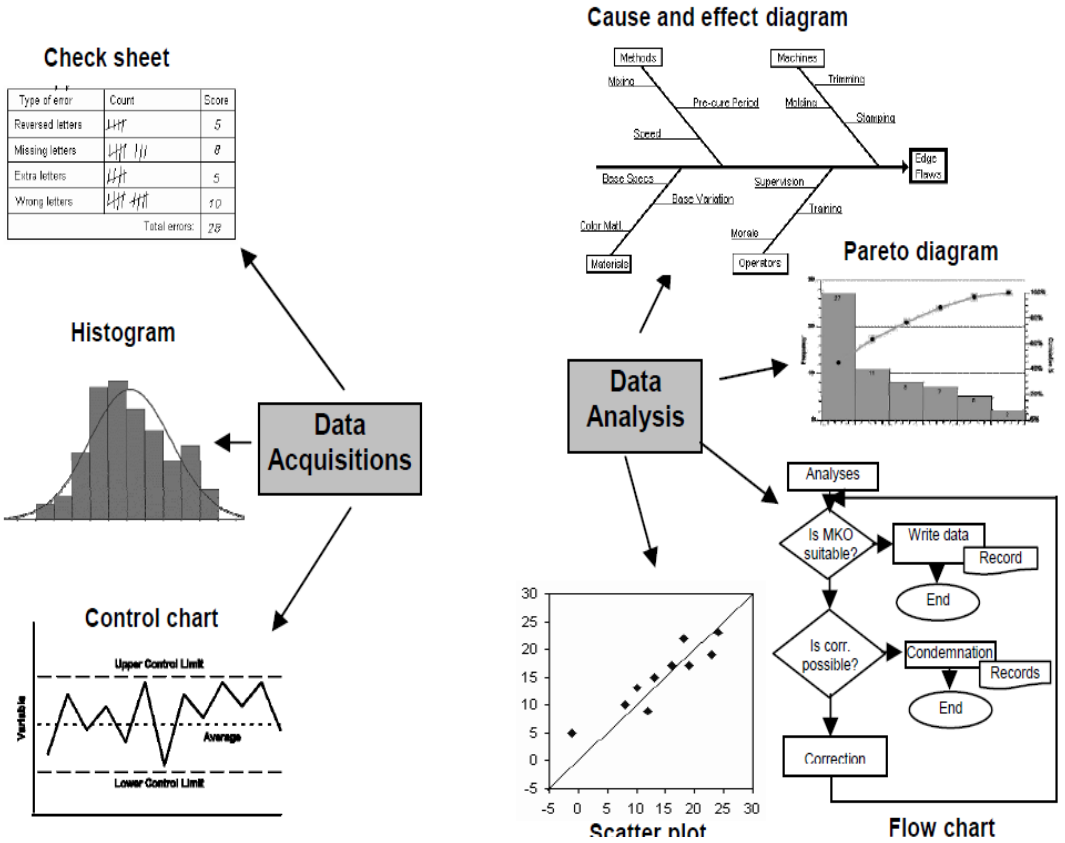

Fig. 4 Basic Seven Quality Tools for Continuous Improvement
Reference: Soković & Jovanović & Krivokapić & Vujović, 2009.

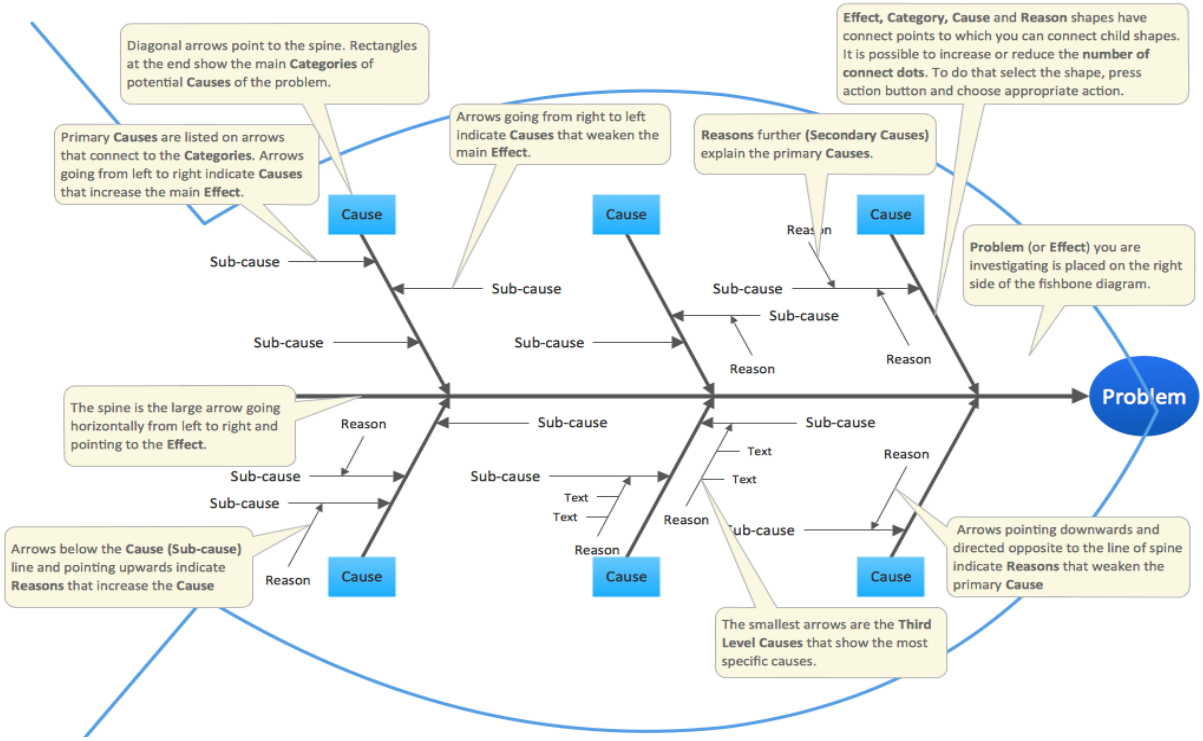

Fig. 5 Fishbone / Cause and Effect Diagram (Ishikawa Diagram)
Reference: Concept Draw Solution Park, 2014

In 1985, Ishikawa suggested that the assessment of customer requirements serves as a tool to foster cross-functional cooperation, selecting suppliers should be on the basis of quality rather than solely on price, and cross-functional teams are effective ways of identifying and solving quality problems. Ishikawa's concept of (TQM) contains the following six fundamental principles (Zhang, 2000):

1. Quality first, not short-term profits first.
2. Customer orientation, not producer orientation.
3. Breaking down the barrier of sectionalism for the customer.
4. Using facts and data to make presentations-utilization of statistical methods.
5. Respect for humanity as a management philosophy, full participatory management.
6. Cross-functional management.

Ishikawa has many other contributions to quality considering user friendly quality control, emphasized the internal customer, shared vision, and implementation of quality circles, which is a volunteer group composed of workers, usually under the leadership of their supervisor, who are trained to identify, analyze, and solve work-related problems and present their solutions to management in order to improve the performance of the organization, and motivate and enrich the work of employees (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009).

Armand V. Feigenbaum

Armand Vallin Feigenbaum (Born in America, 1922) is a quality control expert and businessman. Feigenbaum devised the concept of total quality control, later known as total quality management (TQM). In 1991 Feigenbaum defined (TQM) as: "An effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in an organization so as to enable production and service at the most economical levels, which allow full customer satisfaction". Feigenbaum claimed that effective quality management consists of four main steps, which described as follows (Zhang, 2000) (See Figure 6):

1. Setting quality standards.
2. Appraising conformance to these standards.
3. Acting when standards are not met.
4. Planning for improvement in these standards.

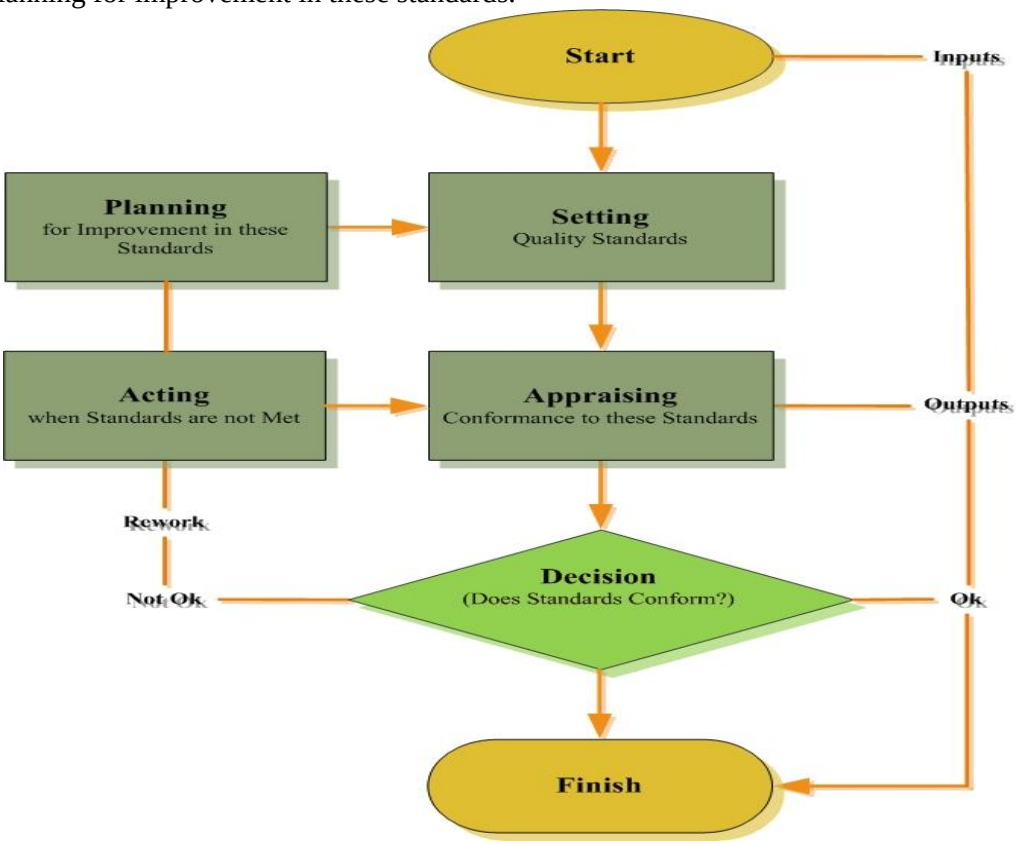

Fig. 6 Feigenbaum Four Steps for Quality Management
Reference: Updated by the researcher.

Feigenbaum argued that quality chain starts with the identification of all customers' requirements, and ends only when the product or service is delivered to the customer who remains satisfied. Thus, all functional activities, such as marketing, design, purchasing, manufacturing, inspection, shipping, installation, and service are involved in and influence the attainment of quality. Identifying customer's requirements is a fundamental initial point for achieving quality. Feigenbaum claimed that effective (TQM) requires a high degree of effective functional integration among people, machines, and information stressing a system approach to quality. A clearly defined total quality system is a powerful foundation for (TQM). A total quality system is defined as: "The agreed firm-wide operating

work structure, documented ineffective, integrated, technical, and managerial procedures, for guiding the coordinated actions of people, machines, and information about the firm in the best and most practical ways, to assure customer quality satisfaction and economical quality costs" (Zhang, 2000).

Feigenbaum emphasized that efforts should be made toward the prevention of poor quality rather than detecting it after the event. Feigenbaum argued that quality is an integral part of the day-today work off line, staff, and operatives of a firm, and there are two factors affecting product quality; the technology, which is machined, materials, and processes, and the human, which is operators, foremen, and other firm personnel. One of these two factors "human" is the greater importance by far. Feigenbaum considered a top management commitment, employee participation, supplier quality management, information system, evaluation, communication, use of quality costs, and use of statistical technology to be an essential component of (TQM). Feigenbaum argued that employees should be rewarded for their quality improvement suggestions, and quality is everybody's job. Feigenbaum also stated that effective employee training and education should focus on the following three main aspects; quality attitudes, quality, knowledge, and quality skills (Zhang, 2000).

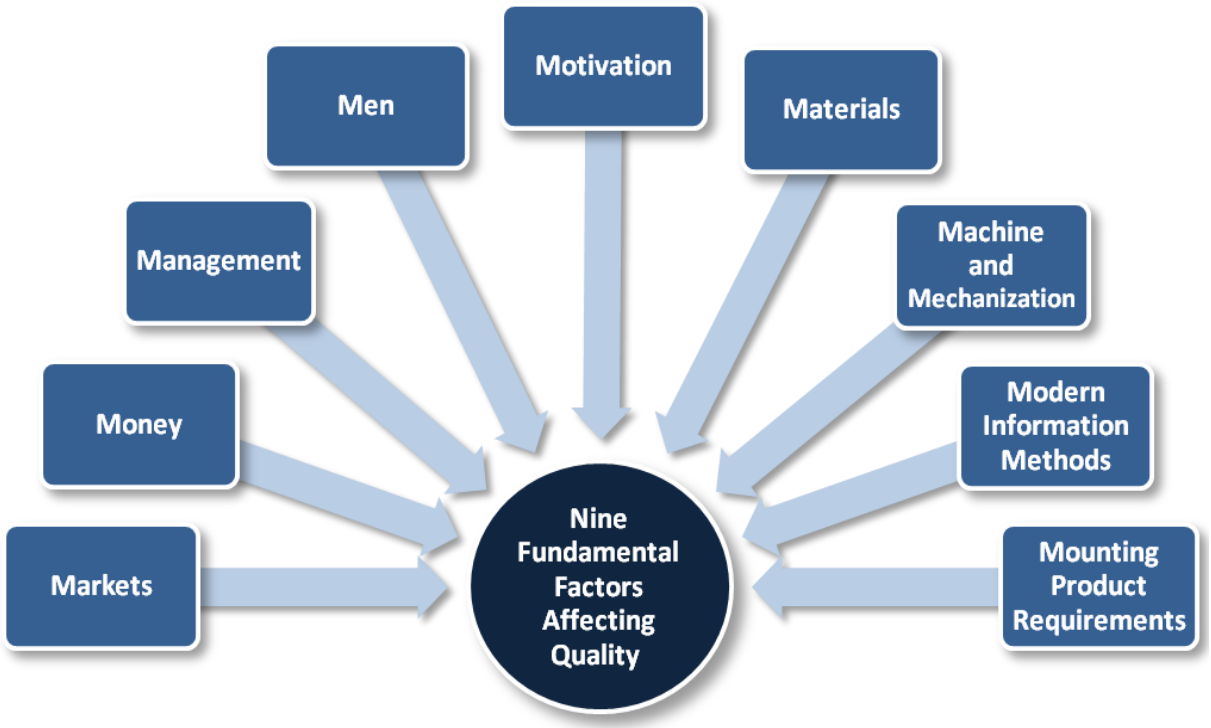

Fig. 7 Feigenbaum Nine Fundamental Factors Affecting Quality
Reference: Updated by the researcher.

Feigenbaum total approach to quality is a major strength in eliminating uncoordinated quality activities. Feigenbaum established nine fundamental factors affecting quality, which are markets, money, management, men, motivation, materials, machines and mechanization, modern information methods, and mounting product requirements (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009) (See Figure 7).

Feigenbaum has many other contributions to quality considering the concept of a "hidden" plant, the idea that so much extra work is performed in correcting mistakes that there is effectively a hidden plant within any factory. Also, accountability for quality, because quality is everybody's job, it may become nobody's job, the idea that quality must be actively managed and have visibility at the highest levels of management. In addition to, the concept of quality costs, which is a means to quantify the total cost of quality-related efforts and deficiencies, it was first described in 1956 by Feigenbaum (Zhang, 2000).

Philip B. Crosby

Philip Bayard Crosby (Born in West Virginia; America, June 18, 1926 - August 18, 2001) is a management consultant, businessman, and author, who contributed to management theory and quality management practices. The philosophy of Crosby focused on reducing costs through quality improvement and stressed that both high and low end products can have high quality. Crosby believed that an organization that established a quality programme will see savings returns that more than pay

off the cost of the quality programme "Quality is free". Crosby's response to quality crisis was the principle of "Doing it right the first time". Crosby also included four major principles (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009):

1. The definition of quality is conformance to requirements (Requirements, meaning both the product and the customer's requirements).
2. The system of quality is prevention.
3. The performance standard is Zero Defects (Relative to requirements).
4. The measurement of quality is the price of non-conformance

Fig. 8 Crosby's Absolutes of Quality Management
Reference: Updated by the researcher.

Crosby argued that Zero Defects are a management tool aimed at the reduction of defects through prevention. It is directed at motivating people to prevent mistakes by developing a constant, conscious desire to do their job right the first time. Crosby considered Zero Defects as a new dimension in quality assurance, and seeks to directly reverse the attitude that the amount of mistakes a worker makes doesn't matter since inspectors will catch them before they reach the customer. Crosby philosophy is based on four fundamental principles called: "Absolutes of Quality Management", which described as follows (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009) (See Figure 8):

1. Quality is conformance to requirements.
2. Defect prevention is preferable to quality inspection and correction.
3. Zero Defects is the quality standard.
4. Quality is measured in monetary terms; the Price of Non-Conformance (PONC).

In 1979, Crosby penned (Quality is Free: The Art of Making Quality Certain), which preserved the idea of Zero Defects in the concept of the Absolutes of Quality Management in a 14 step for quality improvement programme. Crosby's 14 points are action steps for institutions to help them implement (TQM) (Zhang, 2000) (See Table 2):

Table 2: Crosby's 14 Step for Quality Improvement Programme
Reference: Updated by the researcher.

Crosby's 14 Points	
1- Management commitment	2- The quality improvement team
3- Quality measurement	4- The cost of quality
5- Quality awareness	6- Corrective action
7- Zero Defects planning	8- Supervisor training
9- Zero Defects day	10- Goal setting
11- Errors cause removal	12- Recognition
13- Quality Council	14- Do it over again

Crosby has many other contributions to quality considering the concept of Six Sigma, which is a set of strategies, techniques, and tools for process improvement seeks to improve the quality of process outputs, by identifying and removing the causes of defects (Errors) and minimizing variability in manufacturing and business processes. Also, the concept of (TQM), which was developed by Deming, Crosby considered that (TQM) is an approach to improve the effectiveness and flexibility of business as a whole, and essentially a way of organizing and involving the whole organization, every single person at every level to improve quality and achieve customer satisfaction (Zhang, department, every activity, every 2000).

3. LEADERS SIMILARITIES IN PERFORMANCE IMPROVEMENT

All quality leaders / pioneers above mentioned believe that management system rather than the workers are the cause of poor quality. These leaders and others have largely absorbed and synthesized each other's ideas, but generally speaking all leaders belong to two schools of thoughts; those who focus on technical processes and tools, and those who focus on the managerial dimensions. Deming provided manufacturers with methods to measure variation in a production process, in order to determine the causes of poor quality. Juran emphasized on setting specific annual goals and establishing teams to work on them. Ishikawa stressed on the use of quality circles. Feigenbaum considered that total quality control aimed at managing by applying statistical and engineering methods throughout the institution. Crosby argued on a programme of Zero Defects (Brun, 2011 and Al-Saket, 2003 and Oschman, 2009 and M. Salter, 1993). Therefore, after reviewing all their contributions to quality, the researcher developed a comparison table to describe differences and similarities in quality management / approaches and performance improvement of the five quality leaders as follows (See Table 3):

Table 3: Comparison between Most Popular Quality Leaders Contributions in Performance Improvemen
Reference: The researcher.

Dimension	Deming	Juran	Ishikawa	Feigenbaum	Crosby
Definition of Quality	A product or service that helps anyone and has a good sustainable market	Fitness for use free of deficiencies and meeting customer needs	Engaging in quality control in order to satisfy the requirements of consumers	The total composite characteristics of marketing through which the product and service in use will meet the expectations of the customer	Conformance to requirements, including customer satisfactions
Causes of Poor Quality	Caused by: Process overwhelmingly, not the workers (Common cause variation)	Caused by: Poor planning / design	Caused by: Over emphasis on statistical quality control (Make people dislike quality control), and creation of rigid specification standards (Leads to difficulty of change)	Caused by: poorly designed products, inefficiently distributed, incorrectly marketed and improperly serviced and supported	Caused by: Non-conformance; as there are (Hidden) costs of non-quality
Objectives of Quality	Error-free objective; (Reduce common cause variation, and hit target every time)	Reduce chronic poor quality and move to new zone of quality control	Introduce the idea of quality control circle (team) for identifying and solving quality problems	Total quality control aimed at managing by applying statistical methods throughout the institution	Zero Defects objective; (Do it right the first time)

Customer Orientation to Quality	Yes, improve quality to improve competitive position	Yes, meet customer needs	Yes, customer orientation; (Assessment customer requirements and selecting suppliers)	Yes, a clear customer oriented quality management process required	Yes, satisfy customer
General Approaches of Quality	Prospective prevention in all process, not retrospective; (Inspection and understand variation through statistical quality control)	Management approach; (Find opportunities for improvement and change culture regarding quality)	People oriented approach; (Emphasis importance of peoples' participation in problem solving process, and utilization of statistical methods)	A totality system approach to quality	Managerial approach; (QI teams, project basis for improvement, and prevention and remove errors)
Management Responsibility of Quality	Commitment to quality control; don't blame employees, drive out fear, break down barriers, and train and teach statistical methods to employees	Commitment to quality, especially; design and instill a quality culture, and support operating forces and quality improvement project team	Commitment to continuous improvement by; full participatory management and people participation	Commitment to quality by; management and human participation	Commitment, leadership, and involvement in quality improvement by; worker training, and promote quality awareness by employees and management
Methods for Quality / Performance Improvement	Deming Chain Reaction, Deming's 14 key principles for quality management, and PDCA cycle	Juran Trilogy (Quality planning, quality control, and quality improvement), and Juran four quality costs	Ishikawa's six fundamental principles for (TQM) concept, quality circles, and seven quality control tools as; Pareto chart, Cause and effect diagram, Stratification chart, Scatter diagram, Check sheet, Histogram, and Control chart	Feigenbaum four steps for quality management, and Feigenbaum nine fundamental factors affecting quality	Crosby's absolutes of quality management, Crosby's 14 steps for quality improvement programme, and Six Sigma

4. PERFORMANCE IMPROVEMENT PLAN IN BUILDING PROCESS

Based on the previous table findings compared with performance / quality objectives, general approaches, and improvement methods of green building rating systems, which is concerned for green building performance measurements, there is absence in using quality improvement tools and techniques for enhancing building performance. In addition to, there is deficient information among architects about performance improvement indicators / measures in the building process. Also, there is a misconception by concerning green building rating systems as an evaluation tool to get quality accreditation certificates, and not by applying these standards for improving building performance. Therefore, it is pressing necessity for developing map / plan describes performance improvements in the building process.

Quality in architecture main objective is continuously striving to provide efficiently for building process. Performance improvement map / plan approach is to establish a framework that describes performance improvements in the building process, which encourage innovations, allow for more open competition, promote transparent procurement, and support cost-effective building, in order to, achieve high building performance.

American Society for Quality (ASQ) defined quality plan as: "A document or set of documents that describe the standards, quality practices, resources and processes pertinent to a specific product, service or project" (American Society for Quality, 2012).

Purpose of Performance Improvement Map / Plan

The purpose is to meet or exceed the expectations of clients and architects alike for striving efficiently in the building process.

Aims of Performance Improvement Map / Plan

The aim consistent with the purpose of the map / plan to promote building process through quality dimensions as follows:

1. Tangible: The physical facilities, equipment, and appearance of personnel and communication materials.
2. Reliability: The ability to perform the promised building process dependably and accurately.
3. Assurance: The knowledge and courtesy of architects and their ability to convey trust and confidence.
4. Empathy: The provision of caring and individualized attention to occupancy.
5. Responsiveness: The willingness to help occupancy and to provide promoted building process.

Objectives of Performance Improvement Map / Plan

The objectives consistent with the purpose and aim of the map / plan, these objectives can be categories as follows:

1. Establish priorities for improving services that have the greatest impact on client outcomes and satisfaction.
2. Provide guidance and knowledge of the processes that architects require to improve.
3. Respond proactively to occupancy needs, expectations, and feedback concerning that quality services are delivered.
4. Enhance the provided quality services through; ongoing objective and systematic measurement, analysis, and improvement of performance.
5. Facilitate the most appropriate allocation of quality resources.
6. Comply with legislative regulations, accreditation standards, architectural guidelines, and professional requirements.

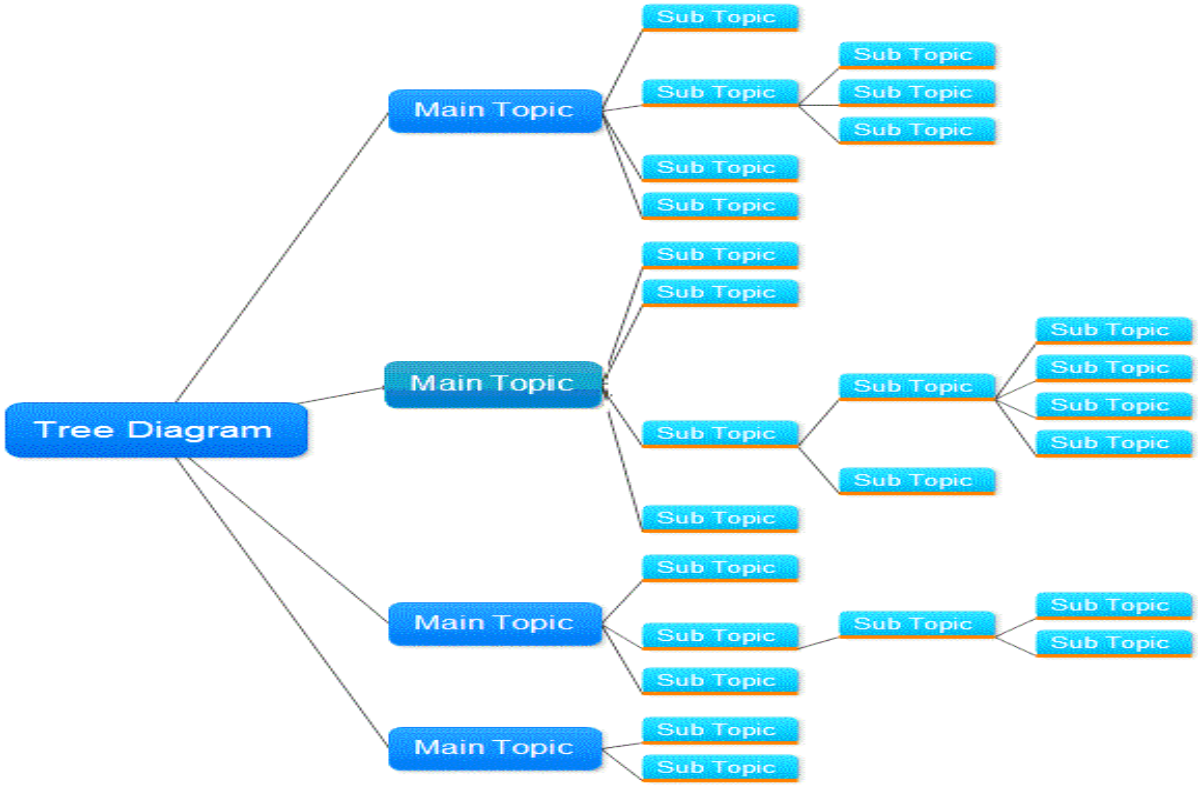

Fig. 9 Sample of Tree Diagram
Reference: Edraw Professional Diagram Solution, 2013.

Scope of Performance Improvement Map / Plan

The scope of this map / plan is to achieve the aim of delivering high-quality services, all architects are given responsibility and authority to participate in the improvement process that outlined in the plan. The scope of this plan includes the following activities:

1. All direct and indirect architect services affecting the satisfaction of occupancy.
2. Occupancy and architect satisfaction surveys.
3. Professional staff credentialing.
4. Occupancy record reviews.
5. Risk management activities.

Framework of Performance Improvement Map / Plan

Tree diagram is one of quality improvement tools that can be used in architecture to break down broad categories into full detail of paths and task levels, which are involved in the process and must be accomplished in order to achieve a goal. Tree diagram used to map out an implementation plan starts with one item that branch into two or more and so on to generate root causes of the problem, and then generate alternative solutions. It looks like a tree, with trunk and multiple branches (See Figure 9). Developing tree diagram helps to move thinking step by step from generalities to specifics (American Society for Quality, 2004).

Tree diagram also called as: Systematic diagram, tree analysis, analytical tree, or hierarchy diagram. The American Society for Quality (ASQ) has formed tree diagram category as: "Data collection and analysis, which can be used when probing for the root cause of a problem, when analyzing processes in detail, and when developing actions to carry out a solution or other plan" (American Society for Quality, 2004).

The researcher proposes a methodology for developing a map / plan, through, applying tree diagram as a quality improvement tool in architecture, which is developed by the researcher for producing baseline data in respect of establishing a framework that describes performance improvement in the building process. The researcher is innovated the proposed tree diagram as follows (See Figure 10):

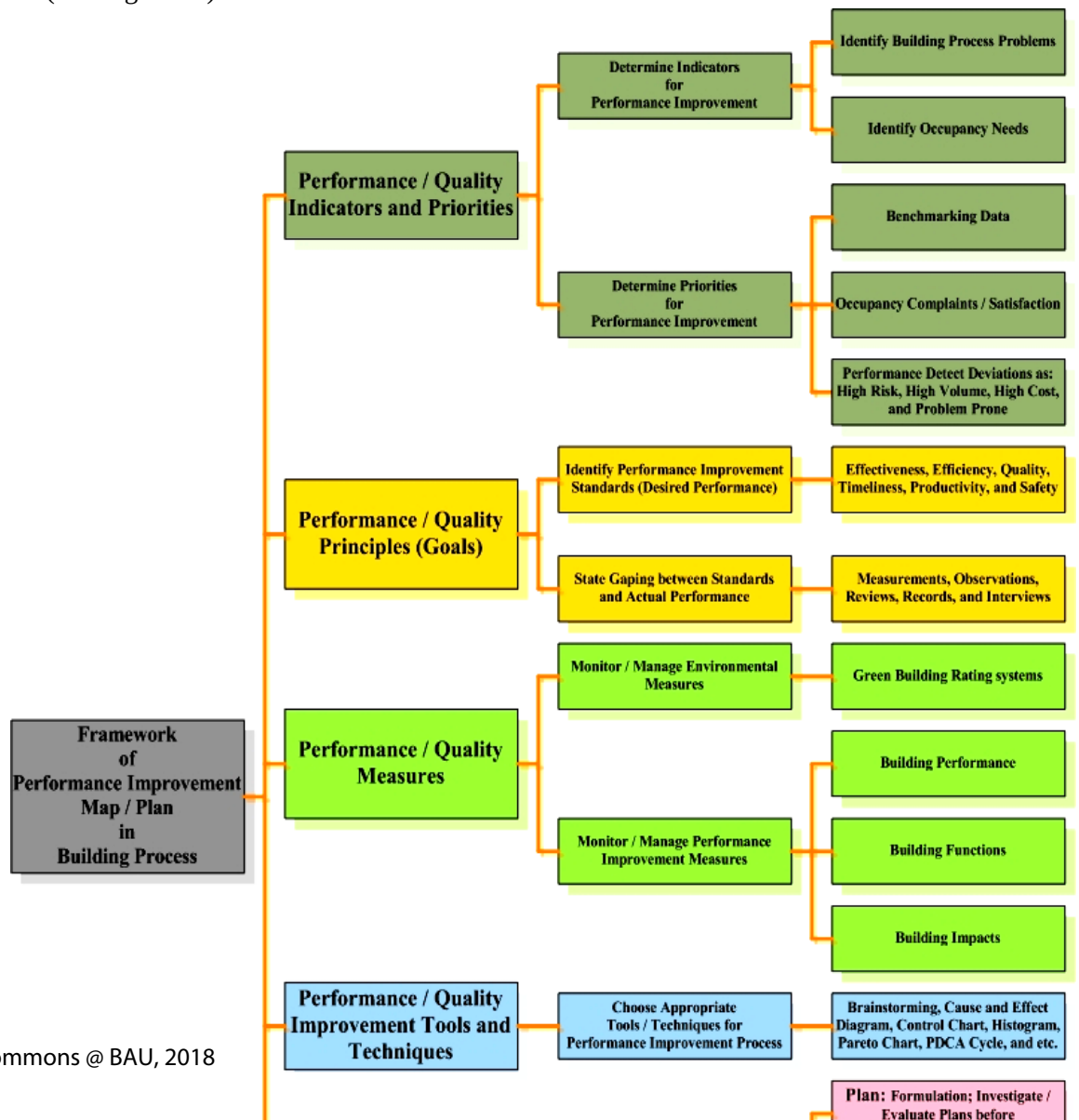

Fig. 10 Proposed Performance Improvement Map / Plan in Building Process
Reference: The Researcher

5. CONCLUSIONS

Performance improvement considered as the fifth stage of quality management / approaches, so, improving quality in architecture reflects on enhancing building performance. Thus, the researcher discusses at the previous study quality leaders implementation in quality management / approaches, represented by quality improvement tools and techniques important in collecting, analyzing, visualizing, and making base data, which can be used in architecture for continuous quality improvement process, as, there are significant numbers of quality tools and techniques that can be used in continuous quality improvement, and could be appropriate for improving building process.

Also, the researcher focuses to reach some suitable key performance indicators (KPIs) that are most critical for determining the extensive success in the building process. Using correctly scientific method in drafting topics up to innovate a map / plan describes performance improvements in the building process, which have been developed to guide and facilitate the design work of architects, through, applying tree diagram as a quality improvement tool that can be used in architecture for enhancing building performance, which led to general strategies for performance / quality:

1. Provide appropriate training programs for architects concerning performance improvement in the building process.
2. Conduct appropriate seminars and lectures that concerning the concept of quality in architecture.
3. Establish diploma / master of quality management in architecture, as; (PMP) and (IPMA) to graduate architects and consultants specialists in project quality management.
4. Use quality improvement tools and techniques for monitoring and controlling building process to maintain and improve performance / quality of building.
5. Develop other quality improvement tools and techniques applications in architecture, which include policies and procedure manual to guide architects and improve building performance.

REFERENCES

- Al-Saket, Ammar. (2003). A Case Study of Total Quality Management in a Manufacturing and Construction Firm, Master Thesis of Engineering Management, Faculty of Engineering. Rand Afrikaans University, January 2003.
- American Society for Quality. (2012). Quality Glossary - Q, ASQ, USA.
  Available at URL: http://www.asq.org/glossary/q.html
- American Society for Quality. (2004). Tree Diagram, ASQ, USA.
  Available at URL:
  http://asq.org/learn-about-quality/new-management-planning-tools/overview/tree-diagram.html
- Brun, Alessandro. (2011). Total Quality Management - Quality Culture, Leadership and Motivation, Master Thesis, Politecnico di Milano.

- ConceptDraw Solution Park. (2014). Fishbone Diagram, CS Odessa Corp.
- Available at URL: http://www.conceptdraw.com/solution-park/business-fishbone-diagram
- Cox, R. & Issa, R. & Ahrens, D., (2003). Management's Perception of Key Performance Indicators for Construction, J. Constr. Eng. Manage. (Published Article Vol. 129, Issue 2, pp. 142–151); American Society of Civil Engineers (ASCE).
  Available at URL:
  http://ascelibrary.org/doi/abs/10.1061/%28ASCE%290733-9364%282003%29129%3A2%28142%29
- Edraw Professional Diagram Solution. (2013). Tree Diagram Software, EdrawSoft.
- Available at URL: http://www.edrawsoft.com/treediagram.php
- M. Salter, Jeffrey. (1993). Total Quality Management and Applications to the Construction Industry, Master of Engineering, University of Florida, August 1993.
- Nelson, Charles. (2006). Managing Quality in Architecture, a Handbook for Creators of the Built Environment, Elsevier Ltd.
- Oschman, J. (2009). A Conceptual Analysis of Total Quality Management, Chapter 2 of Literature Review.
  Available at URL: http://www.uir.unisa.ac.za/bitstream/handle/.../02chapter2.pdf
- Panthi, Kamalesh & M. Ahmed, syed. (2008). Application of Quality Tools to Improve Quality: A Case Study of a Building Remediation Contractor, Florida International University Miami, Florida.
  Available at URL: http://ascpro0.ascweb.org/archives/cd/2008/paper/CPRT240002008.pdf.
- Putri, Nilda Tri & Yusof, S.M. (2009). Critical Success Factors for Implementing Quality Engineering Tools and Techniques in Malaysian's and Indonesian's Automotive Industries: an Exploratory Study, International MultiConference of Engineers and Computer Scientists (IMECS); Vol II.
- Soković, Mirko & Jovanović, Jelena & Krivokapić, Zdravko & Vujović, Aleksandar. (2009). Basic Quality Tools in Continuous Improvement Process, Journal of Mechanical Engineering.
  Available at URL: http://lab.fs.uni-lj.si/labod/documents/2014/ZK/ZK14%20Dodatno%20gradivo.pdf
- Textile Solutions. (2013). Juran's Quality Improvement Trilogy, Dyedspun.
  Available at URL:
  http://dyedspun.com/2013/02/09/jurans-quality-improvement-triology/juran-trilogy-diagram/#main/trackba
- Zhang, et al. (2000). Concept of Total Quality Management, Chapter 2 of Literature Review.
  Available at URL: http://www.dissertations.ub.rug.nl/FILES/faculties/management/2001/z.../c2.pdf.