

IRREGULARITIES IN UNIVERSITY PROCESSES CONCERNING THE LEAN MANAGEMENT TYPOLOGY. THE PILOT STUDY RESULTS

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Purpose: Identify the attitudes regarding key irregularities in university activities of universities referring to *muda*, *mura*, and *muri* from the perspective of two groups of stakeholders - academic teachers and administration/service personnel.

Study design/methodology/approach: A pilot quantitative study using a questionnaire containing 48 statements regarding six categories of irregularities assessed according to the 5-point Likert scale. We asked two research questions:

Q1. Is the questionnaire used in the study reliable for assessing attitudes regarding irregularities that occur in connection with work at the university?

Q2. Which categories of irregularities most often accompany work at the university, and how is their nuisance assessed?

Findings: The reliability of the research tool was statistically confirmed. Respondents represent an attitude close to indifference regarding the perception of most categories of irregularities. The most often indicated by both groups of respondents is "Unused creativity of employees." Respondents consider all types a "nuisance" to a greater than moderate degree.

Originality/value: We propose an original tool to assess irregularities in higher education institutions and apply it in the Polish and possibly international environment. These studies constitute an initial stage of the planned in-depth original research aimed at using the classification of irregularities/losses in surveys of the opinions of all higher education stakeholders (e.g., students, employers), indicating the critical causes of problems and directions of improvement activities.

Keywords: higher education, Lean Management, irregularities, quantitative study.

1. Introduction

Universities, like other organizations belonging to the public sector, following the concept of New Public Management or New Public Governance, more and more willingly use ideas known from the business sector to improve processes, including the concept of Lean Management (LM). The precursors of LM, Womack, and Jones (1996) emphasized that organizations providing services usually have more irregularities and areas for improvement than production firms. Higher education tasks and processes are open to more than acquiring and generating knowledge in times of globalization, uncertainty, and the obsolescence of paradigms that have recently been eagerly invoked. They should shape the ability to predict and reflect on the effects of decisions in the sense of global responsibility (Barth et al., 2007). One of the first publications containing theoretical considerations on using LM in HEIs was an article published in 2000 by Dahlgaard and Østergaard (2000) entitled “TQM and lean thinking in higher education”. In 2005, the term “Lean University” was used by Comm and Mathaisel (2005) to refer to sustainable development. Balzer (2010) introduced the name Lean (in) Higher Education (LeanHE, LHE). According to Cudney et al. (2020), the first works related to practical applications of LM elements in HE should be attributed to Emiliani (2004). In 2013, the idea to create the Lean HE Hub was born. In 2016 it was renamed Lean HE (<http://www.leanhehub.ac.uk/home>).

Based on a systematic review of the literature, Gómez-Molina and Moyano-Fuentes (2021) argue that the number of scientific studies on LM in universities is gradually increasing. However, Antony et al. (2012) indicated that interpreting the LM in HE can be challenging. The fundamental difficulty is related to the lack of awareness of the potential benefits of Lean in HEIs. Hines and Lethbridge (2008) noticed that universities constitute an unfavorable environment for introducing LM due to the typical reluctance, mainly of the scientific community, to introduce quick changes. The idea of leanness is unclear to senior university leaders (Mathaisel, Comm, 2000). Other obstacles arise from the lack of process thinking and visionary leadership in HEIs (Douglas et al., 2015).

We believe that one of the most frequently indicated aspects symbolizing the essence of the LM concept - irregularities categorized by three Japanese words: *muda*, *mura*, and *muri*, can be an important factor motivating the use of this concept in the context of improvement activities in universities. Waste (*muda*) results from resource consumption without creating the value expected by a specific stakeholder (organization or person). The waste division most frequently indicated covers seven categories: overproduction, waiting, unnecessary transportation, over-processing, excessive inventory, unnecessary motion, errors, quality defects of products, and their correction. Unevenness (*mura*), i.e., undesirable variations, fluctuations, and unreasonableness, overburden (*muri*), most often associated with undesired overload, are considered sources of waste (*muda*) (Eaton, 2013).



Those irregularities for natural reasons should be identified and eliminated by people who play key roles in these activities. This applies to such university stakeholders as academic teachers, administration, and service employees or students.

This would contribute to real support for "bottom-up" initiatives, active participation of all groups of employees in activities improving university processes. The results of our previous research confirm that the management and employees of Polish universities expect it (Grudowski, 2020).

Dahlgard and Østergaard (2000) defined eight categories of losses in higher education institutions including uncoordinated teaching, coaching, and examination activities, poor logistic planning and designing of courses, and support activities that do not meet the needs of stakeholders.

Bicheno (2008) indicated 14 types of irregularities in service, administration, and office activities (office wastes). According to Douglas et al. (2015), four general categories of waste occur in the processes of higher education institutions. The first is waste concerning human potential - it occurs when universities do not fully use the knowledge and intellectual capital of employees and other key stakeholders. Process losses refer to shortcomings in designing, implementing, supervising, and improving university processes. Information loss arises when the information available to the right people needs to be more sufficient to support university processes effectively and efficiently. The fourth category, waste of material resources, refers to losses arising when the university does not use its resources efficiently.

Only these three examples clearly show that when classifying irregularities concerning the activities of universities, it is necessary to directly refer not only to the *muda* category, but also to the other two categories, *mura*, and *muri*. Therefore, an accurate example of the classification of irregularities regarding the operation of universities is the following division proposed by Hicks (2007):

1. Too much information.
2. Waiting.
3. Additional processing.
4. Redundancy of activities and/or their results.
5. Unnecessary movement of people and unnecessary meetings.
6. Defects arising from the service process.
7. Variability of implementation times.
8. More use of employees' potential and systems supporting education is needed.

The main purpose of the study presented in this article was to identify the respondents' attitudes regarding irregularities in the activities of universities referring to *muda*, *mura*, *muri* from the perspective of two groups of stakeholders - academic teachers and administration/service personnel. The research questions that we adopted in the study are as follows:

- Q1. Is the questionnaire used in the study reliable for assessing attitudes regarding irregularities in connection with work at the university?
- Q2. Which categories of irregularities most often accompany work at the university and how is their nuisance assessed?

2. Research methodology and research tool

We started the stakeholder opinion research with pilot studies. A pilot study is a preliminary study using a selected survey technique. The tool is verified for its suitability to deliver the information the researcher expects. The pilot study results provide researchers with information on whether a particular element of the main study would need to be changed. It is carried out on a relatively small sample not to generate additional costs. The pilot study results are not intended to verify hypotheses, but to provide information on the quality of a structured research plan (Blatch-Jones et al., 2018).

The classification proposed by Hicks (2007) was used to develop the first version of the questionnaire. The draft questionnaire was submitted for opinion by experts, researchers representing four Polish academic centers, and university administration employees holding managerial positions. Among academics, there were people with at least a PhD degree specializing in quality management (6 persons), marketing research (3 persons), and those closely involved in higher education (3 persons). As a result of suggestions and discussions with the respondents, **the names and number of categories of irregularities and the accompanying statements were modified.**

The first part of the modified questionnaire included questions about the group of employees to which a respondent belongs, the academic position the managerial position, and the seniority of the university. The central part of the survey (Table 1) consisted of 48 statements divided into six categories, accompanied by a 5-point Likert scale. The rating scale was supplemented with a request **to assess the nuisance of a given irregularity for respondents who selected items 4 or 5 on the scale.** Concerning nuisance, three states were defined: 1- low, 2 - moderate, and 3 - high. Thanks to this, it was possible to obtain information about the fact that the respondent noticed a given irregularity and how they perceived its negative impact on the performed work.



Table 1.

Categories of irregularities in university processes with the statements that define them and the scale used to express attitudes

Irregularity/ loss category	Statements: (Rating scale: 1 – I strongly disagree; 2 – I disagree; 3 – yes and no; 4 – I agree.; 5 – I strongly agree – that a given type of irregularity/problem/ loss occurs in connection with my work)	1	2	3	4	5
		Mark with X				
1) Excessive/un necessary activities	1.1 Production/excessive printing, copying of documents, reports					
	1.2 Participation in meetings that result in nothing					
	1.3 Unnecessary on-site meetings instead of online meetings					
	1.4 Too many required approvals in some processes					
	1.5 Moving things between departments, rooms unnecessarily					
	1.6 Redundant activities/movements due to arrangement, planning, lack of integration of activities					
2) Waiting	2.1 Waiting too long for supervisors' decisions					
	2.2 Waiting too long for administrative/student service actions					
	2.3 Waiting too long for the purchase/repair of equipment needed for work					
	2.4 Waiting too long for assignments					
	2.5 Excessive free period between classes ("time windows")					
3) Excessive resources including information	3.1 Too many documents for ongoing storage					
	3.2 Employment in administrative/service positions too high concerning the actual needs					
	3.3 Too high employment in the position of academic teachers concerning the actual needs					
	3.4 Excess of rooms/space necessary for the implementation of didactic and research tasks					
	3.5 Excess of office supplies					
	3.6 Excess of equipment					
	3.7 Records and documents stored for too long					
	3.8 Excess of local and general regulations/provisions					
	3.9 Excess of teaching aids					
	3.10 Purchase of books that are not used					
	3.11 Purchase of journals that are not used					
	3.12 Excess emails and attachments in emails					
	3.13 Excess of messages, announcement					
4) Unbalance d workload for employees and infrastructure	4.1 Unequal workload of employees during semesters in the academic year					
	4.2 Periodic overload and underload of employees					
	4.3 Overloading employees with work on a task whose effects are not used					
	4.4 Unused but purchased equipment					
	4.5 Uneven occupancy of rooms					
	4.6 Wrong priorities for action					
5) Errors, faults	5.1 Mistakes/inconsistencies in documents					
	5.2 Lack of service/communication standards concerning customers					
	5.3 Outdated documents/information in use					
	5.4 Mistakes in class schedules and student lists					
	5.5 Lost documents, despite their posting/handing over					
	5.6 Incomplete information concerning requirements					
	5.7 Mistakes in financial documents					
	5.8 Mistakes in labeling, identification of equipment, places, cases, processes					
	5.9 Erroneous, imprecise, inconsistent decisions of superiors					
	5.10 Errors in information systems and e-mail operation					
6) Unused creativity of employees	6.1 No clear, agreed incentive system					
	6.2 Underestimating the achievements, underestimating the efforts of employees					
	6.3 There are no appropriately differentiated consequences of employees' appraisals					
	6.4 Failure to consider employee proposals when designing improvements					
	6.5 Omitting employees from rewards					
	6.6 Incompetent, inexperienced employees in managerial positions					
	6.7 Employees are not doing the job they know best					
	6.8 No consultation or gaining opinions on the introduced changes					

Source: own elaboration.

Pilot studies were conducted in June 2022. The CAWI method (computer-assisted web interview) was used. The survey form was developed in the Microsoft Forms application. The research questionnaire was addressed to all academic teachers (118 persons) and all administration/service employees (40 persons) of the Faculty of Management and Economics of one of the largest Universities of Technology in Poland - Gdansk University of Technology.

The study was open for 2 weeks. A total of 61 questionnaires were obtained. This number included 50 questionnaires completed by academic teachers and 11 by administration/service employees. The research involved 13 professors, 32 assistant professors, and 5 assistants. Ten people were holding managerial positions in the sample. The STATA SE16 software was used for statistical data analysis.

3. Results and discussion

3.1. Questionnaire reliability

The first research question we wanted to answer (Q1) was about the **questionnaire quality** used in the pilot studies. The measure of quality in the case of the assessed questionnaire was its reliability. For this purpose, exploratory factor analysis (EFA) supported by principal component analysis (PCA) was used. To determine the reliability of the scale used in the study, the coefficient of α -Cronbach's was calculated. It is generally accepted that a scale is considered reliable if the α -Cronbach coefficient is at least 0.7 (Stadler et al., 2021). Table 2 presents the key results of the application of these methods. In the case of category 1 - "Excessive/unnecessary activities," to improve the α value, it is possible to eliminate one of the statements (i.e., 1.3) whose factor loading is slightly too low. In the case of category 3, the result of the PCA application indicates the possibility of splitting this category into two separate categories, one defined by statements 3.1, 3.6, 3.7, 3.8, 3.9, 3.12, 3.13 and the other defined by 3.2, 3.3, 3.4, 3.5, 3.10, 3.11. However, a detailed analysis shows that the benefits of such corrections would not be significant.

Table 2.

The results of data analysis related to the reliability of the research tool

Irregularity/ loss category	Cronbach's alfa
1. Excessive/unnecessary activities	0.6570
2. Waiting	0.762
3. Excessive resources including information	0.748
4. Unbalanced workload for employees and infrastructure	0.770
5. Errors, faults	0.829
6. Unused creativity of employees	0.922

Source: own elaboration using STATA SE16 software.



Based on the analysis of the α -Cronbach coefficient, it can be concluded that the questionnaire is a **reliable and internally consistent tool** ($\alpha > 0.7$).

3.2. Irregularities in university processes from the perspective of employees

To find the answer to the second of the research questions (Q2), it is necessary to analyze the general attitude of the respondents toward particular categories of irregularities, both in terms of their perception (Table 3) and the nuisance associated with these irregularities (Table 4). As a result of the data presented, all respondents and the group of academic teachers represent an attitude close to indifference about the perception of the six categories of irregularities (average grade close to 3). This confirms the observations of Hines and Lethbridge (2008).

In the case of both populations, irregularities belonging to **category 6 – Unused creativity of employees” are most often indicated**. Similar conclusions can be drawn from the research by Klein et al. (2021). These authors show that the loss of knowledge related to the lack of respect for people is one of the universities' most serious management problems. The reason for such a state of "indifference" may be that the irregularities listed in the questionnaire presented both as individual cases (statements) and aggregated in the form of a given category, are perceived as something natural in the university's conditions and are not treated as a problem to be solved.

Table 3.
Occurrence of irregularities (means; 5-point Likert scale)

Irregularity/loss category	All	Academic teachers
1. Excessive/unnecessary activities	3.146	3.202
2. Waiting	2.929	2.956
3. Excessive resources including information	2.394	2.363
4. Unbalanced workload for employees and infrastructure	3.111	3.086
5. Errors, faults	2.681	2.669
6. Unused creativity of employees	3.267	3.290

Source: own elaboration using STATA SE16 software.

Regarding the views on nuisance (Table 4), respondents consider all categories to be "nuisance" to a **more significant than a moderate degree** (2 on the scale). Also in this case, **category 6 obtained the highest average value in the group of all respondents**. These results may confirm the common belief in Polish universities that university management is not interested in employees' opinions on process improvement. This causes the staff to adopt passive attitudes and apathy, demonstrated by the "silence at the workplace" (Vemuri, 2019). It is also a poor prognosis for the success of any future initiatives. An obvious remedy is to change the management attitude to one that makes employees see the sense of their participation and mobilizes internally to a creative approach to the tasks performed. Among academic teachers, only a slightly **higher score was obtained in category 2 - 'Waiting'**. It means university employees value their time and suffer from wasting it due to poor work organization.



Table 4.
Nuisance of irregularities (means; scale 1-2-3)

Irregularity/loss category	All	Academic teachers
1. Excessive/unnecessary activities	2.433	2.437
2. Waiting	2.432	2.459
3. Excessive resources including information	2.133	2.057
4. Unbalanced workload for employees and infrastructure	2.424	2.449
5. Errors, faults	2.297	2.251
6. Unused creativity of employees	2.469	2.449

Source: own elaboration using STATA SE16 software.

Due to the natural limitations of these pilot studies, a more cautious approach should be taken, *inter alia*, with the interpretation of the information on the differences in assessing the occurrence and nuisance of the six categories of irregularities by the administration/service staff and academics. Table 5 presents the test results on the significance of differences in the mean values of the scores for the two groups mentioned above. As the table shows, **at the significance level of $\alpha = 0.05$, there are no significant differences in the evaluation of both these aspects by two groups of university employees.** However, this critical information from the point of view of the selection and implementation of the university process improvement strategy should be verified in research involving a much larger number of respondents.

Table 5.
The significance (p-values) of differences in attitudes between the groups of academic teachers and administrative/service employees concerning the occurrence and nuisance of the category of irregularities

Irregularity/loss category	Administration vs. Academic teachers	
	Occurrence	Nuisance
1. Excessive/unnecessary activities	0.098	0.947
2. Waiting	0.464	0.559
3. Excessive resources including information	0.287	0.056
4. Unbalanced workload for employees and infrastructure	0.685	0.195
5. Errors, faults	0.761	0.359
6. Unused creativity of employees	0.584	0.826

Source: own elaboration using STATA SE16 software.

4. Conclusions

4.1. Findings

As a result of our research, the proposed questionnaire should be considered a reliable tool for measuring respondents' attitudes towards the occurrence and nuisance of irregularities in the processes taking place at the university. This does not mean that minor modifications to this tool are not worth considering.

All respondents and the group of academic teachers represent an attitude close to indifference regarding the perception of the six categories of irregularities (average grade close to 3). This attitude shows management's lack of commitment to persuading employees to improve processes. It may also confirm the fear of employees expressing their opinion.

The originality of our study stems from the fact that we propose a tool to assess irregularities in HIE and apply it to the Polish environment. So far, this type of research has yet to be conducted.

The selected remarks concerning the occurrence and nuisance of the irregularities presented can be considered typical in the academic environment. However, they require appropriate awareness and reaction from the university management, as they cause frustration and passivity of employees, which is the main barrier to the university's development.

Small participation in the survey of administration/service employees means that comparisons of attitudes (significance of differences in assessment) of this group with the group of academic teachers should generally be treated as something other than a reliable basis for inference. This aspect should be considered a limitation of our research. Although controversial, treating all respondents as a homogeneous research sample allows one to conclude the reasons for the attitudes displayed concerning a given category of irregularities. Therefore, in future research, on a larger sample of respondents, we will try to get an answer to the following question: Does the assessment of the occurrence of these irregularities and their nuisance by academic teachers and administration/service employees differ significantly? Furthermore, future research will be expanded to include academic centers outside of Poland, allowing for identifying cultural differences in the perception of irregularities.

4.2. Implications

Our questionnaire for measuring respondents' attitudes towards the occurrence and nuisance of irregularities at the university would support the decision-makers in diminishing losses and enhancing processes efficiency. Measurement results can help properly allocate and effectively use key assets, including human resources. Our proposal also contributes to science by indicating a tool other researchers can use for comparative purposes.

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