

Can Portfolio, Programme and Project Management be effective in Lean Management Implementation?

Michele Cano, Jeremy Garnett

School of Engineering and Technology
University of the West of Scotland (UK)
email: *michele.cano@uws.ac.uk, evi.viza@uws.ac.uk*

Athanasios Kourouklis

School of Business and Enterprise
University of the West of Scotland (UK)
email: *thanos.kourouklis@uws.ac.uk*

Abstract

P3 methodologies have been evolving over the last three decades and robust approaches are available for adoption by organisations. The challenges which organisations face in the implementation of LM and usually contribute to a failure of programmes, can be addressed by a P3 approach. The purpose of this paper is to propose the adoption of Portfolio, Programme and Project (P3) methodologies for implementation of lean management (LM) programmes. The P3 approach is discussed in relation to implementation of LM programmes.

This is a conceptual paper which is based on the review of existing literature within the fields of Lean Management/manufacturing and Portfolio, Project and Programme Management. The proposed use of P3 methodologies can serve as a framework for practitioners selecting LM projects, in line with strategic objectives of the organisation, and assist in capturing success. This paper also expands current thinking on governance and management of LM initiatives by proposing the use of P3 methodologies and suggests how the proposed framework can become a workable tool.

Keywords

Lean Management, Portfolio Management; Programme Management; Project Management; Project Maturity Models.

1. Introduction

In pursue of a competitive advantage and improved performance and higher productivity, many organisations are seeking the answer to their problems through the use of management systems and tools. Implementation of these systems and tools will assist organisations in meeting their business needs whilst identifying areas of continuous growth and improvement. In doing so many organisations adopt approaches such as Lean Management (LM), Six Sigma (SS) and Lean Six Sigma (LSS). However, literature has reported a lack of success in implementation efforts for LM in particular (Bicheno and Holweg 2009; Liker 2004). Literature also reports on a number of critical success factors for LM, SS and LSS, suggesting that focusing on these critical success factors, such as project selection, will enable results (Antony, 2007; Balzer *et al.*, 2105; Radnor and Osborne, 2013). However, literature on LM has yet to link Portfolio, Programme and Project management (P3) methodologies to manage LM implementation efforts (Cano *et al.* 2016). Similarly Project Management literature and in particular Portfolio, Programme and Portfolio Management (P3) literature (Aubry *et al.* 2007; Pelligrinelli and Garagna 2009; Unger *et al.*, 2012)), doesn't specifically refer to improvement projects or programmes such as LM, SS and LSS. P3 literature however does recognise the importance of strategic alignment of projects to organisational goals and objectives (Aubry *et al.* 2007). Similarly the literature on Lean Management/Manufacturing, Six Sigma and Lean Six Sigma highlight implementation frameworks few of which build in project or programme management (Ahlstrom, 2004; Anand and Kodali, 2009a; 2009b; Bicheno and Holweg, 2009; Hines *et al.*, 2004; Mostafa *et al.* 2013; Motwani, 2003; Nordin *et al.*, 2012; Stone, 2012). Alternatively Hilton and Sohal (2012) offer a conceptual model for Lean Six Sigma which incorporates a maturity model approach for assessing competencies within lean Six Sigma. (Cano *et al.* 2016) suggest consideration of P3 within an organisation considering implementation of lean manufacturing principles. This paper builds on previous work and the authors argue that a P3 approach can aid the success of LM implementation programmes. This paper also explains the P3 approach and how it can be used to consider and capture improvement projects and programmes as part of an organisation's portfolio for change.

2 Lean Management and the need for a P3 approach

Lean Management has evolved from Lean Production as defined by Womack *et al.* (1990) in their book 'the machine that change the world'. Based on the success of the Toyota Production System (TPS), which yielded impressive results in production efficiencies (Ohno, 1988; Ortiz, 2008) in the car industry, it is said to have also revolutionised manufacturing (Bicheno and Holweg, 2009; and Liker, 2004). It is a philosophy that has also transferred from manufacturing to other sectors including healthcare, education, retail, government and finance. Kochan *et al.* (1997, p.303) are of the view that '*lean production was a universally applicable system and that those firms that did not adopt it would sooner or later be squeezed out of the market*'. Novak (2006, p.150) also supports the view of LM being universally applicable when he argues that '*lean techniques can, and have been, used successfully beyond the shop floor*'. Stone (2012) also echoes that view and recognises that lean thinking has evolved from the manufacturing environment to be applicable throughout an organisation and industries outside manufacturing.

The success that LM can offer an organisation is centred on the implementation of five underlying principles which include: specifying value, identifying the value stream, streamline flows, facilitate customer pull and pursuit excellence (Balzer, 2010; Hines *et al.*, 2004; Womack and Jones, 2003). It is an approach which encourages efficient flows of products or services through the elimination of waste within an organisation (Bicheno and Holweg, 2009; Douglas *et al.*, 2015; Liker, 2004; Womack *et al.*, 1990; Womack and Jones, 2003). Pavnaskar *et al.* (2003) argue that LM methods can be applied to identify and measure waste so that opportunities for improvement become clear. These types of waste have been identified as overproduction, excess inventory, unnecessary transportation, defects, over processing, motion and waiting (Askin & Goldberg 2002); Breyfogle III and Forrest, 1999; Liker, 2004; Ohno, 1988, and Santos *et al.*, 2006) known as the seven types of waste in the system. Liker (2004) also includes ‘unused employee creativity’ as an eighth type of waste in the system.

By following the LM principles, these types of waste can arguably be reduced and eliminated realising greater efficiencies and a reduction in costs, better product or service flows, increased customer and employee satisfaction. However, it is also recognised that many attempts fail to achieve the possible benefits, with many initiatives falling away. This is evident in manufacturing and service companies with few achieving the full benefits that LM claims to bring about (Bicheno and Holweg, 2009; Feld, 2001; Liker, 2004; Ortiz, 2008; Page, 2004; Santos *et al.*, 2006; Scherrer-Rathje *et al.*, 2009; Womack and Jones, 2003).

However, it is also recognised that there is no one approach or framework to assist companies with the implementation of LM. For example, Bicheno and Holweg (2009, p.43) state that every ‘*Lean guru and consultant has their own approach to Lean transformation*’. This can lead to difficulties and implementation issues dependent not only on the sector but also on the individual organisation.

Page (2004) supports this by recognising that despite much literature is raising awareness about the prospects of LM, there is a conspicuous lack of practical LM implementation advice. Ortiz (2008), contests the lack of practical advice and argues that most manufacturers employ the finest experts who have the requisite ability to grasp the basic LM approaches.

However, according to Hobbs (2004), the implementation of LM in many companies is inadequate, thereby resulting in some level of frustration due to the fact that promised benefits are often not realised. Liker (2004) recognises that few companies adopt the LM philosophy fully and fail to achieve anything beyond process improvement. In support of this he moots that LM consists of a four stage model which includes a long term philosophy; processes; people and partnerships; and continuous improvement with each of these four elements required in order to gain real benefits.

Ortiz (2008) attributes the lack of real success in LM implementation to organisations that adopt tools and execute process reviews and projects in an *ad hoc* manner. This is supported in previous research findings (Ayunaba *et al.*, 2010; Cano and Kobi, 2011; Liker, 2004). Scherrer-Rathje *et al.* (2009), state that achieving the levels of organisational commitment in implementing LM is a daunting task and they also recognise that it is very difficult for many companies to get LM right the first time. According to Feld (2001), a LM programme will succeed if factors including motivation, tenacity, leadership, and a good sense of direction take centre stage in the process of planning and implementing the LM programme.

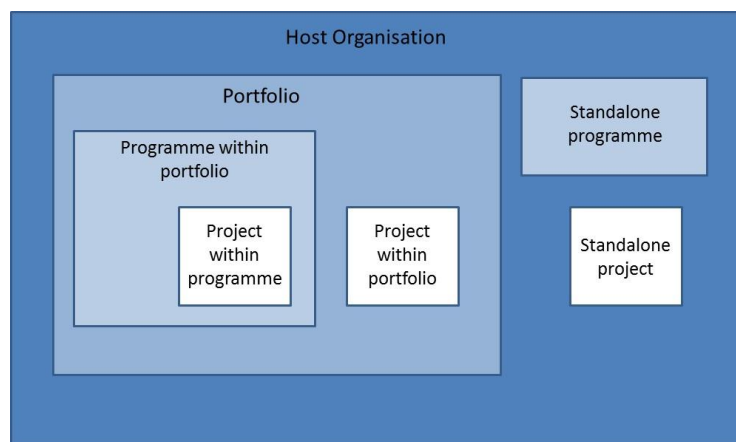
The selection of projects has been raised as a critical factor in the success of a LM initiative with poor selection of projects causing potential failure (Antony, 2007; Balzer *et al.*, 2010; Radnor and Osborne, 2013). Balzer *et al.* (2015, p.930) recognise that LM must be core to the strategy of the organisation and argues that ‘*lean must guide strategy*’ and, therefore, ‘*choice*

of LHE initiatives must align with organizational strategy’. Liker (2004) while recognising the importance of strategy deployment for LM, also suggests that the product journey be reviewed which then supports the joint top down and bottom up approach. Literature suggests there is a definite need for viewing LM implementation in a holistic way (Bicheno and Holweg, 2009; Liker, 2004; Naslund, 2008; Radnor and Osborne, 2013; Seddon *et al.*, 2011; Seddon and Caulkin, 2007; Svensson *et al.*, 2015). Adopting a P3 approach would offer such a holistic approach.

3. The P3 Methodology: Portfolio, Programme and Project Management

Within the P3 methodology, there are three key functions which are portfolio management, programme management and project management. According to the APM Body of Knowledge (BoK) (2012, p.2), ‘Project, programme and portfolio (P3) management is concerned with managing discrete packages of work to achieve objectives’. Within the context of P3 management consideration has to be given to the governance and the setting, where the governance deals with the procedural and cultural aspects influencing the outcomes and setting is to do with the organisational factors which are out with the boundaries of the project (APM BoK, 2012). Within the APM BoK (2012, p.2), the following diagram (Figure 1) presents diagrammatically the context for P3 management.

Figure 1: Context of P3 Management



Source APM Body of Knowledge, 2012, 6th Edition

Within the context of P3 Management, there exist maturity models to assess organisation performance in project management and levels of maturity which enable organisations to develop effective improvements and develop project management capability.

Many organisations while are successful at the project level in implementing lean management, six sigma and lean six sigma, fail to achieve overall programme or business improvements through a lack of programme and portfolio management.

To result in project success and ultimately achieve business growth and competitiveness, organisations should consider the implementation of all three functions of P3. Whist organisations may have a mature approach to projects, for ultimate business success, maturity

should also be developed in terms of portfolio and programme management. Figure 2 gives a comparison of project, programme and portfolio management.

Figure 2 - Comparison of project programme and portfolio management

Organizational Project Management			
	PROJECTS	PROGRAMS	PORTFOLIOS
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programs have a larger scope and provide more significant benefits.	Portfolios have an organizational scope that changes with the strategic objectives of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	Program managers expect change from both inside and outside the program and are prepared to manage it.	Portfolio managers continuously monitor changes in the broader internal and external environment.
Planning	Project managers progressively elaborate high-level information into detailed plans throughout the project life cycle.	Program managers develop the overall program plan and create high-level plans to guide detailed planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Program managers manage the program staff and the project managers; they provide vision and overall leadership.	Portfolio managers may manage or coordinate portfolio management staff, or program and project staff that may have reporting responsibilities into the aggregate portfolio.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	Success is measured by the degree to which the program satisfies the needs and benefits for which it was undertaken.	Success is measured in terms of the aggregate investment performance and benefit realization of the portfolio.
Monitoring	Project managers monitor and control the work of producing the products, services, or results that the project was undertaken to produce.	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor strategic changes and aggregate resource allocation, performance results, and risk of the portfolio.

Source: PMBOK® Guide, (Project Management Institute [PMI], 2013a, p. 8)
<https://www.pmi.org/learning/library/career-path-project-managers-knowledge-skill-development-5888>

3.1 Portfolio management

The APM Body of Knowledge (2012 p.16) describes portfolio management as ‘*the selection, prioritisation and control of an organisation’s projects and programmes in line with its strategic objectives and capacity to deliver. The goal is to balance change initiatives and business-as-usual while optimising return on investment*’. Similarly, portfolio management is described as a collection of programmes, projects and other activities which are grouped together to meet the organisations strategic business objectives (PMI 2013b).

It is also very important to integrate portfolio management into the strategic plan during implementation because it provides key knowledge areas that could benefit the organisations in achieving the required outcomes. These knowledge areas are

- Portfolio strategic management – enables organisation to set short, medium and long-term goals by implementing portfolios, programmes and project.
- Portfolio performance management – enables organisations to measure success by looking at better ways of improving how they work and the processes they use

Portfolio communication management – Allows effective communication between stakeholders, portfolio managers and everyone involved in managing the portfolio.

The projects in portfolio may or may not be directly related but the key is in finding out what things need to be done in managing multiple projects or programmes within the portfolio. Portfolio management can additionally provide a framework for Hoshin Kanri, a Japanese technique for strategy deployment often utilised in Lean Management and Six Sigma approaches to continuous improvement (Ohno, 1988; Liker, 2004).

Portfolio management also provides a bigger picture of the current situation of an organisation and enables scrutiny of programmes and projects to make sure they are in line with the expected organisational objectives. Focus should be on project selection to support business strategy and the losing those that do not support it (Too *et al.*, 2014).

Project selection has been identified as a critical success factor in approaches such as Lean Management, Six Sigma and Lean Six Sigma (Antony, 2007; Balzer *et al.* 2015; Radnor *et al.*, 2006; Radnor and Osborne, 2013). Under portfolio management, selection of projects is a key factor and according to Nieto-Rodriguez (2014, p.31) as a '*company-wide process must be applied consistently*'. He suggests that every proposed idea for a project requires a business case and some common selection criteria might be: return on investment, payback period, strategic alignment, risk, interdependencies and competency to deliver. However, for LM projects, selection factors might also include the potential to add value and benefits for the customer. Therefore, portfolio management enables organisations to evaluate new organisational needs against old ways of working and in turn, allows organisations to assess the impact of projects and programmes on how the business is run as usual. Within LM key issues are the *ad-hoc* approach which many organisations adopt during implementation and the capturing of success of individual projects (Cano *et al.* 2015). This supports Blichfeldt and Eskerod (2008) view that many small projects are not included in an organisation's portfolio, yet can deplete resources from other enacted projects. They further advocate the view that two approaches can be taken to smaller projects, either include in the overall portfolio or have a 'loose' project structure for these smaller projects where some resources are allocated. One of the key aims and indeed critical factors for LM is a culture change to one of continuous improvement. To facilitate this culture change projects are considered using a bottom up approach as well as a top down approach. Yet Cano *et al.* (2015) highlighted the problem of capturing success and the potential negative impact of projects on areas of the business for bottom up projects.

Another important issue is risk management which is a key influencer on the Project Portfolio Management (Blichfeldt and Eskerod, 2008; Martinsuo 2013) and this aspect of Project Portfolio Management can address some of the issues of project selection and negative impact on other areas (Cano *et al.* 2016). Portfolio management could also assist in the identification of what constitutes a lean management project compared to a cost savings project for example. Both would have their place in the organisation's change portfolio but would allow lean management to be disassociated from negative perceptions surround cost cutting exercises.

3.2 Programme Management

Programme management is quite different from portfolio management (Blomquist and Müller, 2006; Lycett *et al.*, 2004; Nieto-Rodriguez, 2014). Programme management, while connected and related to portfolio management, is seen as the integration and management of related projects to realise benefits (Thiry, 2002; Lycett *et al.*, 2004) or as a programme linked with organisational change (APM BoK, 2012; Pellegrinelli, 1997; Thiry, 2002). Vereecke *et al.* (2003, p.1279) also recognise the differing opinions on programme management and the split in thinking of programme management as '*managing multiple projects*' and the '*management of organizational change through projects that bring about change*'; while the APM BoK (2012, p. 14) defines Programme Management as the '*coordinated management of projects and change management activities to achieve beneficial change*'. Pellegrinelli (1997, p.141) argues that programme management is quite different from multi-project management, and recognises that '*the widespread use of projects in realising strategic or complex change also brought with*

it the need to marshal project-based activity in some coherent, beneficial way'. This need for greater co-ordination and control is also argued for by Thiry (2002); Lycett *et al.* (2004); Vereecke *et al.* (2003); and Moran (2015).

Three features of programme management which, according to Pellegrinelli (1997), are of importance include:

- Creating benefits through better organisation of projects
- Evolving in response to the business' needs
- Taking a wider view to ensure that the overall business benefits from the projects' activities.

The APM BoK (2012) incorporates these elements in their core processes for programme management which are: co-ordination; managing the transformation; benefits management; stakeholder management and communication.

Moran (2015 p.103) further, adds that the function of programme management is to *'encompass governance, oversight for processes and methodologies (including their continual improvement and optimisation) as well as provide support'*. Pellegrinelli (1997, p.142) however, makes an important observation that programmes, unlike projects, *'do not necessarily have a single clearly defined deliverable'* and adds that programmes create value by improving the management of projects that were previously in isolation. Thiry (2002) however, argues that while this is the case, the use of Value Management (VM) as a problem identification and solving methodology is a technique within the programme management which can be utilised. Pellegrinelli (1997) further argues that risk analysis and management techniques should be carried out at the programme level, as well as the project level, to address wider issues. He further advocates the importance of measurement in tracking project performance. Thiry (2002, p.225) recognises the need for measurement and tracking but also advocates the need for programme appraisal to *'reassess the programme's critical success factors on a regular basis'*. This is especially important for LM implementation where the programme is often perceived as failing to achieve real benefits.

3.3. Project management

To distinguish projects from programmes, project management is defined as *'the application of processes, methods, knowledge, skills and experience to achieve the project objectives'* APM BoK (2012, p.12). The PMI (2013b) also describes a project as a set of agreed activities that have a definite start and finish.. One key issue in project management is the trade-off of the time, cost and quality constraints (Burtonshaw-Gunn, 2015). If a project, for example is behind schedule, it might affect the cost and quality. Additionally sometimes organisations have financial and other resource constraints but through good project management processes organisations can meet the required objectives.

The following are the key components of project management according to APM (2018):

- defining the reason why a project is necessary;
- capturing project requirements, specifying quality of the deliverables, estimating resources and timescales;
- preparing a business case to justify the investment;
- securing corporate agreement and funding;
- developing and implementing a management plan for the project;
- leading and motivating the project delivery team;
- managing the risks, issues and changes on the project;

- monitoring progress against plan;
- managing the project budget;
- maintaining communications with stakeholders and the project organisation;
- provider management;
- closing the project in a controlled fashion when appropriate.

It should also be noted that project management is not the same as business as usual as it requires people to work as a team to achieve a successful outcome in a project. The complexity of the work to be done differs from one project to another but success depends on a wide variety of factors.

3.4 Maturity Models

According to de Souza and Gomez (2015 pp. 92), *‘Every organization wants to achieve excellence in projects. Using project management, even if for an extended period of time, is not a sufficient condition for reaching excellence’*. As one of the fundamental principles of LM is to strive for perfection, then excellence in projects must also be achieved. De Souza and Gomez (2015) suggest that the best way to achieve project success is through the use of maturity models.

De Souza and Gomez (2015 pp.93) cite the Project Management Institute definition of a maturity model as *‘a conceptual structure, with constituent parts, which defines the maturity of the area of interest and, in some cases, also describes the processes that the organization will need to develop to reach a desired future’*. They further discuss maturity in terms of repetitive processes and systems whilst recognising that repetitiveness of systems and processes does not necessarily guarantee success but does increase the likelihood of project success. One of the main factors within the LM philosophy is the idea of standardisation of processes (Bicheno and Hogweg 2009; Liker 2004). This is consistent with the concept of maturity models and therefore the use of maturity models within a P3 approach can recognise such efforts in LM implementation.

Originating in the software development sector, the use of maturity models in project management is being utilised in other sectors as a tool to help achieve project success (Crawford, 2015; Görög, 2016). Citing Torres (2014), Görög, (2016) states that the potential values of the maturity models, such as (a) strategic value, i.e., higher level maturity is a competitive advantage; (b) benchmarking value, i.e., highlighting the needs for developing the maturity status; and (c) performance value, i.e., higher level maturity, leads to better performance. He also recognises that there are in excess of 30 different maturity models in existence. Incorporating an understanding of maturity will assist organisations in incorporating improvement into their P3 approach which in turn will facilitate a better understanding of LM programmes within the organisation’s portfolio for change. Under the ethos of continuous improvement, project management capability should also improve simultaneously to help organisations measure and plan for further improvements. The maturity models provide a basis on which project management capability within an organisation can govern and drive the necessary changes both in culture, services and processes to gain competitive advantage and growth.

4. Conclusion

LM is a philosophy which claims to help organisations improve efficiencies and achieve competitive advantage and growth through the elimination of waste. Waste elimination and the implementation of LM principles is carried out through a project approach. Selection of projects is seen as a critical success factor as is alignment with organisational strategy and goals. However, capturing project success, the *ad-hoc* manner in which many projects are selected and managed contributes to LM programmes failing to achieve full benefits. The P3 approach in managing portfolios, programmes and projects, offers a methodology which can capture and align projects with strategic objectives. Projects within an LM programme are often conceived in a bottom-up approach and are difficult to evaluate in terms of impact. These projects also often suffer from a lack of allocated resources particularly if they are aimed at value adding rather than cost savings.

The P3 methodology helps to select these types of LM projects and therefore enable appropriate resource allocation through a structure for alignment with strategic objectives or alternatively through the creation of a bundle of small projects.

P3 includes techniques of project selection, within the portfolio management, risk assessment and value management within the programme management and resource allocation within management of individual projects.

4.1 Future Work

This paper is a conceptual paper and it has shown the potential of the P3 approach in managing LM programmes. However, a number of outstanding issues still need to be resolved. These include:

- Is it necessary to identify and recognise all small projects? Does it not just increase the bureaucracy if all projects, including the very smallest, are formally brought under the P3 methodology?
- How easy is it for different organisations to successfully integrate top-down and bottom-up approaches. To what extent does it depend on the culture of the organisation?
- There are over 30 maturity models to choose from. How easy is it for an organisation to choose the most appropriate model – and then to adopt it? Can an organisation really measure its own maturity, or should it bring in auditors from outside?
- Education and training. Just how widespread and extensive does the training programme need to be for the approach to be rolled out across the organisation?
- Timescales. What are realistic timescales for the approach to deliver tangible benefits?

Future work will attempt to answer some of these questions and provide practical guidelines for successful implementation of the approach.

References

- Ahlstrom P., 2004. Lean Service Operations: translating lean production principles to service operations. *Service technology and Management*, 5(5/6), pp. 545-564.
- Anand G. and Kodali R., 2009a. Selection of LM systems using the analytic network process – a case study. *Journal of Manufacturing Technology Management*, 20(2), pp. 258-289.
- Anand G. and Kodali R., 2009b. Development of a framework for LM systems. *International Journal of Services and Operations Management*, 5(5), pp.687-716.

- Antony J., 2007. Is Six Sigma a Management Fad or Fact? *Assembly Automation*, 27(1), pp. 17-19.
- APM Body of Knowledge, 2012. 6th Edition, London: Association for Project Management.
- APM. “What is project management?.” [ONLINE] Available at: <https://www.apm.org.uk/resources/what-is-project-management/>. [Accessed 31 March 2018].
- Askin G.R., and Goldberg B.J., (2002). Design and Analysis of Lean Production Systems. New York: John Wiley & Sons.
- Aubry, M., Hobbs, B. and Thuillier, D., 2007. A new framework for understanding organisational project management through the PMO. *International journal of project management*, 25(4), pp.328-336.
- Ayunaba J., Cano M, and Kourouklis A., 2010. A Study into the Implementation of Lean in Three Scottish Case Studies, Proceedings of the International conference Qualita, Angers France.
- Balzer W.K., 2010. *Lean Higher Education: Increasing the Value and Performance of University Processes*. Portland OR: Productivity Press.
- Balzer W.K., Brodke M.H. and Thomas Kizhakethalackal E., 2015. Lean higher education: successes, challenges, and realizing potential. *International Journal of Quality & Reliability Management*, 32(9), pp.924-933.
- Bicheno J. and Holweg M., 2009. *The Lean Tool Box: The essential guide to Lean transformation*, Buckingham: Picsie Books.
- Blichfeldt, B.S. and Eskerod, P., 2008. Project portfolio management—There’s more to it than what management enacts. *International Journal of Project Management*, 26(4), pp.357-365.
- Blomquist T. and Müller R., 2006. Practices, roles, and responsibilities of middle managers in program and portfolio management. *Project Management Journal*, 37(1), p.52.
- Breyfogle III F.W. and Forrest W., 1999. *Implementing SIX SIGMA: smarter solutions using statistical methods*. New York: John Wiley & Sons.
- Burtonshaw-Gunn, S. 2015. *Project Management*. [ONLINE] Available at: <https://doi.org/10.1002/9781119208723.ch12>. [Accessed 31 March 2018].
- Cano M. and Kobi A., 2011. Evaluation of Continuous Improvement Approaches within the Scottish Manufacturing Sector, Toulon Verona Conference, September 1 – 3 Alicante.
- Cano M., O’Neill E., Kobi A., 2015. Preliminary Insights into the Implementation of LM in Higher Education (part one): A grounded theory approach. Proceedings of the 18th Toulon Verona International Conference Excellence in Services, 2-3 September, Palermo.
- Cano M., Moyes D., Kobi A, A framework for implementing Lean Operations Management in the Higher Education Sector. 19th Toulon Verona Conference Excellence in Services, 5-6 September 2016, Huelva, Spain.
- Crawford, J.K., 2014. *Project management maturity model*. CRC Press.
- de Souza, T.F. and Gomes, C.F.S., 2015. Assessment of maturity in project management: a bibliometric study of main models. *Procedia Computer Science*, 55, pp.92-101.
- Douglas J., Antony J. and Douglas A., 2015. Waste identification and elimination in HEIs: the role of Lean thinking, *International Journal of Quality & Reliability Management*, 32(9), pp. 970-981.
- Görög, M., 2016. A broader approach to organisational project management maturity assessment. *International Journal of Project Management*, 34(8), pp.1658-1669.
- Feld, W.M. 2001. *LM: Tools, Techniques, and How to Use Them*. Washington, DC: CRC Press.

- Hines P., Holwe M., Rich N., 2004. Learning to Evolve: A Review of Contemporary Lean Thinking. *International Journal of Operations and Production Management*, 24(10), pp. 994-1013.
- Hilton, R.J. and Sohal, A., 2012. A conceptual model for the successful deployment of Lean Six Sigma. *International Journal of Quality & Reliability Management*, 29(1), pp.54-70.
- Hobbs D.P., 2004. *LM implementation: a complete execution manual for any size manufacturer*. Boca Raton: J. Ross Publishing.
- Kochan T.A., Lansbury R.D. and Macduffie J.P., 1997. *After Lean Production: Evolving Employment Practices in the World Auto Industry*. Ithaca: Cornell University Press.
- Liker J.K., 2004. *The Toyota Way – 14 Management Principles from the World’s Greatest Manufacturer*. New York: McGraw-Hill Companies.
- Lycett M, Rassau A, Danson J, 2004. Programme Management: a critical review. *International Journal of Project Management*, 22(4), pp. 289-299.
- Martinsuo, M., 2013. Project portfolio management in practice and in context. *International Journal of Project Management*, 31(6), pp.794-803.
- Moran A., 2015. *Managing Agile*. Cham, Springer International Publishing.
- Mostafa S., Dumrak J. and Soltan H., 2013. A framework for LM implementation. *Production & Manufacturing Research*, 1(1), pp. 44-64.
- Motwani J., 2003. A business process change framework for examining LM: a case study. *Industrial Management & Data Systems*, 103(5/6), pp. 339-47.
- Naslund D., 2008. Lean, Six Sigma and Lean Six Sigma: fads or real process improvement methods? *Business Process Management Journal*, 14(3), pp. 269-287.
- Nieto-Rodriguez A., 2014. Implementing Project Portfolio Management. *Project*, February, pp.30-33.
- Nordin N., Deros B.M., Wahab D.A. and Rahman M.N.A., 2012. A framework for organisational change management in LM implementation. *International Journal of Services and Operations Management*, 12(1), pp. 101-117.
- Novak S., 2006. *The small manufacturer’s Toolkit: A guide to selecting the Techniques and systems to help you win*. Boca Raton: CRC Press.
- Ohno T, 1988. *Toyota Production System*, Portland OR: Productivity Press.
- Ortiz C.A., 2008. *Lessons from a Lean Consultant; Avoiding Lean Implementation Failures on the Shop Floor*. Boston, MA: Pearson Education, Inc.
- Page J., 2004. *Implementing LM Techniques: Making your System Lean and Living with It*. Cincinnati: Hanser Gardner Publications.
- Pellegrinelli S., 1997. Programme management: organising project-based change. *International Journal of Project Management*, 15(3), pp.141-149.
- Pellegrinelli S. and Garagna L., 2009. Towards a conceptualisation of PMOs as agents and subjects of change and renewal. *International Journal of Project Management*, Volume 27, Issue 7, pp. 649-656.
- Pavnaskar S.J., Gershenson J.K. and Jambekar A.B., 2003. Classification scheme for lean manufacturing tools. *International Journal of Production Research*, 41(13), pp. 3075-3090.
- Piercy N. and Rich N., 2015. The relationship between lean operations and sustainable operations. *International Journal of Operations & Production Management*, 35(2), pp. 282-315.
- Project Management Institute [PMI], 2013a, *PMBOK Guide*, <https://www.pmi.org/learning/library/career-path-project-managers-knowledge-skill-development-5888>

- Project Management Institute [PMI], 2013b. *PMI's Pulse of the Profession: The High Cost of Lower Performance*. Project Management Institute.
- Radnor Z. and Osborne S.P., 2013. Lean: A failed theory for public services? *Public Management Review*, 15(2), pp. 265-287.
- Radnor Z., Walley P., Stephens A. and Bucci G., 2006. *Evaluation of the lean approach to business management and its use in the public sector*. Edinburgh: Office of Chief Researcher, Scottish Executive.
- Santos J., Wysk R., & Torres J.M., 2006. *Improving Production with Lean Thinking*. New Jersey: John Wiley & Sons, Inc.
- Scherrer-R Scherrer-Rathje M., Boyle T.A. and Deflorin P., 2009. Lean, take two! Reflections from the second attempt at lean implementation. *Business horizons*, 52(1), pp. 79-88.
- Seddon J. and Caulkin S., 2007. Systems thinking, lean production and action learning. *Action Learning: Research and Practice*, 4(1), pp. 9-24.
- Seddon J., O'Donovan B. and Zokaie. K., 2011. *Rethinking lean service*. In: M. McIntyre, G. Parry and J. Angelis (eds). *Service Design and Delivery* (pp. 41-60). New York: Springer.
- Svensson C., Antony J., Ba-Essa M., Bakhsh M. and Albliwi, S., 2015. A Lean Six Sigma program in higher education. *International Journal of Quality & Reliability Management*, 32(9), pp.951-969.
- Stone K.B., 2012. Lean Transformation: Organizational performance factors that Influence Firms' leanness. *Journal of Enterprise Transformation*, 2(4), pp. 229-249
- Thiry M., 2002. Combining Value and project management into an effective programme management model. *International Journal of Project Management*, 20(3), pp. 221-227.
- Too, E et al, 2014. The management of project management: A conceptual framework for project governance. *International Journal of Project Management*, [Online]. 32, 8, 1. Available at: <https://www.sciencedirect.com/science/article/pii/S026378631300094X> [Accessed 31 March 2018].
- Torres, L., 2014. A Contingency View on the Effect of Project Management Maturity on Perceived Performance (PhD thesis) Skema Business School.
- Unger B.M., Gemünden H.G. and Aubry M., 2012. The three roles of a project portfolio management office: Their impact on portfolio management execution and success. *International Journal of Project Management*, Volume 30, Issue 5, pp. 608-620
- Vereecke A., Pandelaere E., Deschoolmeester D. and Stevens M., 2003. A classification of development programmes and its consequences for programme management. *International Journal of Operations and Production Management*, 23(10), pp. 1279-1290.
- Womack J.P. and Jones D.T., 2003. *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. New York: Free Press.
- Womack J.P., Jones D.T. and Roos D., 1990. *Machine that changed the world*. London: Simon and Schuster.