Part 1

Lean at WiPro (WiPro) had the interesting challenge of taking the well recognised Toyota Production System (TPS) or Lean, as it is often referred to, from where it had traditionally been used in a manufacturing situation to a new sector, namely software development. This was undertaken in 2004 following numerous operational and climate challenges facing the organisation as a whole. Critical to the whole application of TPS within WiPro was the recognition that acceptance from all levels of the organisation was going to be vital[1]. Previous attempts to establish working systems had been undertaken on a top down basis and had been relatively ineffective due to the lack of widespread acceptance[2]. A core team of ten individuals was put together to explore the potential application of Lean and this was carried out on a relatively small scale, alongside normal working practices, to ensure that when it was rolled out on a wider scale, the model had already been suitably tested. Another crucial factor in this early stage development was the quantitative methods used on the evaluation of the early stage testing. By placing strict criteria on whether or not the project was a failure or success, it became easier for the management teams to make the relevant decisions and for those required to accept the new way of working (i.e. the project managers) to understand the benefits derived[3].

Applying the Lean process to WiPro was a real challenge as the company is not a standard manufacturing type organisation. It was noted, from the outset, that there would need to be a total shift in culture to accommodate this new way of working and that this would be required from top management as well as from those implementing the new processes. This was achieved by ensuring that the goals (a 10% improvement) were set at an achievable level, but still sufficiently difficult that it required a different working approach to be taken. By setting the targets too low, it was recognised that there would be a danger that individuals would simply work harder to achieve the goals, in the short term, without altering their long term patterns of work.

There was recognised commitment towards maintaining a CMMI framework which ensured that the lifetime of the project operated on a very structured approach, ensuring that no time

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[1] Wu, Yen Chun, Lean manufacturing: a perspective of lean suppliers, International Journal of Operations & Production Management, 23, 11, 2003

[2] Liker, Jeffrey K., Becoming Lean: inside stories of U.S. manufacturers, Productivity Press, 1997

[3] Toyota Motor Manufacturing in Europe: lessons for management development Author(s): Ian Winfield, Maire Kerrin Source: Journal of Management Development; Volume: 15 Issue: 4; 1996

or money was leaked by progressing through the stages too quickly and thus resulting in poor specifications impacting on the effectiveness of the project, at the later stages. This was certainly a solid approach for many of the projects that WiPro was undertaking, ensuring that the specifications were fully understood. This notion was at the heart of the Lean application in WiPro and following the waterfall method ensured that each stage of the development was 100% complete, before moving on to the next[4]. Whilst the application of this was effective to a certain degree, several additional changes were necessary, following periods of trial and error and in order to reflect the different types of projects within WiPro itself.

It is also significant that WiPro only looked to implement Lean in projects that were appropriate and that this analysis was given considerable importance. This was actually incredibly important for the application of Lean in WiPro, as gaining acceptance at all levels was at the heart of the ongoing success for the initiative and any failures would be extremely detrimental to the general morale within the company[5]. Identifying the correct projects to which Lean can be applied is therefore seen as critically important to the ongoing success of this new way of working[6].

Although the waterfall approach to TPS worked well in the main particularly in the way that it was applied in WiPro, it was necessary to use several countermeasures, where appropriate, to gain the full effectiveness of Lean. For example, WiPro used just-in-time throughout all its projects. This has been adapted slightly to deal with the nature of WiPro's work, but the concept of using just-in-time as opposed to batch processing was evident[7]. Whilst work did not begin until a customer's order had been received, the aim of waiting until the order had been received was to ensure that every stage was completed immediately before it was ready at the next stage, with no time lag between the different levels of the waterfall.

For example, where a website was being converted or being updated in a major way and the old site was a series of web pages on top of Java Server Pages, under the old method of working one of the individuals would convert all of the relevant pages and another individual

[4] Dirgo, Robert, Look Forward Beyond Lean and Six Sigma: a self-perpetuating enterprise improvement method, J. Ross Publishing, 2005
[5] Babson, Steve, Lean Work: empowerment and exploitation in the global auto industry, Wayne State University Press, 1995
[6] Hines, Peter, Holweg, Matthias & Rich, Nick, Learning to evolve: A review of contemporary lean thinking, International Journal of Operations & Production Management, 24, 10, 2004
[7] Kippenberger, T., Apply lean thinking to a value stream to create a lean enterprise, The Antidote, 2, 5, 1997

would work exclusively on the pages that draw on these original pages. Under the new scheme the individual converting the JSP would pass each individual page over as it was ready; as a result of this, it was discovered that approximately 30% of the pages did not need to be called at all, thus saving both time and cost[8].

Another key aim of using Lean in WiPro was to integrate the problems faced with the solutions offered. By bringing together the two factors in terms of both the individuals that undertake the task and the time at which the tasks are undertaken, it is possible to gain considerable efficiency and to ensure that staff members learn from each other[9]. By pulling together, everybody was involved in the project and at phase 1 it was possible for those involved in the later stages to adapt their own techniques later on in the project to take account of the problems that were identified in phase 1. Not only was this efficient from an operational point of view, but it was also very effective at increasing staff buy-in to the project and staff acceptance of the project as they understood every phase and felt involved at every stage, thus increasing both morale and loyalty to the firm.

The application of Lean to WiPro has been incredibly successful. Through a combination of careful planning and provision of management time that was given as well as the willingness to adapt where necessary to take account of the differences inherent in software development, it has been proved that it is possible for Lean to be used in a non-traditional manufacturing environment. Considerably more attention was paid to staff acceptance and cultural issues than would have been necessary in a manufacturing environment, but by giving the necessary importance to this issue WiPro has managed to integrate the processes, successfully, in a way that has saved it both time and money[10].

Part 2

WiPro had found itself in a particularly difficult position, commercially, in recent years, which led the management team into considering a wide range of options as to how these difficulties could be dealt with through the use of Lean processes.

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[8] Hibbs, Curt, Jewett, Stephen C. & Sullivan, Mike, The Art of Lean Software Development: A Practical and Incremental Approach, O'Reilly, 2009

[9] Lewis, Michael A., Lean production and sustainable competitive advantage, International Journal of Operations & Production Management, 20, 8, 2000

[10] Smith, Ricky & Hawkins, Bruce, Lean Maintenance: reduce costs, improve quality, and increase market share, Butterworth-Heinemann, 2004

Several key challenges were recognised within WiPro and these formed the basis of the decision to use Lean within the company, in order to mitigate these challenges and even to ensure that these challenges were turned into opportunities where possible. It was recognised that, from an operational point of view, one of the main difficulties facing the company (and others in the software industry) was that of recruiting and retaining the best possible software engineers. Software engineers have a particularly static reputation in terms of how they work within the operation, as a whole[11]. They are generally considered to be inflexible in their working patterns and unwilling to alter patterns to fit in with other individuals within the team[12]. This was a particular challenge for WiPro, both from the point of view of ensuring operational efficiency and in terms of the way in which they went about implementing the new Lean processes. As well as the individuals involved being key to the operational activity of the organisation, it was also recognised that the operation itself was very difficult to control, with client individuality and needs being incredibly variable. These types of issues were particularly challenging for the organisation when it came to implementing Lean. Whilst it is clear that one of the underlying aims of implementing Lean was to encourage a more flexible, dynamic and innovative work process, this was going to be met potentially with resistance due to the nature of the staff base in the overall organisation. Traditionally, Lean has been seen as an option for manufacturing companies that have unskilled labour undertaking process-based and repetitive tasks. In order to use Lean appropriately, within the software environment, it was necessary to take account of these differences so that the aims of innovation and increased quality could be achieved, without there being any negativity across the team as it stood[13].

One of the criticisms and difficulties that was identified within WiPro was how segmented each of the individuals within the workforce actually was. Each process was undertaken in a manner that was distinct from the others, resulting not only in time being wasted, but also in a lack of quality due to the fact that customer needs were often not passed through the chain with a suitable degree of accuracy, meaning that the initial specification was largely ignored once the project had entered a third or fourth stage. Interaction with the client at every stage

[11] Bicheno, John & Elliot, Brian, Operations management: an active learning approach, Open Learning Foundation, Wiley-Blackwell, 1997
[12] Worley, J.M. & Doolen, T.L., The role of communication and management support in a Lean manufacturing implementation, Management Decision, 44, 2, 2006
[13] Bhasin, Sanjay & Burcher, Peter, Lean viewed as a philosophy, Journal of Manufacturing Technology Management, 17, 1, 2006

was a desired aim of implementing Lean, as the overall success of the project would be related directly to the way in which the initial demands of the client were understood and implemented, as well as the way in which the final project was then rolled back out into the customer's business. Streamlining and making this process more efficient would not only have the impact of making the internal operational side of the company more effective and reducing unnecessary duplication, but would also give the customer an enhanced quality of service[14].

As well as the general operational aims that were focussed on by the Lean programme in terms of operational issues that impact the sector as a whole, there were also some substantial improvements in the organisational area that the shift aimed to achieve[15]. There was a huge personnel expansion seen during the years immediately prior to Lean being brought in, with a 40% increase in staff, bringing the total to 18,000. This required an entirely different style of management and control and whilst personal autonomy was important, particularly to the software engineers, it was not possible to operate an entirely free system without losing substantially in the areas of efficiency and quality[16]. Having such a large workforce meant that the systems within the organisation had to become more robust and easier to follow for new team members. It was also important that team managers were given the necessary level of control over processes and performance. Prior to Lean being brought in, the project managers had a very tight initial and ongoing control over the project by being responsible for creating a detailed project plan and then assigning the relevant parts of the project to team members. This meant that the individuals within the teams were often not used to their full potential; therefore, not only were skills being wasted, but the client was not getting the best possible service in the circumstances.

As a result of this way of operating, it was found that different business units across the organisation were performing very differently, largely driven by the way in which the individual project manager worked and their relationship with the wider team members. Whilst it was accepted that the type of industry in which WiPro worked required flexibility and variation depending on individual needs, one of the aims of the Lean programme was to

[14] Sim, Khim L. & Rogers, John W., Implementing Lean production systems: barriers to change, Management Research News, 32, 1, 2009
[15] Lee, Quarterman & Snyder, Brad, The Strategos Guide to Value Stream & Process Mapping: Genesis of Manufacturing Strategy, Enna Products Corporation, 2007
[16] Pettersen, Jostein, Defining lean production: some conceptual and practical issues, The TQM Journal, 21, 2, 2009

achieve consistency of operation and quality wherever possible across the different functions[17]. Fundamentally, there was a concern that where one business area had a particularly good working structure in place, this was not being replicated and skills were being lost. Greater integration and use of resources was at the heart of the Lean project, for this reason.

The marketplace itself has also become more competitive with the software engineers based in India being able to offer substantially cheaper services. It was recognised in WiPro that they had carved themselves a market niche stating that they were both cheap and high quality[18]. With the influx of Indian companies into the market, maintaining a tight control over costs, whilst also ensuring good quality and local service would be critical. Lean was aimed at achieving this by reducing wasted costs and time as well as ensuring that customer needs were met directly in a way that could not be achieved by offshore competitors.

These aims have, as discussed above, largely been achieved by Lean within WiPro, and whilst continuous improvements and developments are necessary to ensure that the benefits are retained, the implementation has, at this stage, impacted on the operational and organisational aims of the company, going forwards.

Part 3

There are naturally multiple different ways to approach making a working process within any type of organisation to ensure greater efficiency and ultimate success within the company. TPS (as applied in WiPro) is often referred to as Lean but, in reality, there are many other different approaches to Lean that can be used and that may offer different options, depending on the nature of the business in question and the way in which the organisation could be improved, based on the operational and organisational issues that are faced by that specific sector or company.

Within the TPS system (and generally a factor that is seen within manufacturing industries), some companies will have a relentless drive towards ensuring improving profits. It is natural for an organisation to want to ensure the best possible profits when sales minus costs are

[17] Middleton, Peter & Sutton, James, Lean software strategies: proven techniques for managers and developers, Productivity Press, 2005

[18] Jina, Jay, Bhattacharya, Arindam K. & Walton, Andrew D., Applying Lean principles for high product variety and low volumes: some issues and propositions, Logistics Information Management, 10, 1, 1997

taken into account. However, in the case of WiPro, there was also a very important focus on quality and meeting bespoke client needs[19]. Other Lean systems will place a much greater emphasis on the financial impact of a Lean system, looking to trim out any unnecessary costs[20]. This will often involve the process of value curve analysis which looks at ways in which an organisation can maximise its profits, which may not necessarily involve maximising sales. By using a value curve, it is possible to determine the optimum production levels for the organisation in question. This works well within an environment where there is large scale production of a set product and where economies of scale operate in a meaningful way so that definitive production levels can be established[21].

Another Lean approach that is often used by companies, particularly those that are highly fragmented, is that of tool orientation. To a certain extent, this has been seen within WiPro due to the fact that many of the initiatives used have been focussed on problem solving rather than on looking at the overall process[22]. For example, within WiPro, the issue of the project manager taking control of the initial design alone was dealt with by involving several other members of the team. This, to a large extent, is very much in keeping with the tool orientation approach. WiPro, however, goes on to merge this problem solving tool orientation with the waterfall technique to ensure that work flows and benefits of this problem solving travel through the relevant stages of the project.

Tool orientation can be particularly useful in a heavily automated environment such as Toyota, where problems need to be identified and ring-fenced so that they can be dealt with separately to ensure overall efficiency[23]. In an environment such as WiPro, this was more a case of value stream mapping where information flows are monitored and any stoppages or wastage identified. It is, essentially, the same process as seen in manufacturing, but by mapping value and information as opposed to actual products, it is possible to identify and fix issues. When it comes to information flow, this is somewhat weaker due to the fact that all situations are slightly different; therefore, one solution may not fit all and a greater degree of

[19] Rich, Nick, Esain, Ann & Bateman, Nicola, Lean Evolution: Lessons from the Workplace, Cambridge University Press, 2006
[20] Emiliani, B., with Stec, D., Grasso, L. & Stodder, J., Better Thinking, Better Results: Case Study and Analysis of an Enterprise-Wide Lean Transformation, 2nd ed., Kensington, Conn: The CLBM, LLC, 2007
[21] Womack, James P. & Jones, Daniel T., Lean Thinking: Banish Waste and Create Wealth in Your Corporation, HarperBusiness, 2003
[22] Goldratt, Eliyahu M., Critical Chain, Great Barrington, MA: North River Press, 1997.
[23] Dettmer, H. William, The Logical Thinking Process: A Systems Approach to Complex Problem Solving, Milwaukee, WI: ASQ Quality Press, 2007

flexibility had to be brought into the Lean processes in the case of WiPro in order to take account of this and the bespoke nature of the goods.

Related to this method is that of the theory of constraints. With the theory of constraints, the business operation, as a whole, is looked at very much in the same way as TPS was implemented in WiPro[24]. By considering the whole process holistically in a way that takes the raw product (or in this case the client brief at the initial stage) and following it through until final delivery, noting at every stage the factor that delays or takes the longest to complete, i.e. the major constraint in the whole process, then it is possible to reduce both time and cost in relation to the overall project. One of the key difficulties with this type of approach and the reason that it would not necessarily be appropriate in the case of WiPro is the fact that it only looks at the core business process. With WiPro, many of the demands are external or supplemental to the process, such as the needs of the individual client or the way in which the client implements the final product, once it has been developed. This means that a much wider point of view needs to be taken and, whilst elements of the theory of constraint can work well, particularly during the development phase, it would have to be part of a wider Lean process to be fully effective when it is applied in WiPro[25].

In reality, by looking at the various case studies, it is clear to see that there are, in fact, multiple different options in terms of implementing Lean and that, with an organisation that is as strategically complicated as WiPro, a combination of all factors may produce the best possible result.

Part 4

Throughout the process of implementing Lean in WiPro, the main focus has been on ensuring that the client receives a cost effective service, whilst also retaining the quality that they need to ensure continued loyalty. Over the years, the area of software development has become increasingly cost sensitive and there has been a growing trend towards using offshore companies to provide cheaper services[26]. With this in mind, the focus for WiPro, regardless

[24] Cox, Jeff & Goldratt, Eliyahu M., The Goal: a process of ongoing improvement, Great Barrington, MA: North River Press, 1986

[25] Qui, Mabel, Fredendall, Lawrence & Zhu, Zhiwei, TOC or LP? [production control], Manufacturing Engineer, 81 (4), 2002, pp. 190-195

[26] Brown, Steve, Lamming, Richard, Bessant, John & Jones, Peter, Strategic Operations Management, Elsevier, 2000

of how it is achieved, rightly had to be the provision of bespoke, quality services in a cost efficient and streamlined manner. Whilst in this case WiPro chose to use the TPS system, other methods (or a combination of methods) may have worked equally well in ensuring that these ultimate aims are reached.

As alluded to above, one of the main difficulties faced by WiPro was the duplication of efforts and the way in which different phases were undertaken in isolation, resulting in activities taking place that were wasted or could have been done much more quickly, had all of the information been made available at the time of the phase being initiated. Client needs are central to WiPro and it was identified that it was desirable for a much wider involvement at the design phase[27].

One alternative operational approach that WiPro could have explored and have, to an extent, considered in the design phase, is the notion of creating cross function teams. One of the key weaknesses in the previous process was that one phase would be undertaken in its entirety, before passing it on to the next phase[28]. Not only did this mean that the second stage was delayed from starting on the project, but it also meant that any information that was valuable within the second phase could not be fed back into the first phase in time for the issue to be dealt with or rectified, if necessary[29]. By creating a project team that spans the entire life of the project, it is possible for those involved at the early stages to gain information and insight from those later on in the process that will ultimately benefit the efficiency of the overall process. In establishing this type of process, there is a potential difficulty with autonomy as software engineers are generally protective of their knowledge base and as such strong project management from start to finish is critical.

Alongside this approach, WiPro could have chosen to focus on its key selling point which is the bespoke quality it offers. Competing with cheaper offshore suppliers on a cost basis is impractical. Differentiating services and being more in tune with customer requirements

[27] Ijioui, Raschid, Emmerich, Heike & Ceyp, Michael, Strategies and Tactics in Supply Chain Event Management, Springer, 2007
[28] Eckerson, Wayne W., Title Performance dashboards: measuring, monitoring, and managing your business, John Wiley and Sons, 2005
[29] Kalkan, Veli Denizhan, An overall view of knowledge management challenges for global business, Business Process Management Journal, 14, 3, 2008

would allow WiPro to move away from the 'pile them high, sell them cheap' approach[30]. However, in order to do this, it would be required operationally to shift more towards offering enhanced quality control and total quality management, at every stage of the process[31]. To achieve this, the role of ensuring value added services and quality management would have to fall to a key individual in order to ensure that the issue is not simply passed from one person to the next, with no-one taking overall responsibility. In practice, the process being used by WiPro through TPS shows recognition of the importance of quality control; however, it does not place it at the heart of the changes[32].

Having a specific quality manager and project manager who follows the entire process through from initial instruction to implementation would not only create internal efficiency, but would also assist with the reputation of the firm for providing a quality service for clients and involving them at every step of the process[33]. In order to achieve this, the project managers would need to be separately trained and would need to shift their emphasis from the notion of dealing with customers to dealing with clients[34]. This would also allow for continuous improvement and would enable the firm to increase the costs of its services, due to the enhanced quality provided[35].

Regardless of the chosen approach in WiPro, it seems clear that greater interaction between the various phases must be at the heart of any attempt to make the company more efficient. This not only prevents duplication, but also increases quality and reduces variations in the services offered. In order to achieve this, a combination of cross team working and ownership of a project by key individuals will be necessary[36]. Where possible, individuals will be required to work outside of their immediate expertise area so that a greater understanding of the wider issues can be had and waste eliminated from the processes, where possible. Cross function teams would be extremely effective in this regard as, through implementing TPS, WiPro retains one of its major problems which is the fact that one stage of the project does not fully interact with another[37]. With this in mind, it is suggested that WiPro combines the TPS method of eliminating waste with the use of cross functional team and total quality

[30] Waller, Derek L., Operations Management: A Supply Chain Approach, Cengage Learning EMEA, 2003
[31] Leonard, Denis & McAdam, Rodney, The strategic impact and application of the business excellence model: implications for quality training and development, Journal of European Industrial Training, 26, 1, 2002
[32] Morgan, Gareth, Images of Organization, SAGE, 2006
[33] Rouse, William B. & Sage, Andrew P., Work, Workflow and Information Systems, IOS Press, 2007
[34] Yasin, Mahmoud M. & Yavas, Ugur, Enhancing customer orientation of service delivery systems: an integrative framework, Managing Service Quality, 9, 3, 1999
[35] Leavy, Brian, Building the self-renewing organization through continuous innovation, Strategy & Leadership, 34, 4, 2006
[36] Al-Hakim, Latif, Challenges of Managing Information Quality in Service Organizations, Idea Group Inc (IGI), 2006
[37] Yasin, Mahmoud M., Alavi, Jafar, Kunt, Murat & Zimmerer, Thomas W., TQM practices in service organizations: an exploratory study into the implementation, outcome and effectiveness, Managing Service Quality, 14, 5, 2004

management to improve the professional services offered by the firm, whilst also retaining a streamlined physical process within the company and keeping its own costs

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