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A Project Management Approach to Improve on Time Delivery Performance in Manufacturing Industry

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Abstract: **The purpose of this research was to develop an on-time delivery (OTD) improvement model for make-to-order (MTO) manufacturing organisations, based on: (i) a business process model combining product development and customer order management processes. All manufacturing industry works with the objective of 100% on time delivery performance and optimized cost in order to be competitive in the market. when it comes to consistency in results, that's where the strong process, system, methodology is needed. Hence PMI's Project Management body of knowledge was applied to see the performance enhancement results over few identified pilot projects in valve flow controls organization. As a pilot study,5 project orders were taken and implemented the PM process. Results are very much encouraging on the on time delivery and the cost. This makes the effort satisfactory to recommend this methodology to adopt on an on an ongoing basis to have the consistent results.**

Keywords: **Project Management, PMBOK, On time delivery, Competitive advantage, Manufacturing.**

I. INTRODUCTION

The manufacturing industry has very specific challenges and pain points to deal with. The main pain points are schedule, cost, scope and quality. This probably sounds very familiar to project management professionals, as these are the four corners of the Devil's Quadrangle. The biggest challenge for manufacturers is to produce a high-quality product in the shortest amount of time possible. Reducing the time to market can be vital for organizations to gain a competitive advantage, keep production costs low, and keep the scope in check. However, this can't be done at the expense of quality as product quality is directly related to customer satisfaction and profit

This is the biggest challenge in front of every manufacturing organization as of today and every industry try to do it on its own way and some succeed, and some may not and at the end they struggle to maintain the consistency in the results. some of the biggest pain points manufacturers face today are but not limited to

- Forecasting timelines, budgets and clearly define scope
- Meeting quality, cost and on time delivery goals
- Controlling scope creep and change orders
- Controlling project progress while overseeing multiple contractors over long periods of time
- Securing cost-effective materials and resources
- Managing changing client expectations and demands

Time is money, shorter lead time or throughput time is always good thing for producer or customer. The production timing effort of each planning step that gives information about the starting and ending dates, which are necessary for an exact scheduling of the whole production process. Based on good planning that shorter project lead time is easy to get a way to realize.

Project management is a discipline that can be applied to all industries, and can be particularly effective in the manufacturing industry. Manufacturing relies heavily on quality and time to market to build and retain its customer base, so these two factors—quality in particular—need to be the focus during the manufacturing process. When a project management methodology is applied to the manufacturing process, its tools and techniques can ensure that quality standards are met and the time to market is efficient. This will be achieved primarily through the techniques of planning, scheduling, stake holder management, risk management, quality management, quality assurance and quality control, and lessons learned

II. LITERATURE REVIEW

As per Project Management Body of Knowledge, Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements [1].

As stated inloox Blog by Linh Tran, The goal in manufacturing and project management alike, is to improve continuously. It's important to improve production processes, products and tools utilization. To do so, it's important to combine project management skills and methods with established manufacturing methods to increase the efficiency and effectiveness of processes and products. Implementing project management methods can help manufacturers improve, to 'get better at getting better' so to speak: By streamlining processes, by carefully tracking and measuring the progress of the production, by tightly controlling risks, and by utilizing available PM tools to their fullest potential.

Project management can help the manufacturing industry mitigate some of these challenges and enables manufacturers to produce better products, in the shortest amount of time and at the lowest cost. While it might be difficult to stay focused on project management methodologies while keeping the production schedule, it is definitely worth it.

As per John Kotter, acclaimed author and former Harvard Business School professor, who wrote recently that "Strategy should be viewed as a dynamic force that constantly seeks opportunities, identifies initiatives that will capitalize on them, and completes those initiatives swiftly and efficiently." He recognizes the inextricable link between strategy and execution, which is where project, program and portfolio management deliver unparalleled value to organizations.

When organizations continue getting better at executing their projects and programs, they drive success. But when organization executives undervalue the benefit of effective project, program and portfolio management—strategic initiative management—they put real money at risk, and perhaps more.

As per KPMG's Project management survey report July 2013, while the success of each individual project should be defined at project initiation stage, traditionally success in projects is defined on three measures- timely delivery, delivery on budget and delivery of the stated deliverables. The following are the facts about the project success rates [2].

PMI's Pulse of the Profession™ research, which is consistent with other studies, shows that fewer than two-thirds of projects meet their goals and business intent (success rates have been falling since 2008), and about 17 percent fail outright. So if the project that fails is one of the strategic initiatives that is expected to drive organization success, it will most certainly have a financial impact on the bottom line. And if expected benefits aren't realized, competitive advantage can be squandered, efficiencies lost, and organizations cannot function in a "do more with less" business environment [3].

The third global survey on the current state of project management conducted by PricewaterhouseCoopers LLC (PwC) in 2012 revealed that as many as 97 percent of respondents believe project management is critical to business performance and organizational success, and 94 percent believe project management enables business growth [4].

III. RESEARCH PROBLEM AND OBJECTIVE

Valve flow technologies organization who is engaged with manufacturing of valves for various industrial application is facing severe issue in retaining its existing customer base and adding new customers due to its poor performance metrics on delivery and cost. This has significantly contributed to its turnover and year on year business growth. When the data was analysed in detail to frame a clear problem statement it is understood that it's on time delivery performance was <30% which is nothing but 3 out of 10 orders only executed on time as per customer requirement and its profit margins are eroded by > 50% for 7 out of 10 orders executed. This is really a burning issue to this organization. Hence this was taken as an objective of the study to improve the on-time delivery and improve the profit margins by avoiding cost over runs.

IV. METHODOLOGY ADOPTED

Currently this organization uses traditional approach of managing and executing the customer orders where there is no structured method of execution, ownership and monitoring. Hence it has been decided to implement PMI's PMBOK approach (5th Edition) of Project Management to manage and execute the orders. As a pilot project, 5 new customer orders were considered to manage it through Project Management approach and the following steps were applied.

Project Management Standard steps

1. Initiation
2. Planning
3. Execution
4. Monitoring and control
5. Closure

As part of this approach, 5 process groups and 10 knowledge area's were applied to each and every orders that is executed right from winning of order. Each order received was formally initiated, systematically planned and thoroughly monitored and controlled and then finally closed for its completion. The table attached shows the 47 steps that was followed.

TABLE 1 : PROJECT MANAGEMENT METHODOLOGY-PMBOK STANDARD

Knowledge Area\ Process group	Initiation	Planning	Execution	Monitoring &Control	Closure	5th Edition Total
Project Integration Mgmt	Develop Project charter	Develop Project Mgmt plan	Direct & Manage Project Work	Monitor &Control Project Integrated change control	Close project	6
Project Scope Mgmt		**Plan Scope Management** Collect requirements Define scope Create WBS		Verify scope control scope		6
Project Time Mgmt		**Plan Schedule Management** Define activities Sequence activities Estimate Activity resources Estimate Activity duration Develop schedule		Control schedule		7
Project Cost Mgmt		**Plant cost Management** Estimate costs Determine Budget		Control cost		4
Project quality Mgmt		Plan Quality Management	Perform quality Assurance	Control quality		3
Project HR Mgmt		Develop HR management Plan	Acquire project team Develop project team Manage project team			4
Project communication Mgmt		Plan communications Mgmt	**Manage communication**	Control communication		3
Project Risk Mgmt		Plan Risk Management Identify Risks Perform Qualitative analysis Perform quantitative analysis Plan Risk Responses		Control Risks		6
Project Procurement Mgmt		Plan Procurement Management	Conduct Procurements	Control Procurements	Close procurements	4
Project Stake Holders Mgmt	Identify stake holders	Plan stakeholder management	Manage stakeholder engagement	Control Stakeholder engagement		4
Total	**2**	**24**	**8**	**11**	**2**	**47**

Each project order was initiated with assigning a project manager and detailed charter to reflect the details about the nature of project, description, its priority, objectives, key milestones, Target revenue and profitability etc. All the stake holders involved in the project are clearly identified as the state holders can positively and negatively influence the project and its success can be influenced by them.

Then clear project management plan was developed with the cross functional approach by consolidating all knowledge area's as described above. The key aspects are clear definition of scope of the project and expected deliverables and its work breakdown structure. Then clear definition of detailed actions, sequencing the actions, defining time estimates and resources. Other aspects include effective cost estimates and budgeting, Quality planning, Resource planning and selection, training, defining responsibilities, communication requirements planning, risk planning, procurements planning, stake holders management planning.

Then comes executing the project as per project plan defined. This is where the real transformation of activities in to outputs starts.When the execution starts, it is essential to start monitoring the project against the established plan to ensure that whether the actions are going on track or not. Effective monitoring will result in better controlling which ensures that the objectives are met. This monitoring is done through various ways and there are lot of tools available for monitoring and one of effective tool is the review meetings. Having regular / periodic / structured review meetings at various layers will help the team to understand the exact progress and gaps. So that actions can be initiated before the project gets derail.

When the monitoring starts, this may call for changes to the scope, schedule, cost, quality, resource or anything, This demands effective change control mechanism which ensures that each change is properly validated, reviewed and analysed for its impact and approved by the appropriate authorities before it is being implemented. This is where the margins / costs are getting derailed in general. Hence this process was put in place to evaluate all changes which comes after the project initiation. During this phase, continuous risk reviews conducted to see the potential risks and effective mitigation plans were developed to prevent / protect from the risks and its impact.

Once the product / results are delivered, then this was reviewed against the planned scope and deliverables to see its alignment. Based on that the project comes to a closure stage. A structured lessons learned review was conducted by the cross functional team to capture all the lessons that we learned which includes things gone right and things gone wrong. This helps future projects to adopt the good lessons and avoid bad lessons.

V. RESULTS AND DISCUSSION

Based on the pilot study that was carried out on 5 customer projects, the following are the results that was observed at the end of the project closure.

TABLE II – SUMMARY OF RESULTS

Project details	Scope / deliverable	Schedule Target	Cost Target	Actual Results
Project 1 -Turbine valves	Design, manufacture, test as per customer spec's with no deviations	24 weeks	20% Gross Margin (min)	Delivered in 23 weeks 20.5% Gross Margin realized
Project 2 – Conditioning valves		28 weeks	10% Gross Margin (min)	Delivered in 28 weeks 13% Gross Margin realized
Project 3- Check valves		16 weeks	18% Gross Margin(min)	Delivered in 14.5 weeks 19.6% Gross Margin realized
Project 4- De super heating station		12 weeks	15% Gross Margin(min)	Delivered in 10 weeks 16% Gross Margin realized
Project 5- By pass valves		24 weeks	10% Gross Margin(min)	Delivered in 24 weeks 14% Gross Margin realized

Based on the above results, it is a clear evident that there is an improvement of 5 to 15 % over and above the on time readiness is 100% against the target schedule which was not the case with the earlier approach. Similarly, Gross margin improvement of 3 % to 40% by way of controlling the costs with close monitoring and risk management. This data shows 100% OTD (on time delivery) based on all pilot projects performance. However, the organization's score card target OTD is >95% but it was achieving only in the range of 30% OTD.

VI. CONCLUSION

It is clear understanding that the structured project management approach turns out the results substantially on positive side as the project management concept is a proven science and application of project management knowledge, skills, tools and techniques to the project activities certainly yield better results as the Project Management Institute (PMI- USA) states that usage of project management methods will increase the success rate of the projects. This Project Management body of knowledge is a ANSI standard and its methods can be applied to any industry. The consistency in results are possible only by way of demonstrating the structured approach. Hence it is evident that high level of relationship exists between structured project management method to the organizations competitive advantage by way of achieving on time delivery performance and improved financials.

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