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# The effect of Lean on staff morale in a rural district hospital outpatient department in KwaZulu-Natal

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**Abstract**

Ineffective operations management in health care facilities contributes to poor service delivery and a lackluster work environment. Non-value-adding activities result in job discontentment and low staff morale. This operational action-research aims to identify the effect of Lean on staff morale.

The sample consisted of all service nodes and employees of a rural district hospital outpatient department in KwaZulu-Natal, South Africa. A pre- and post-intervention assessment of staff morale was conducted. At the 95% confidence level, pre- and post-intervention scores were compared using paired t-tests or Wilcoxon paired signed-rank tests depending on data distribution. Bivariate analyses for proportions were carried out using Fisher's test.

The implementation of Lean had a positive impact on the proportion of staff satisfied with their jobs (increased from 21.1% to 77.8%; $p<0.0001$) and those that felt motivated (increased from 15.8% to 77.8%; $p<0.0001$). The proportion of staff who felt that things were getting better in their department, increased from 21.1% to 83.3% ($p<0.0001$). Pre- and post-intervention scores for communication strength ($p=0.0003$) and staff attitude toward teamwork ($p=0.002$) significantly improved. The application of Lean has a positive effect on job satisfaction and staff morale. The lessons learnt from this study may be emulated for staff morale improvement across similar hospitals.

***Key phrases***

*job satisfaction; kaizen; Lean thinking; rural hospital; staff attitudes; staff morale*

## 1. INTRODUCTION

South African public health-care facilities are fraught with delivery of poor health-care service, partly owing to problems inherent in operations management (Harrison 2009:28-29).

Some of the problems are reflected in staff discontentment and low staff morale in outpatient departments (OPDs) of hospitals (Department of Health 2007:3; Harrison 2009:32).

Lean is a novel management approach that offers the potential benefit of improving health-care service delivery through the reduction of inefficiency (Womack & Jones 1996:1; Zidel 2006:7-15). Lean aims to 'achieve more with less', and even in systems with high variability such as hospitals, it could result in greater achievement of health-care objectives and outcomes with better process efficiencies at facility level and staff satisfaction (Jones & Mitchell 2006:13). Little is known, however, about the applicability of Lean and its impact on operational efficiency and staff morale in South African rural district hospital OPDs. Lean is a highly reputable management approach employed to identify and successfully resolve operational problems using specific tools and techniques, while reducing inefficiency and cost (Bliss 2009:39; Zidel 2006:7-15). As a result, this may have a positive effect on staff morale (Graban 2008:24-26).

The selected study site in KwaZulu-Natal is a 170-bed rural public hospital that endures the above challenges typically experienced in many public health-care facilities. The outpatient department reflects the outcome of these challenges in long patient queues, a disorganised department, and disgruntled employees, all of which are not uncommon to other public hospitals. This hospital provided an ideal setting in which to determine the impact of Lean on staff morale.

## 1.1 Lean tools and techniques

In this study, the following Lean tools and techniques were applied: PDCA (*P*lan, *D*o, *C*heck, *A*ct), *kaizen*, Value Stream Mapping, A3 reports, 5-S, 5-Why and *takt* time.

One of the key techniques supporting the implementation of Lean is continuous improvement (*kaizen*) which may be practised using the iterative, 4-step PDCA (*P*lan, *D*o, *C*heck, *A*ct) cycle (Zidel 2006:154). The PDCA process may be facilitated through regular *kaizen* team meetings. The *kaizen* team usually consists of frontline workers from the *Gemba* (actual place where value is being created, such as an OPD) and key role-players who identify problems and plan, implement, and adjust improvements (Fine, Golden, Hannam & Morra 2009:33).

The primary tool of Lean for identifying work activities and waste in the value stream is the Value Stream Map (VSM), a process flowchart which presents information about speed (cycle or activity times, lead or waiting times and *takt* times) of value-added work, non-value-

added work and the continuity of flow (Casey 2007:25). *Takt* time is the time necessary in the process to meet the demand of the clients (Casey 2007:96).

A tool that principally empowers employees in its application is the A3 report, which is the core of Toyota's success in problem-solving. This tool, which harmonizes the PDCA cycle, is an 11-by-17 inch sheet of paper that is used to analyse the way in which a process may be improved in the value stream (Grunden 2009: 31). On the left-hand side of the sheet, the problem background is described, and a root-cause analysis is determined by frontline workers. The right-hand side allows role-players to develop solutions to the problems. Grunden (2009:31) argues that, by empowering workers, A3 thinking is often the first step toward culture change; this inculcates a spirit of teamwork by fostering work across functional boundaries or "silos".

The 5-Why analysis tool for root-cause analysis and identifying wastes during *kaizen* team meetings is also part of the Lean toolbox (Zidel 2006:12) The 5S (*sort, straighten, scrub, standardize,* and *sustain*) tool helps with housekeeping, standardization and systemization of work (Zidel 2006:12).

## 1.2 Evidence for the benefits of Lean in health care

In the U.S.A., a pre-surgical nursing unit at the Western Pennsylvania Hospital managed significantly to reduce lead and cycle times by eliminating ambiguities through Lean in the following processes, *inter alia*, signing in before registration (from "up to 2 hours" down to zero); time spent in registering patients (from "12 minutes to 1 hour" down to three minutes); and time spent each day assembling patients' charts (from "9 hours" down to 2¼ hours) (Spear 2005:83-85). Perfecting Patient Care (PPC) through Lean is the Pittsburgh Regional Healthcare Initiative's flagship process improvement methodology. Numerous hospitals participating in PPC instituted a plethora of combined countermeasures to eliminate Central-Line Associated Bloodstream (CLAB) infections. In Allegheny General Hospital, the number of CLAB infections and associated deaths declined from 37 to 6 and 19 to 1 year-on-year, respectively (Spear 2005:86). In the participating LifeCare hospitals, there was an 87% reduction in CLAB infections, despite an increase in the number of central lines placed by 9.75% during the study period (Spear 2005:86).

Also in the USA, iterative trials and experiments using Lean in the South Side Hospital in Pittsburgh, showed that the time spent searching for medications decreased by 60% and stock-outs fell by 85% in the pharmacy, without investment in additional technology (Spear

2005:87). The nearby Shadyside Hospital adapted the Lean methodology from South Side Hospital. Their iterative experiments and trials revealed that an estimated 2900 nurse-hours per year were saved on time spent on patient-controlled anaesthesia pumps (Spear 2005:89). Patient falls in the same hospital had occurred on average every 12 hours, but this dramatically declined to zero falls in 95 days since the implementation of Lean (Spear 2005:90).

In 2006, at the 500-bed Flinders Medical Centre in Adelaide, Australia, Lean was implemented in the form of the Redesigning Care programme, after it was reported that the emergency department was "bursting at the seams" with up to 1000 patients per month waiting for more than 8 eight hours before being treated (Ben-Tovim, Bassham, Bolch, Martin, Dougherty & Szwarcbord 2007:10-15). Lean tools and techniques such as point kaizen, Value Stream Mapping and a series of PDCA cycles benefited the centre by reducing average patient waiting-times by 25% (70% of patients going home within 4 hours), as well as patients reneging from queues without seeing a doctor fell by 41% (Ben-Tovim *et al.* 2007:10-15).

Locally, Faull and Booysen (2007:1) experimented with Lean by conducting action-research in 2006 at G.F. Jooste Hospital in Manenberg, Cape Town, which sees up to 70 000 patients per year in the Accident and Emergency unit alone. The research team proved that Lean improves patient flow, patient service level and attitude amongst key staff. Average lead time achieved (89 minutes) exceeded the target of 120-150 minutes, and 100% of patients and staff surveyed were satisfied with the achievements and service-delivery (Faull & Booysen 2007:16-17).

DelliFraine, Langabeer and Nembhard (2010:219) postulated from a systematic review of 34 articles (spanning 1999 to 2008) based on studies on Lean in health care that there is insufficient evidence of substantial benefits of these quality improvement methods in health care. Nevertheless, using Slavin's classification system for evidence-based practices, the review concludes that there is slightly stronger evidence that Lean improves processes of care than the evidence that it improves clinical outcomes (DelliFraine *et al.* 2010:219-220). Furthermore, five of the reviewed articles on Lean showed improved Emergency Room throughput, and 12 articles showed reduced patient waiting-times. Four of these articles showed statistically significant reductions in patient turnaround and waiting times in different departments (DelliFraine *et al.* 2010:221).

## 2. PROBLEM STATEMENT

In addition to having insufficient resources for health-care provision at many district hospitals in Kwazulu-Natal, ineffective operations management greatly contributes to poor health-care service-delivery to patients, and a lack of motivation in hospital staff (Harrison 2009).

## 3. RESEARCH QUESTIONS

The following four research questions were asked in this paper:

i. Could the application of Lean in a rural district hospital OPD improve staff attitudes and morale through its impact on operational efficiency?
ii. To what extent can Lean principles, tools and techniques be applied by action-research participants?
iii. What change in morale and attitudes among employees took place before and after the implementation of Lean?
iv. What recommendations on the application of Lean in rural district hospital OPDs can be made?

## 4. RESEARCH OBJECTIVES

The main purpose of the study was to apply certain Lean principles, tools and techniques, and to determine the impact on, *inter alia*, staff morale within the OPD at a rural district hospital in Amatikulu, Kwazulu-Natal, South Africa.

To achieve the main purpose of this study, three secondary objectives were identified which are:

i. To apply certain Lean principles, tools and techniques (PDCA, Value Stream Mapping, A3 reports, 5-S, 5-Why, *takt* time and *kaizen*) with action-research participants (*kaizen* team);
ii. To determine the change in morale and attitudes among employees working in the OPD at the hospital before and after the implementation of Lean; and
iii. To use the study findings to make recommendations on the application of Lean in rural district hospital OPDs.

This paper intends to report on the study methods, results and conclusions derived from the application of Lean which relate to the effect on staff morale.

# 5. RESEARCH METHODOLOGY

The type of study is health-systems research, and an operational action-research (before-and-after study) design was used. Operational action research deals with operational matters, is participative in nature, involves research in action as opposed to researching participants as part of a system, and it typically comprises four steps in a cycle (planning, taking action, evaluation of the action and taking further modified action and planning) (Coughlan & Coghlan 2002:220-240; Gummesson 2000:16).

The application of Lean follows a similar cyclical process of gathering baseline data, analysing and acting on it (PDCA cycle) using selected tools and techniques (Value Stream Mapping, A3 reports, 5-S, 5-Why, *takt* time and *kaizen*), and planning further as the participants proceed on a journey of continuous quality improvement. In effect, this study used the following steps in the application of Lean: (1) Specify value; (2) Identify the value stream; (3) Make the value-creating steps flow; (4) Create pull; and (5) Pursue perfection (Womack & Jones 1996:1).

## 5.1 Study site

The selected study site is a 170-bed rural district hospital situated in Kwa-Khoza Reserve, Amatikulu, in the uThungulu Health District on KwaZulu-Natal's north coast in South Africa. The rural hospital offers multidisciplinary medical and surgical services for both inpatients and outpatients, serving a population of over 200,000 people (Department of Health 2012:Internet)

The study included all major areas (patient administration, screening, consultation rooms, investigations, X-ray department and/or pharmacy) through which a typical general outpatient usually has to pass in the health-care service delivery process before exiting the hospital.

## 5.2 Sampling

Although the study findings are not intended to be generalised, the target population, to which the transferability of results is anticipated, comprised the OPDs in public-sector rural district hospitals in KwaZulu-Natal, South Africa. The chosen hospital was judgementally selected based on the investigator's experience of operational problems in the OPD.

The study population consisted of all 32 employees (census) in the hospital's OPD. All six OPD service nodes (patient administration, screening, doctor consultation rooms, clinical

investigations node, X-ray department and pharmacy) were included throughout the study period.

The following seven *kaizen* team members, who play an important role in the OPD value stream and in the application of Lean, were purposively selected: two senior managers of the hospital, the OPD unit manager, one OPD doctor, and a representative from patient administration, pharmacy and the X-ray department. The two senior managers (Nursing Manager and Hospital Manager) were instrumental in the decision-making process and to obtain senior management buy-in for the approval and implementation of certain actions. The OPD unit manager and doctor, whose participation was crucial, are the two leaders of the frontline workers (within patient care areas) who would be carrying out the primary activities decided by the *kaizen* team. The other three *kaizen* team members are supervisors of their respective frontline workers in the other service nodes of the OPD value stream.

## 5.3 Exclusion and inclusion criteria

Questionnaires were only distributed to health care workers (excluding students) and support staff (such as porters and administration workers) who had worked for longer than three consecutive months in any of the OPD service nodes, and were stationed there during the study period. Three months was considered to be a period sufficient enough for staff to have been well-orientated with systems and processes within the OPD for them to apply Lean tools and techniques therein. Four of the 32 employees in the OPD were excluded from the study because they worked there for less than three consecutive months.

## 5.4 Data collection

Self-administered questionnaires were distributed to all 28 OPD staff who met the inclusion criteria, before and again after Lean implementation, in order to measure baseline and post-Lean attitudes and morale, respectively. Each questionnaire consisted of 36 Likert-scale (5-point) statements categorised into 7 themes, 13 closed- and open-ended questions targeted at exploring staff attitudes and motivation, and 7 questions to collect demographic data. Completed questionnaires were collected from the staff on the same day. In an attempt to ensure that post-Lean questionnaires were issued to the same study participants that received pre-Lean questionnaires, the staff duty roster was used to verify that no new employees were assigned to the OPD. In the case where the post-Lean participants were not the same as the pre-Lean participants, a record was made of this but the questionnaire was still issued.

## 5.5 Data analysis

Cycle and waiting times and Likert-scale responses were coded and captured onto Microsoft Excel®, and missing values were identified. Imputed values for the few missing values were obtained by linear regression on the basis of other values that were present. At the 95% confidence level, pre- and post-intervention cycle and waiting times were compared using unpaired t-tests or Wilcoxon rank sum tests depending on data distribution.

Questions in the questionnaire were grouped into the following 7 different themes reflecting attitudes and morale: teamwork, communication strength, empowerment of staff, and attitudes toward the supervisor, work, clients and promoting the hospital. The themes were scored by summing the responses to Likert-scale questions for each theme's group of questions. Pre- and post-intervention scores of questionnaire themes were compared using Wilcoxon rank sum tests. Bivariate analyses for proportions were carried out using Fisher's test to compare relevant pre- and post-intervention categorical variables. The above statistical tests were carried out using the SPSS® software package.

## 5.6 Measures to ensure validity

Action-research validates the Hawthorne effect (a phenomenon whereby participants alter their behaviour in response to their awareness of being observed), especially in the context of Lean philosophy, where the facilitator intentionally plays out his/her role in a real, participatory sense, instead of reducing the effect as in a positivistic, laboratory setting (Mays & Pope 2000:50-51). Nevertheless, the Hawthorne effect was minimized by carrying out *two* baseline measurements of variables *before* and *two* measurements *after* Lean implementation at dispersed intervals. Repeated measurements reduce the changes of participants' behaviour by extending the research time line and getting them comfortable with frequent observations.

The researcher's interpretation and account of the collected data was compared with those of the *kaizen* team members during two-weekly *kaizen* meetings, in order to establish the level of congruence between the two data sets (before-and-after study). These were recorded in a journal that was kept by the researcher. The participants' reactions to the analyses as presented in the *kaizen* meetings were then considered in the interpretation of the study findings by thematically analysing the researcher's journal content.

*The kaizen* team members were briefed in an initial meeting which was held to present the research procedures and concepts of Lean, and to clarify the participants' ways of describing

and interpreting problems and events. With the researcher's prolonged engagement with the *kaizen* team and study setting in a series of iterative action-research cycles, research credibility was increased.

In addition, a census of OPD staff (who meet the inclusion criteria) and service nodes for measuring attitudes / morale and cycle times, respectively, reduced selection bias.

### 5.7 Ethical considerations

Permission to conduct the study was obtained from the Postgraduate Education Committee of the University of KwaZulu-Natal, the Hospital Manager of the study site, the uThungulu District Manager of the Department of Health and the KwaZulu-Natal Provincial Health Research and Knowledge Management Unit. A complete research protocol and supporting documentation were submitted to the Biomedical Research Ethics Committee of the University of KwaZulu-Natal and approval (BE097/11) was granted.

Information leaflets containing details of the research (frequently asked questions on its purpose, objectives, benefits, risks, costs, ethical considerations, name and contact details of the principle investigator and the Ethics Committee that approved the research) were provided to action-research participants (kaizen team), senior managers of the hospital and all employees in the OPD. Written informed consent was obtained from the participants when the questionnaires were distributed to them. To maintain confidentiality and anonymity, participants returned completed questionnaires by depositing them into a sealed box which was securely kept in a senior manager's office at the hospital.

## 6. RESULTS

### 6.1 Response rate

Of the 28 employees sampled in the OPD before Lean implementation, there was a response rate of 67.9% (*n*=19), which were all valid and completed questionnaires. After Lean implementation, the questionnaire response rate achieved was 64.29% (*n*=18) as summarised in **Error! Reference source not found.**. A total of 9 and 10 people pre-Lean and post-Lean respectively declined to participate in the questionnaire survey for reasons they did not want to disclose. This was despite the provision of the information leaflet and verbally addressing their concerns.

**TABLE 1: Summary of questionnaire respondents**

| Service node | Baseline | Post-Lean |
|---|---|---|

| | n | Male | Female | Average years of service | n | Male | Female | Average years of service |
|---|---|---|---|---|---|---|---|---|
| Patient administration | 2 | 0 | 2 | >5 | 2 | 1 | 1 | >5 |
| Patient screening | 4 | 0 | 4 | 3 | 4 | 0 | 4 | 3-5 |
| Consulting room | 2 | 1 | 1 | 1 | 1 | 0 | 1 | <1 |
| X-ray | 1 | 0 | 1 | <1 | 1 | 0 | 1 | <1 |
| Investigations | 3 | 0 | 3 | 5 | 4 | 0 | 4 | 5 |
| Pharmacy | 7 | 3 | 4 | >5 | 6 | 5 | 1 | >5 |
| Total | 19 | 4 | 15 | | 18 | 6 | 12 | |

Source: Calculated from study results

## 6.2 Staff attitudes and morale themes

Participant responses to questions about their attitudes and morale were categorised into the following seven themes (TABLE 2) which are based on commonalities in the Likert-scale questions. **TABLE *2*** Each theme was scored by summing the responses to each 5-point Likert-scale item (the more positive and/or optimistic the response, the higher the score):

**TABLE 2: Attitude and morale themes and maximum scores**

| Attitude and morale themes | Maximum score |
|---|---|
| Attitude to teamwork | 35 |
| Communication strength | 65 |
| Empowerment of staff | 15 |
| Attitude towards the supervisor | 30 |
| Attitude towards work | 30 |
| Attitude towards clients | 18 |
| Attitude towards promoting the hospital | 12 |

Source: Calculated from study questionnaire

## 6.3 Effect of Lean on staff attitudes and morale

At the 95% confidence level, pre- and post-intervention scores were compared using paired Wilcoxon paired signed-rank tests. Before and after scores for all service nodes were grouped together and compared for each theme (TABLE 3). Scores for all themes except "Empowerment of staff" showed statistically significant improvements after Lean implementation.

**TABLE 3: Comparison of pre- and post-intervention scores of the seven themes of attitude and morale for all service nodes**

| Attitude and morale themes (all service nodes) | Baseline average score *(std. deviation)* | Post-Lean average score *(std. deviation)* | p-value ($\alpha$=0.05) |
|---|---|---|---|
| Attitude to teamwork | 17.9 (7.3) | 25.3 (6.2) | 0.002 |
| Communication strength | 34.1 (8.2) | 46.4 (10.4) | 0.0003 |
| Empowerment of staff | 10.0 (2.3) | 10.6 (2.5) | 0.48 |
| Attitude towards the supervisor | 19.2 (5.5) | 23.6 (4.8) | 0.01 |
| Attitude towards work | 17.9 (4.7) | 23.3 (4.8) | 0.002 |
| Attitude towards clients | 14.2 (2.1) | 15.7 (2.1) | 0.04 |
| Attitude towards promoting hospital | 6.2 (3.0) | 9.6 (3.3) | 0.002 |

Source: Calculated from study results

Before and after scores were also compared separately for the Patient Screening (TABLE 4TABLE 3) and Pharmacy (TABLE 5) service nodes.

**TABLE 4: Comparison of pre- and post-intervention scores of attitude and morale for the patient screening service node**

| Attitude and morale themes (Patient screening node) | Baseline average score *(std. deviation)* | Post-Lean average score *(std. deviation)* | p-value ($\alpha$=0.05) |
|---|---|---|---|
| Attitude to teamwork | 16.1 (7.9) | 25.3 (8.9) | 0.24 |
| Communication strength | 30.1 (5.9) | 42.5 (11.4) | 0.02 |
| Empowerment of staff | 9.1 (2.0) | 9.6 (2.7) | 1.00 |
| Attitude towards the supervisor | 16.0 (4.5) | 22.8 (6.1) | 0.04 |
| Attitude towards work | 16.7 (3.4) | 22.1 (5.8) | 0.09 |
| Attitude towards clients | 14.3 (2.4) | 15.6 (1.6) | 0.14 |
| Attitude towards promoting hospital | 6.7 (2.2) | 9.3 (3.5) | 0.14 |

Source: Calculated from study results

Statistical analyses could be conducted because the number of respondents from these nodes was sufficiently high. Statistically significant improvements after Lean implementation in the Patient Screening node were noted in the communication strength ($p$=0.02) and attitude towards the supervisor ($p$=0.04).

**TABLE 5: Comparison of pre- and post-intervention scores of attitude and morale for the pharmacy service node**

| Attitude and morale themes (Pharmacy node) | Baseline average score *(std. deviation)* | Post-Lean average score *(std. deviation)* | p-value ($\alpha$=0.05) |
|---|---|---|---|
| Attitude to teamwork | 19.0 *(6.4)* | 26.3 *(3.2)* | 0.04 |
| Communication strength | 36.9 (10.3) | 55.7 *(4.1)* | 0.004 |
| Empowerment of staff | 10.0 *(2.8)* | 11.7 *(1.2)* | 0.19 |
| Attitude towards the supervisor | 21.0 *(4.6)* | 24.8 *(2.7)* | 0.06 |
| Attitude towards work | 19.3 *(5.8)* | 25.8 *(2.0)* | 0.03 |
| Attitude towards clients | 13.7 *(1.5)* | 17.0 *(0.9)* | 0.005 |
| Attitude towards promoting hospital | 6.7 (4.0) | 12.0 *(0)* | 0.007 |

Source: Calculated from study results

Similarly, in the Pharmacy node, statistically significant improvements were noted in communication strength ($p$=0.004) as well as in attitude towards teamwork ($p$=0.04), the supervisor ($p$=0.06), work ($p$=0.03), clients ($p$=0.005) and promoting the hospital ($p$=0.007). A slight improvement of the score for "Empowerment of staff" for both service nodes was observed, but this was not significant ($p$>0.05).

## 6.4 Effect of Lean on staff satisfaction and motivation

Bivariate analyses for proportions were also carried out using Fisher's test to compare pre- and post-intervention results for the following three issues involving binary responses ('yes' or 'no'):

i. whether one was satisfied with his/her job in general;
ii. whether one feels things are getting better in his/her department; and
iii. whether one feels inspired (motivated/stimulated) in his/her job.

Before and after scores for all service nodes were grouped together and compared for each of the above issues (TABLE 6).

**TABLE 6: Bivariate analyses comparing binary responses of attitude and morale pre- and post-intervention**

| Attitude and morale themes | Baseline average score (std. deviation) | Post-Lean average score (std. deviation) | p-value ($\alpha$=0.05) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Proportion of staff satisfied with job | 21.1% | 77.8% | <0.0001 |
| Proportion of staff that feel things are getting better in their department | 21.1% | 83.3% | <0.0001 |
| Proportion of staff that feel inspired/motivated | 15.8% | 77.8% | <0.0001 |

Source: Calculated from study results

Statistically significant improvements from baseline ($p$<0.0001) were noted in all three aspects after the implementation of Lean. The proportion of staff satisfied with their jobs and those that felt inspired or motivated increased from 21.1% to 77.8% ($p$<0.0001) and 15.8% to 77.8% ($p$<0.0001) respectively. The proportion of staff who felt that things were getting better in their department increased from 21.1% to 83.3% ($p$<0.0001).

# 7. DISCUSSION

In the context of the research questions raised, the discussions are as follows:

## 7.1 The context of Lean application

Cooper and Moharbeersingh (2008:110) contextualise value in health care as "a process leading to elimination of waste, and adding value to each step along the patient's care pathway, enabling staff responsible for analysing what they do and how they can improve". In this study, the value was assumed. The value required by the patient has been assumed to be an effective, quick, effortless journey through the OPD which results in a desired health outcome.

It is further emphasized that there is the need for a long-term strategic focus (of Lean application) if the organisation is to achieve the best service for its stakeholders and value for money (Cooper & Moharbeersingh 2008:110). In this study, it is important to highlight that the setting was a microcosm of a health institution which is encumbered by a highly volatile patient load and disease burden, unstable short-term workforce patterns and several unprecedented events occurring on a daily basis. Thus, for the duration of the study, there is no way in which the sustainability or long-term impact of Lean application on staff attitudes and morale could be assessed.

Even though the Lean process was carried out over a short period of time, the results suggest that there was an overall inclination towards a positive change of culture of the OPD in terms of staff behaviour, attitude and morale.

Questionnaire responses reflected definite and statistically significant improvements in scores after Lean implementation for all themes of attitudes and morale, except for empowerment of staff ($p$=0.48). With the bureaucracy and red tape that generally exists in decision-making across the public sector hospitals, empowering of staff was impeded (score increased from 10.0 to only 10.6; $p$=0.48).

## 7.2 Person-centred approach to Lean

Owing to the nature of the Lean philosophy of using together a team of empowered staff to bring about improvements in a particular process or service, the attitudes of staff towards teamwork and the communication strength amongst those involved improved significantly. Veech (2004:69) argued the importance of adopting a person-centred approach in order to sustain a 'Lean house' (Figure 1) built on a foundation of stability and employee satisfaction.

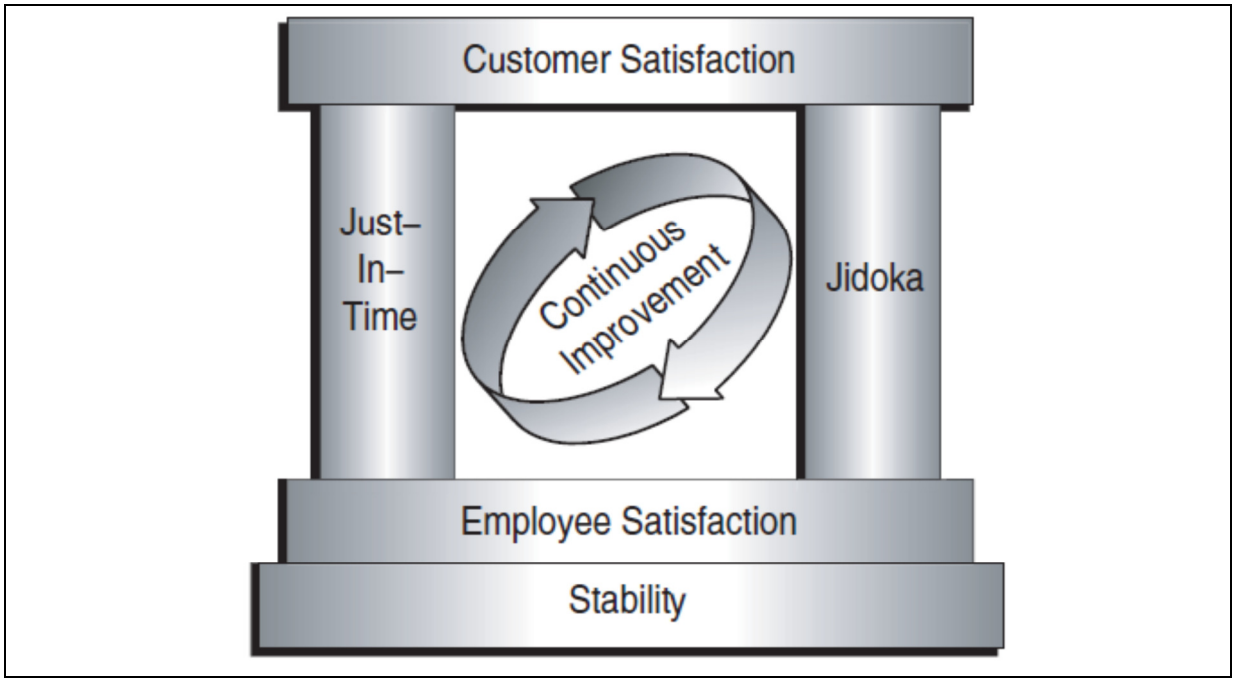


**FIGURE 1: The Lean House**

Source: Veech 2004:161

The Just-In-Time (JIT) column reflects Lean tools and techniques such as 5-Why and 5-S (sort, straighten, scrub, standardize, and sustain) that are used in making a system 'go' faster and more efficiently. *Jidoka* reflects the interaction of humans with the machinery and tools used to do their job, such as mistake-proofing and visual controls (Veech 2001; Veech 2004:159-171).

Thus the results of this study have shown that the human elements of Lean (stability and employee satisfaction) exhibited in this study by attitude towards teamwork and communication strength are very closely related to and are positively affected by the process of Lean implementation (through a *kaizen* team).

Veech (2004:162) elaborates that stability contains four elements, all of which were incorporated into the Lean process as used by this study: trust between the workforce and management; commitment from leaders; situational awareness, and an empowered workforce. These factors are crucial in developing a sustainable change in the organisation, which would foster a culture of self-driven commitment by the workforce.

## 7.3 Teamwork and communication

Since Lean and *kaizen* methodology create a system for breaking down boundaries and eliminating silo functions, teamwork emerges as a new approach to performing tasks. Attitude towards the supervisor, work, and clients all improved significantly with Lean implementation, most likely owing to this dismantling of barriers to information flow, and the cross-functionality inspired by Lean (Bahensky, Roe & Bolton 2005:39).

The pharmacy node in particular showed above-average improvements in staff attitude and morale. The employees in the pharmacy work in a 'laboratory' environment, with more self-contained interaction amongst themselves. Thus, the *kaizen* approach is more conspicuously manifested through significantly improved communication ($p$=0.004); teamwork ($p$=0.04); and attitudes toward the supervisor, work and clients.

## 7.4 Lean and continuous improvement

Overcoming some of the obstacles of Lean implementation would lead employees in the direction of indoctrinating a continuous improvement way of thinking. Edwards and Paarup (2009:41) argue that different mind-sets and emphasis on differing logic, such as doctors' reliance on scientific validity for patient treatment and nurses' tendency towards human understanding, is a major obstacle to process change such as Lean. Embracing common goals would surmount such obstacles and cultivate a learning organisation with continuous improvement as a backbone.

Staff attitude toward promoting the hospital in respect of attracting clients and new employees also significantly improved after Lean implementation ($p$=0.002), implying that they were happier working in the OPD.

Subsequent to Lean implementation, more staff felt that things were getting better in their respective departments compared to the baseline results ($p$<0.0001). This recapitulates the continuous improvement characteristic of *kaizen* and Lean. In contrast with Hasle and Bojesen's (2009:40) findings that Lean may be considered a limitation and an attack on the professionalism of nursing staff in hospitals, the perceived improvement of conditions and increased motivation and job satisfaction after Lean implementation at the OPD is quite significant in the present study ($p$<0.0001) (Edwards & Paarup 2009:41; Hasle & Bojesen 2009:40-41).

# 8. CONCLUSION AND RECOMMENDATIONS

It has been deemed from the research findings that Lean can be applied in a resource-constrained district hospital environment as an effective operations management approach. In revisiting the research questions, we conclude that the application of Lean in a rural district hospital can be used to improve staff attitudes and morale through its impact on operational efficiency. The research findings show that staff satisfaction and motivation levels improve with the application of Lean. Furthermore, Lean principles, tools and techniques can be applied easily to the extent of reaching efficiency targets successfully. These conclusions and recommendations are explained further below.

## 8.1 Improvement of staff attitudes and morale through Lean

The application of Lean principles, tools and techniques is possible in a rural district hospital OPD, without any demands on staff in terms of learning and adopting a new quality-improvement management approach by which to improve operational efficiency.

There was an overall inclination towards a positive change of culture in the OPD in terms of staff behaviour, attitude and morale, even though the Lean process was carried out over a short period of time. Improvement in empowerment of staff is impeded owing to the inherent bureaucratic nature and red tape existing in the hospital. Attitudes of OPD staff towards teamwork and the communication strength amongst those involved, as well as overall motivation and job satisfaction, improved significantly after Lean was implemented.

## 8.2 Application of Lean tools and techniques with ease

This study has also shown that the Lean tools and techniques which were employed (PDCA, Value Stream Mapping, A3 reports, 5-S, 5-Why, *takt* time and kaizen) can be applied effectively and extensively with ease and enthusiasm by frontline workers. The resistance to change of processes and behaviour is less apparent through the direct involvement and

engagement of frontline workers as opposed to the typical bureaucratic or top-down approach of instituting change. The Lean tools and techniques can be applied by frontline staff, who lack expertise and experience in Lean, to the extent of successfully reaching targeted end-points.

## 8.3 Implication of study findings for district hospitals

Rural public sector hospitals require a novel and evidence-based approach to improving operational efficiency and staff morale in OPDs and other departments. It has been shown that Lean can indeed positively impact staff attitudes and morale in a rural district hospital OPD in South Africa.

## 8.4 Practical recommendations

With the potential benefits of Lean on staff attitudes and morale in other departments and facets of health care in a hospital setting, the *kaizen* team should extend their efforts to applying Lean elsewhere within the hospital such as to the wards, theatre and pharmacy.

Lean should also be adopted as a new management approach by the Department of Health's district hospitals owing to its inherent systematic approach to improving quality and elevating staff morale. It would provide hospital managers with an evidence-based management approach to resolving problems and improving quality indicators and staff satisfaction.

Formal teaching should be conducted for health-care managers in the public sector. This training should incorporate Lean concepts, tools and techniques, in order to empower health-care managers to drive the Lean process at their facilities. Teaching can also take the form of professional board games for hospitals (Dukovska-Popovska, Hove-Madsen & Nielsen 2008:2).

## 8.5 Recommendations for future research

By rolling out such a management approach in other similar hospitals, using more refined methods, and by adopting Lean as a systematic way of improving efficiency, the impact on severely resource-constrained service nodes, its acceptability by staff and its sustainability over a longer period can be assessed further. The applicability of Lean in specific departments within regional and tertiary hospitals in the South African public health sector also desires research.

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