

Organizational technology integration evaluation model



Organizational Technology Integration Evaluation Model Leopold E. Madrigal
university of Phoenix An organizational technology integration model will be proposed using a specific case in the automotive industry, one that took place in 1998. A consideration to be noted is the potential that the proposed model could have been used successfully at the time of the presented case's implementation as it may be used today in any situation to assess technology efficiency.

Antecedents The problems the United States auto industry had during the late 1980s and early 1990s were the lack of discipline, high absenteeism rates, and low morale among employees, all of which resulted in inefficiencies and low quality products. "Even with lesser quality, the (GM) Fremont plant averaged 34 man-hours of labor per automobile, versus only 20 at Toyota" (Redder, Henry, ; Smith, 1985, p. 36).

Read also: "Difference Between Flow Shops and Job Shops"

The implementation of new technologies in the American automotive industry, such as lean manufacturing principles, self-directed teams, quality circles, and flexible operations required that employees and their unions were aligned and committed with this new direction. The results in organizations implementing new technologies in which stakeholders bought in were as expected and manufacturing productivity as well as product's quality improved.

Product quality and production efficiency augmented as a result of implementing new technologies and new manufacturing approaches, as in example: Lean manufacturing, quality circles, self-directed work than several
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of Gem's newer plants. Plans are to reach an annual 200,000 units in 1986 with a work force of 2,500 - a level which rivals Japanese productivity' (Redder et al., 1985, p. 38). International Truck & Engine Company In 1996 International Truck & Engine Company was evaluating the implementation of new technologies to improve its manufacturing efficiency.

One of the new technology approaches considered was the implementation of an enterprise resource planning system. "Firms around the world have been implementing enterprise resource planning (ERP) systems since the 1980s to have an uniform information system in their respective organizations and to reengineering their business processes" (Phillipians, 2002, p. 87). For this new project other technologies were considered besides the ERP system implementation.

The automotive industry in America was adopting lean manufacturing principles driven by the success of the Toyota Production System (TAPS) that was first implemented in America in 1985 at the MINIMUM plant in California. "Toyota's extraordinary success is indisputable, and the TAPS has been a major element in its increasing status in the world automotive industry' (New, 2007, p. 3546). As part of the lean manufacturing initiatives the objective of a new organizational design that empowered employees and promoted teamwork in self-directed work groups was set in motion. Our major finding is that highly empowered teams are more effective than less empowered teams" (Kirkland & Russell, 1999, p. 69). This initiative represented a new approach to an organization that was very conservative in their management of shop-floor operations. It was also decided that a new facility would be designed and built in accordance to lean manufacturing <https://assignbuster.com/organizational-technology-integration-evaluation-model/>

principles, as in example modular assemblies should flow directly to the point of application in production sequence.

The new facility would be installed in Mexico, “ in an effort to lower production costs, many U. S. Firms manufacture products offshore in countries with low labor costs” (Oldenburg, Roman, & Terra, 2007, p. 23).

The challenge Beyond the imminent challenge that an experienced team of people would find while setting up a new manufacturing facility the additional requirement to implement new technologies compounded the complexity.

The new technologies to be implemented consisted of new technical designs for manufacturing, new conceptual designs for manufacturing processes while using lean manufacturing initiatives, new management practices such as self-directed work groups, and a new ERP system implementation. Lean manufacturing based on the Toyota production system (TAPS) “ changed the anal assembly into a mixed model final assembly system to level the demand on their suppliers, converted the linear subassembly lines into U-shaped subassembly cells and redesigned the Job shop into manufacturing cells.

Final assembly operates with a take’ time, and the cells are designed to have a cycle time slightly less than the take’ time and to operate on a ‘ make one, check one, and move one on’(MO-CO-MOO The task consisted of planning the implementation strategy, building a new facility in a foreign country using lean manufacturing principles, selecting and hiring the dervish team for the new facility, implementing a new ERP system for the organization,

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and capable to start production of trucks being built at other facilities to alleviate some of the capacity restrictions while reducing the manufacturing cost.

In summary, there were three major areas in which the implementation team had to be focused: 1) the manufacturing system, 2) the human integration to the new manufacturing design or the socio-technical system, and 3) the ERP system as an enabling technology. While working on the design and implementation of the manufacturing system the implementation team had to take into consideration that the manufacturing system is the beating heart of any manufacturing company.

The manufacturing system is defined as a complex arrangement of physical elements characterized by measurable parameters” (Black, 2007, p. 3643). The socio-technical system included the design and implementation of self-directed work groups and a multi-task development program tie to a payment structure, “ the people who work in a manufacturing system are the ‘ internal customers’, and the system must be designed to satisfy their needs. At the same time, the manufacturing system must produce products that satisfy the needs of the ‘ external customers” (Black, 2007, p. 43). The ERP system implementation was viewed as an enabling technology to enhance performance. “ ERP systems consist of a number of functional modules such as materials management, production planning, sales and distribution, human resources, and financial accounting. In order to serve the needs of a wide range of companies with different characteristics, ERP systems in general, and these modules in particular, are built on the best practices, which represent the most cost-effective and efficient ways of <https://assignbuster.com/organizational-technology-integration-evaluation-model/>

performing business processes” (Sackbut & Subliminal, 2006, p. 7). There was an advantage in the way the organization decided to take on this challenge as it was to be set up in a new facility with new management and new people, with it some of the change management issues could be diminished. “ Change management is primarily a human resource management issue. This is because implementing new procedures, technologies, and overcoming resistance to change are fundamentally people issues” (Bananas, 2009, p. 236).

The deliverables Any organization that decides to invest in technology does it because there is an expectation about the future state of the business and how that technology, once successfully implemented and performing will be fit to meet the future organizational needs and those of customers and stakeholders. “ Technological innovation is an important source of value creation. The application of knowledge to human activity allows for the more efficient production of existing products and services” (Shame, 2009, p. 7).

The expectations the organization had from the new technologies implementation were: 1) To increase in 120 units per day the medium duty truck assembly capacity, 2) To increase in 60 units per day the heavy duty assembly capacity, 3) To reduce the man-hours per truck by 10%,) To reduce the cost of direct labor by 70%, 5) To implement an ERP system integrating information from all performance and assemblies), 7) To limit online stocking areas by designing narrow aisles along the assembly lines, 8) To implement quality circles and multi-ability development programs for people, and 9) To increase the quality of the product by minimizing end-of-line defects-per-truck. The expectations regarding the ‘ soft’ systems <https://assignbuster.com/organizational-technology-integration-evaluation-model/>

technologies, those related to the people, were that each person should go through a specific training program to be certified to perform all operations of at least three assembly stations.

The belief that a certified person should be able to perform without incurring in mistakes w working at line speed (take' time). " The lean system is designed to produce superior quality products. Toyota believed in company-wide total quality control and therefore taught it to everyone from the company president down to every production worker. They were able to change from a company that made junk to one that could give customers product high reliability' (Black, 2007, p. 3644). The ERP system implementation represented another piece of the technology improvements and even though no clear measures of success were established t ere some beliefs about the outcome. Typical benefits of ERP systems commonly cited in the literature include, but are not limited to, inventory and lead time reductions, improved on-time deliveries, reduced operating costs, enhanced customer relationships (Hit et al. , 2002) and improved decision making" (Sackbut Subliminal, 2006, p. 49). The situation By March 1998 the new facility had initiated operations although on a limited basis. Only one of two assembly lines was ready to assemble trucks, the other assembly line, the cab fabrication, and paint areas were being conditioned for production. The materials flow design and the use of Kanata and assembly mod were in place. The new personal seemed to be comfortable with the processes, procedures, tools, and systems at their use. The ERP system was already set in production environment.

The organization was concerned about the situation at the new assembly plant. Millions of dollars were committed and expended to increase the corporation's production capacity, improving production efficiency and product quality, while reducing manufacturing costs. Unfortunately, that was not the case. The situation was that trucks were getting at the end of the assembly line with missing parts, required materials were not available at the plant much less at the point of use. Production ramp-up plan had to be aborted and redesigned to reduce the compounding problem of assembling incomplete trucks to be reworked at the true storage area. The root causes of the problem at hand were not easy to identify as there were many variables unknown to manufacturing experts at other assembly plants.

The organization was dealing with a new manufacturing facility, with a new operational philosophy based on lean manufacturing, with new processes, new to new systems, new inexperienced people, and in a foreign country with a different culture. Problem definition and purpose statement In summary, the problem at hand was that the new assembly facility was incapable of producing five trucks a day without missing some components, the missing request planning (MRP). In consequence the trucks presented many defects at the end of the assembly line making undesirable to ramp up production to the expected 30 units per day planned to be produced by April 1998.

Without the opportunity to build 'clean' trucks it was difficult to assess the improvements in the man-hours per truck or any manufacturing costs reductions. Moreover, the new installed capacity as theoretical as given the high number of missing components there was no opportunity to test the <https://assignbuster.com/organizational-technology-integration-evaluation-model/>

assembly line at top line speed. The purpose while conducting an assessment of effectiveness of technology implementation would be to test each of the different technologies implemented at the new assembly facility from the planning and designing stages throughout the pre-production and implementation stages. Once those tests were completed an integration test between the different technologies would need to be carried out. Finally, the total system would be tested.

At this point the data gathered at different performance levels may provide evidence to validate the new technologies as fit or no fit to meet the deliverables defined in the new facility original concept. Any discrepancies found during any of the unit, integration, or system tests would provide information to be analyzed to evaluate a design change, include additional capabilities, or modify the expectations about the outcomes. Assessing the effectiveness of technology implementation At that time the situation was reviewed using some approaches from the general systems theory (SST), meaning that the desired state of the system was defined and entreated against the current state of the system. " General systems theory is, as emphasized, a model of certain general aspects of reality.

But it is also a way of seeing things which were previously overlooked or bypassed, and in this sense is a methodological maxim" (Bertelsmann, 1972, p. 424). The tool to assess the effectiveness of technology implementation to be proposed in this paper was not the one used at the time the described situation was taking place although the addition of the GIST as a design and performance validation tool will be included. The new facility contained different technologies. The result being sought was the resultant of each of <https://assignbuster.com/organizational-technology-integration-evaluation-model/>

those technologies individually performing as planned. Then those technologies would be tested interacting with other technologies while performing flawlessly, and delivering as expected as an integrated system.

Bananas (2009) suggested three different stages of testing: 1) Unit testing, 2) Integration testing, and 3) system testing. The proposed methodology would include those three stages. The different technology components may be tested using Thompson (2003) assessment table that described “ that the assessment is a function of residential or ambiguous standards of desirability and the degree of completeness of beliefs about cause/effect knowledge” (University of Phoenix, 2012). This approach is also supported by some management problem solving tools as the one presented by Tennyson ; Isis (2011) who stated that “ an effective performance improvement approach must start by identifying a performance problem and then finding ways of solving that problem. Thompson assessment techniques are similar to the initial step in the systemic problem solving approach by defining the desired state of the yester and its desired output (standards of desirability) and contrast it against the complement this approach and discover the root causes of the problem one has to be prompt to ask the reasons and purposes behind system’s design decisions by using a V model life cycle test. In an ideal technology implementation a V model life cycle test should be used. “ The V model requires that each deliverable be verified in an attempt to identify defects as early as possible and to ensure that specifications are complete and correct.

The model specifies that activities in one stage must be completed before boning on to the next stage” (Bananas, 2009, p. 274). The stages included in <https://assignbuster.com/organizational-technology-integration-evaluation-model/>

the V model life cycle are: 1) defining reasons for testing, 2) acknowledging structure testing, 3) testing and verification at the design stage, 4) testing within a system implementation, and 5) testing with a system maintenance environment (Bananas, 2009). The next diagram shows Thompson (2003) technology assessment table: Beliefs about Cause/Effect Knowledge Standards of Desirability Complete Uncertainty Crystallized Efficiency test Desired state is achieved Ambiguous Extrinsic Measures Organizational rationality

In summary, the proposed methodology flows as presented in the next table: Unit Interrelation System System - Ideal state Technology component Define performance at ideal state Define performance as designed System - Current state Technology components Define performance at testing stage Defining reasons for testing Understanding structured testing Testing and verification at the design stage Testing within a system implementation Testing with a system maintenance environment Each of the different technology components needs to be defined in terms of performance as by design and evaluated during the V model life cycle (bottom part of the table) as a unit, after that as an interactive technology, and finally as part of a system (moving toward the right side on the table). Each test result needs to be confronted objectively to the ideal state, as per design, so whenever possible specific and objective goals must be defined to assess the current performance of each unit, their integrations, and as a total system against the desired performance. At this point Thompson assessment table can be used to evaluate the different stages according to the following premises: “

When standards of desirability are crystallized ND beliefs are complete, efficiency is the desired means of assessment.

When standards are crystallized and beliefs are incomplete, assessment of effectiveness is by achieving a desired state. When standards are ambiguous, but beliefs are complete, extrinsic measures such as someone else's opinion is used. Finally, when standards are ambiguous and beliefs are in complete, then a predetermined organizational measure is used" (University of Phoenix, 2012). It is important to notice that the success of any assessment methodology depends in a good definition of the expected outcomes of a technology implementation. Those outcomes need to be litigated at the designing stage to clarify if such technology implementation is capable of providing them.

Then as the implementation moves from design into integration of technologies, it is tested in different pre-production environments, these validation need to be performed against objective measurements or against expectations with solid foundations of attainability. Conclusions The proposed technology implementation effectiveness assessment tool would be appropriate to any technology implementation situation. As stated earlier a key component of the success of the assessment resides in a clear and objective benefiting of what is expected from the implementation. The definition of performance parameters at the design phase will provide an objective guidance while performing the assessment assuming that those parameters are within the technology's capabilities. The technology implementation described in this paper was resolved by September 1999.