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Lean Management model in Academic libraries of Iran

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ABSTRACT

Lean management notion refers to eradicating loss and creating Values in an organization as well as appealing either staff`s or client `s cooperation through constant improvement. The study target is to develop a Lean management model in academic libraries of Iran. This applied study of survey- analytic type will evaluate manager`s and administrator`s viewpoints about using lean management components in various departments of medical university libraries in the Northern Iran including Babol, Mazandaran, Golestan, and Gilan . In this study, lean management components affecting different library departments were assessed through survey research, a researcher – made questionnaire containing 8 sections and 64 inquiries, library studies, and Delphi method.To analyze the research dataand statistical inference, various analyses were used.First, to study lean management status and aspects, a single –sample t-test was engaged. Then, significant relationships direction was obtained through confirming factor analysis and analytic technique to achieve a research conceptual model. Finally, to test hypotheses and review components relationships, Kruskal- wallis, Mann whitney tests, structured equations model, and SPSS and LISREL 8.8 applications were used. components ranking indicates that the total average of lean management components of the studied medical sciences libraries is 3.69, assuming standard score is 3. The highest and lowest scores refer to purchase system management (3.88) and human force organization (3.54) respectively. There is a significant difference (p≤0/05) between administrators` and librarians` viewpoints of the studied universities upon lean management components usage/status in libraries of 4 studied universities. According to the analysis, the usage status of lean management in the studied community is desirable. In addition, the LISREL output indicates that the structured equations model is appropriate.

Keywords: structured equations model, Lean management, Lean management model, academic libraries

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INTRODUCTION

Today, modern changes and attitudes of management could be obvious in almost all organizations. Universities and higher educational centers especially medical universities need improvements in all departments particularly administrative levels due to their intrinsic mission. They are attempting, therefore, to alter their own management leading to constant development in the country`s educational system. Thus, libraries and centers as the beating heart of universities cannot be excluded. In a regular system libraries were associated geographically and even global and this requires a revision of managing libraries and application of scientific methods. Ranganathan argued that the social development and library services, such as rings, chains are joined together [1].

Lean management is a new administrative notion established through destroying loss and creating values in organizations to be able to achieve the most by least resources and equipment.To implement this administrative system demands an intellectual revolution in a pertinent organization where not only do

the management and staff need to undertake and exploit it as a compulsory necessity but possibilities also must be introduced to establish this scholarly shift all over the organization(2).Lean management attitude is to enhance productivity, continually create values, and minimize costs and losses.As the organization - structure -improvement idea upon unexpected costs first emerged in 1960 in TOYOTA Inc.,and after two decades it was accomplished in Boeing Inc., the fact was clarified that many of administrators` efforts were made towards in efficient costs rather than management absolutely .Then, " purely " managing , or " lean management " , or management approach leading to directly producing goods/ services was suggested.

Called "lean" by modern thinking, it can offer a method to achieve the most from the least. The approach attempts to potentially diminish the factors draining an organization`s energy and capability whether a distance between two rooms or a human force`s expectation for performing a task by another one and so on. In other words , the losses could be found in targets and strategies , an organizational structure , working processes , human resources , managerial styles , organization culture or values , and anywhere else(3).Lean thinking, therefore , can be formulated with some principles such as setting up accurate , reasonable , and rational targets, developing innovative and effective strategies, supreme goals, re-engineering / valuing processes , professional human force , cooperative/dynamic managerial procedures, efficient methods based on integration and convenience of information flow , eliminating worthless hierarchy , and learning organization focusing on extreme advantages (4).

The studies of management scope evaluating lean management / thinking suggest that their indices for lean management are under various factors, so through measuring their intensity and weaknesses, potential accomplishment of the management will be assessed in varied organizations. The indices are considered different formats in a variety of studies. Locka my believed that performance assessment and its connection to sale , warehouse and provisions , repairs and maintenance, and logistics and support systems are prominent means to cut down prices of products , enhance manufactured - goods quality , reduce waiting time for delivery, and finally lean production [5]. Other studies indicate constant improvement , organizational culture reforms, instruction and team cooperation for constant improvement, accurate TQM operation, and changing working nature, attitudes, individual / team / organizational behaviors as important factors to successfully achieve and shift towards leanness [6,7,8].

The studies of lean management and thinking suggest that research means for lean management evaluation would be various questionnaires formulated by scholars of this field who consider particular indices. The most efficient questionnaires about management are Roszell , Seyyed hoseini, and Bayaat`s reflecting the most relevant and comprehensive aspects of successfully functioning lean thinking in organizations as main indices (e.g. information technology, organization and leadership, human resources arrangement, purchase system, provisions and inventory control, providers management, Total Quality Management , production process management , equipment/ hardware management , and repairs /maintenance management and some sub-indices [9,10].This questionnaire was normalized in libraries by specialists` and scholars `perspectives and Delphi method and finally 8 main and 64 secondary components were confirmed by Delphi panel members on the basis of Iran academic libraries requirements .Thus , it appears that achieving the organization goals will be operationalized in lean management system considering the system`s specifications and principles .

Regarding organizations` and production /service centers` acceptance for developing Lean Management plans , different researches about organization capability and efficiency of performed Lean Thinking have been conducted so far. Since no study of Lean Management development has been done in libraries and it may be very important to production/ service systems specially Libraries, The Purpose of the present study is to review use of Lean Management components from MSULS staff`s and administrators` points of view in Northern Iran (Babol,GolestanGilan and Mazandaran) through measuring variables relevant to Lean Management and to develop lean management to Iranian academic libraries.

MATERIALS AND METHODS

The applied study is a surrey –analytic type. The statistical population consists of entire working managers and administrators (105 people) of Medical Sciences academic Libraries in Northern Iran (Mazandaran,Golestan, Gilan, and Babol) in 2013. Data gathering phase is the initiation of a process in which a researcher collects field/ library findings, categorizes and analyzes them and finally, he evaluates his own formulated hypotheses [11]. Data gathering methods could be sorted in to two categories in this study: library- archive information and field information [12]. The engaged means is a researcher-made questionnaire based on former studies in this field normalized with Delphi method in libraries. To recognize the scientific validity, the content validity was used. Sent to experts of information, epistemology, and management, the questionnaire could be corrected and developed. Internal correlation method was employed to specify reliability rate, in this case, the Cronbach alpha

index for entire inquires of the questionnaire was calculated 97%, thus, the reliability of the research means was verified to measure the research targets. The questionnaire covered two main sections; the first section was related to demographic characteristics of the research community and the second one included objective inquiries dealing with the research goals designed in 8 parts. The questionnaire containing 64 five- choice inquiries was formed with Likert spectrum from very little to very much and 1-5 numbers. The studied characteristics included information technology, organization and leadership, human resources arrangement, purchase system, inventory control and provisions, providers management, total quality management, production process management, and equipment/ hardware management. The average point of each research aspect was calculated then, the mean over and below 3 was considered desirable and undesirable respectively. The data were compared using single-sample T, independent T, freedman, Kruskal -wallis, andMann Whitney tests and the P≤0.05 was defined. In addition, appropriateness of the structured equations model for hypotheses measurement was reviewed with LISREL application.

RESULT

In this section, the statistical analysis to examine how the distribution of sample in terms of variables such as gender, education, age, work experience and degree university libraries under study are discussed.

100 out of 105 distributed questionnaires were completed. According to the data, the average staff `s age was 37.5 that the minimum and maximum age was 25 and 48 respectively. 30% and 70 % of the respondents were male and female respectively. In the whole studied population, the staff were working in different universities as follows:

-28 people (28%) in Babol Medical Sciences University
-28 people (28%) in Mazandaran Medical Sciences University
-23 people (23%) in Gilan Medical Sciences University
-21 people (21%) in Golestan Medical Sciences University

10%, 68% , 22%, and 1% of the studied population had DHE , BA , MA , and PHD degrees respectively. Their seniority average was 13.7 years. Their university major included 71% librarianship and 28% non-librarianship. The staff`s employment status showed that 70%, 14%, and 16% of them were official, agreed-upon, and contractual respectively. 13%, 34%, 45%, and 8% of them were working in management, technical service, general service and administrative departments respectively.

To analyze the research data and statistical inference, various analyses have been engaged.First, to study lean management status and aspects, a single – sample t- test was used. Then,significant relationships direction was measured through confirming factor analysis and analytic technique to acquire a research conceptual model accurately.Next, the correlation coefficient significance test was used to study the relationship between segments of research variables. Finally, to measure hypotheses, regression analysis was engaged. It is necessary to mention that the standard score in this study is 3; thus, the scores above and below 3 are considered desirable and undesirable respectively.

Hypothesis 1: practice status of lean management components in MSULS of Northern Iran is appropriate.

As shown in table 1, the status of lean management in studied libraries is desirable considering the significance degree.

Table 1. single-sample t- test data to compare lean management mean with desirable status

	N	Mean	Std. Deviation	Std. Error Mean
nab	100	3.6898	.68820	.06882

One-Sample Test

	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Nab	10.024	99	.000	.68981	.5533	.8264

Table 2 shows the data of Lean Management components analysis in MSULSof Mazandaran, Golestan, Gilan, and Babol.

Table2. Status of Lean Management aspects in studied libraries

	average score***	Standard deviation	p-value	Status
information technology	3/7917	/793270	0/0001	Desirable
organization and leadership	3/7500	/797660	0/0003	Desirable
human resources arrangement	3/5464	/903980	0/0001	Desirable
total quality management	3/8067	/715670	0/0001	Desirable
production process management	3/6530	/680830	0/0000	Desirable
providers management	3/6300	/793340	0/0000	Desirable
equipment/ hardware management	3/6883	/936730	0/0000	Desirable
purchase system, provisions and inventory control	3/8800	/766180	0/0000	Desirable

***Standard score 3; above 3 desirable , below 3 undesirable

Hypothesis 2: Type of managers and administrator attitudes to lean management in terms of demographic features (Gender, university, academic degrees, seniority, ...) differ significantly.
The data resulted from U Mann Whitney and Kreskas- Wallis tests indicate that the significance degree for participants, gender, different academic degree, seniority, and university type is below 0.05, thus, there is a meaningful difference between types of subjects attitudes to the lean management status in libraries and the variables (table 2).

variables	Test name	Mean ±Std. Deviation	P value
University			
Babol	Kruskal- Wallis	0/56 ± 3/40	0/000
Golestan		0/76 ± 4/15	
Gillan		0/76 ± 3/78	
Mazandaran		0/48 ± 3/54	
Type of academic degrees			
Associate	Kruskal- Wallis	0/40 ± 3/32	0/001
Ba		0/69 ± 3/55	
Ma		0/59 ± 3/78	
PHD		0/0 ± 4/29	
Seniority			
1-10 years	Kruskal- Wallis	0/70 ± 3/45	0/015
11-20 years		0/69 ± 3/81	
21-30 years		0/52 ± 3/88	
Gender			
Female	Mann Whitney	0/69 ± 3/53	0/001
Male		0/51 ± 4/04	

A significant relationship between usage rate of lean management components in different universities can be seen (P = 0.000). Golestan MSUL shows better situation for using lean management components than other studied libraries. A significant relationship between average point of lean management and different types of academic degrees can be seen (P=0.001). The personnel with higher and lower academic degrees found the usage status of lean management in libraries more and less favorable respectively. A significant relationship between usage status of lean management components and seniority can be seen (p=0.015),as the best and poorest evaluation point could be obtained from the groups with 21-30 and 1-10 years of seniority respectively. Additionally, there is a significant difference between gender and the usage rate of lean management in libraries regarding the significance value (0.001) that is lower than the significance level (0.05).
The obtained lean management means for females and males are 3.54 and 4.04 respectively showing that lean management use in libraries has more favorable condition in male groups than females.
It should be mentioned that a meaningful relationship between lean management components and other studied variables could not be observed.

Structured equations for the research model

The conceptual research model and its segments will be defined in this section. As it can be seen, independent variables of lean management aspects in this model including information technology, organization and leadership, total quality management, production process management and each component of the practices are suggested totally and partly respectively. Dependent variables of the research include human resources arrangement, supplying chain management, hardware/software equipment and purchase system, provisions and inventory control. Figures1 and 2 show standard estimates and T-values of structured equations model respectively for the research conceptual model.

Model Appropriateness

LISREL application, obviously, suggests a set of indices to measure formulated model appropriateness. The indices for the research conceptual model are as follows:

- **Chi- square/ degree of freedom (χ^2/df):** One of the best indices to review appropriateness of a model is, studying the ratio of Chi- square test to freedom degree. Although, there is no standard for appropriateness of the index value, several scholars believe that the index needs to be lower than 3. The index value in this study is $\frac{25.55}{10}$=2.555~2.6.
- **P-value index:** The index is thought another standard to measure appropriateness of a model, but it is not acceptable unanimously. Some statistics experts believe that the value than 0.05. The P-value of the model in this study is 0.000.
- **Root mean square error of approximation (RMSEA):** The index is built with model errors indicating in appropriateness of a model as the same chi-square test does.Some scientists believe that it must be lower than 0.05. The index value in this study for the research model is 0.024.
- **GFI index:** This index is standard to measure appropriateness of a model**.** The value above 0.9 indicates appropriateness of an extracted model contributing to the data. The index value for the obtained model is 0.99.
- **AGFI index:** In fact ,this index is the adjusted state of GFI index considering the freedom degree. It is additional standard to appropriateness of a model. If it is 0.9, it will show that the extracted model is appropriate with regard to the data. The index value for the obtained model is 0.98.
- **NFI index:** The index could be also used to measure appropriateness of an obtained model due to the data. If it is above 0.9, it will indicate that the extracted model is appropriate. The index value for the resulted model is 0.97.

Table 4 shows the standards relevant to model appropriateness indices and the values collected from LISREL output indicating appropriateness of a developed conceptual model. The observed data, in other words, adjust to the research conceptual model.

Table 4. Indices of model appropriateness

	Appropriateness **standard**	**data**
Chi-square/degree of freedom	**<3**	**2/6**
Goodness-of-fit index (GFI)	**>0/9**	**0/92**
Normed Fit Index (NFI)	**>0/9**	**0/ 97**
Adjust Goodness-of-fit index (AGFI)	**>0/9**	**0/98**
Root mean square error of approximation (RMSEA)	**<0/05**	**0/024**

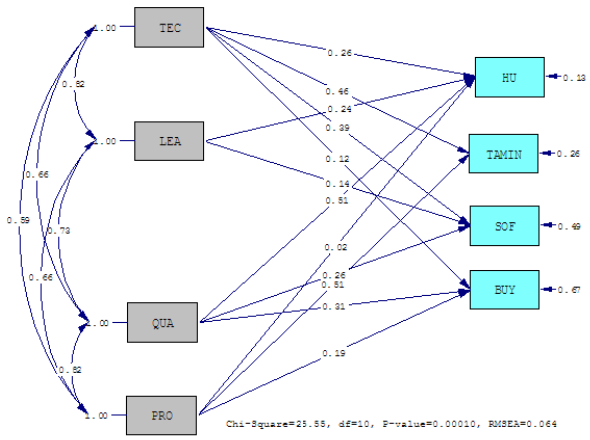

Fig 1. Relationships between research major variables (standard approximations)

The figure shows standardized regression coefficient that can suggest the effect of independent variables on dependent ones. The larger coefficients, the more effective their relevant variables. Among current relationships, the effect of total quality management (QUA) On dependent variable of human resource arrangement (HU) and production management (PRO) on dependent variable of providers management may be more than other variables.

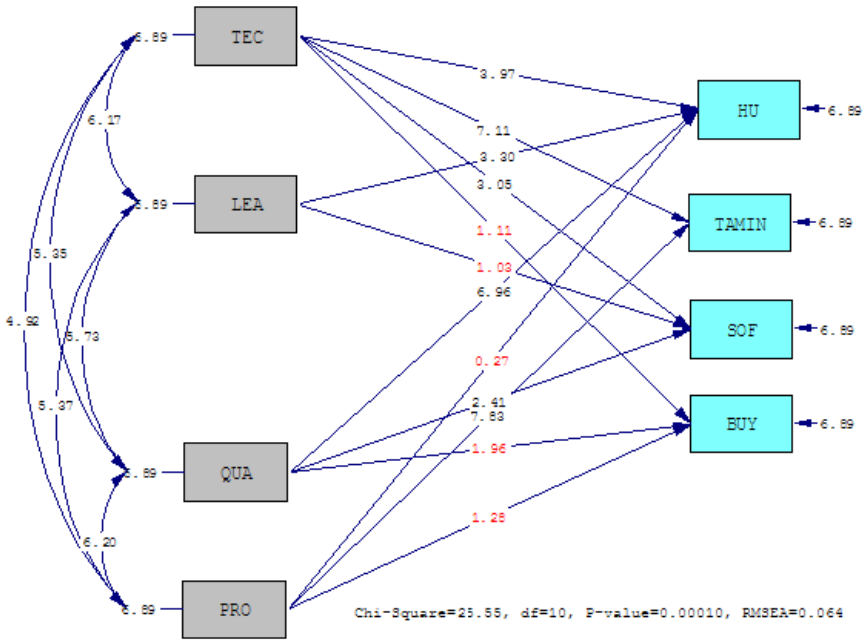

Fig 2. Relationships Between research major variables (T- values)

Figure 2 shows the significance degree of structured model coefficients for lean management aspects. The obtained values will be meaningful if their t values are higher or lower than 2 and -2 Respectively. As shown in fig 2, the relationships in most lean management components are significant, but the relationships between information technology (TEC) and purchase system (BUY), leadership arrangement (LEA) and equipment/hardware management (SOF), total quality management (QUA) and purchase system (BUY), production management (PRO) and human resources arrangement (HU) , production management and purchase system could not be significant.

DISCUSSION AND CONCLUSION

The data indicate appropriateness of practice status of lean management components in medical sciences libraries. The LISREL application output also shows appropriateness of the structured model. The data suggest that generally, the usage rate of 8-component lean management in north region MSULS (Mazandaran, Golestan, Gilan, and Babol) is considered acceptable. Since purchase system, provisions and inventory control component shows the highest mean (3.88) of other factors, it could be inferred that academic library administrators and managers have been taking account of collection building and the elements relevant to it such as engaging in-time purchase/provisions system for constant improvement, paying attention to client`s requirements of providing resources, considering staff`s role in decision-making on developing collection, and focusing on agents` purchase inquiries. The research data of Gupta et al and seyyedhoseini et al confirm this impact [11,12].

On the contrary, human resources arrangement aspect shows the lowest mean (3.54) of other ones .As human force plays a main role in an organization to boost the goals, considering human resources and its arrangement as one of the managerial priorities and planning for academic library administrators/ managers is highly recommended. Consequently, to accomplish lean management targets and plans the following points need to be taken account ; giving more attention to man force and instruction, their cooperation on planning`s and organization management, increasing staff`s authority assignment , providing a fair rewarding / promotion system, improving payment proportion in the organization compared with the same ones , and creating an environment to suggest perspectives with no fear. Shoghishafagharia in his study believes an effective incentive system as one of the required structures to

fulfil comprehensive quality management which is an important aspect for lean management [13]. Training staff is another factor having a prominent role to achieve management targets of human force arrangement that does not agree to nasrabadi`s study, as he claims that some administrators may not focus on staff training because instruction outcomes are untouchable and invisible. He believes that staff training is a hidden investment with long-run positive consequences [14]. His study agrees to the data by Tighzadeh [15] and Raoofi et al [16]. Their study of in-service training impact on staff`s efficiency indicates that there is a positive relationship between in-service trainings and staff`s efficiency, thus, it is necessary to revise in-service training process and constant learning in libraries.

The research data show that staff`s collaboration towards organization planning and management could be the other aspect appearing in the discussion about human resources arrangement that receives inadequate attention. It need to be suggested, therefore, that failing to perceive staff`s views and consequently declining their attachment to the system in the studied universities may hold lean management targets back. As a result, the paper suggests considering staff`s perspectives for organization planning and management, enhancing staff`s authority assignment, and improving decentralization on organizational decision-making to promote staff`s collaboration for lean management targets achievement in the studied academic libraries. Toorani believes that the personal cooperation rate is not acceptable required to improve continually [17].

Golestan Medical Sciences University Library shows the highest mean (4.15) of the studied academic libraries due to lean management. Gilan and Mazandaran MSULS obtain two next points (3.78) and (3.54) respectively for using lean management.

Bablo MSUL taking the last place with most difference rate from the others needs much more authorities` and managers consideration to upgrade necessary areas for lean management achievement.

In considering the research data and inevitable impact of lean thinking on productivity growth, constant value-making in processes, and minimizing costs and wastefulness , the following points will be suggested to improve service- providing and satisfy clients ` Information needs optimally ; revising/reforming the organization`s structure and targets based on lean management aims, specifying staff`s tasks concerning with the system purposes, engaging modern technologies and service/information potentials, designing/developing in-service training program, Producing creativity areas, exploiting collaborative management, considering/utilizing constructive proposals, assigning librarians` task frameworks clearly , accurate information to client and using their opinions, appointing authorities and responsibilities to librarians to create a commitment between them, and frequent asserting library targets and priorities.

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