

**COMPARATIVE STUDY OF LEAN AND AGILE ORGANIZATIONS. EVIDENCE FROM ROMANIA***Alexandru CONSTĂNGIOARĂ<sup>1</sup>**Gyula Laszlo FLORIAN<sup>2</sup>**Olga Erica BRAD<sup>3</sup>*

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**ABSTRACT**

*Agility and lean capabilities embrace organizational structures, operations, distribution, information and management systems and above all organizational cultures. This paper uses a dataset of local firms to analyse the characteristics of Romanian organizations. Factor analysis is used to identify whether Romanian firms are lean, agile or hybrid. Structural analysis is used to estimate the contributors to organizational performances. Empirical findings show that Romanian firms have begun to developed characteristic of a hybrid system. Our research provides management with insights into the measures and steps necessary to achieve the full potential of lean and agile organizations*

**KEYWORDS:** *agile organization, lean management, hybrid systems, structural equations*

**JEL CLASSIFICATION:** *C35, C54, M10*

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**1. INTRODUCTION**

An important question of the ongoing debate about how organization should manage their business operations is about what type of managerial system to implement or, put it in other words, whether the managerial system should be product or customer oriented. Obviously the answer to this question depends both on product characteristics and costumers' expectations oriented (Chandra and Grabis, 2007). Today's business practice has consecrated two prevalent business philosophies that meet this objective: lean and agile managerial systems.

Lean manufacturing is a management system originally developed by Toyota but refined by many world-wide academics and practitioners. Shah and Ward (2007) argue that lean organizations are employing a plethora of managerial instruments and tools. However Petersen (2003) and Begam, Swamynathan and Sekkizhar (2013) based on a compressive lean literature review conclude that lean is more than just a collection of managerial tools. They argue that lean is a philosophy of continuous improvement that approaches organizations from a systemic perspective.

Chandra and Grabis (2007) show that lean organizations rely on continuous efforts to eliminate waste and non-value activities by means of reengineering key business processes. Lean operations are pulled from demand rather than depending on forecasted production schedule with the end result of increased product customization and customers' choices. Lean manufacturing is focusing on cost to serve, defined as the ratio between total cost involved and customers' perceived value. Lu (2011) identifies six drives of lean organizations: waste reduction, demand management, engaging people, process standardization collaboration and continuous improvement. Same author identifies ten lean

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principles, advocating a small first tier supplier base, single sourcing only, selection of suppliers based on performance, partnership and early engagement of suppliers, synchronized flexible capacity, just in time delivery incentives alignment and sharing proprietary information (Lu, 2011). Parthipan, Anto and Nirmalkannan (2015) present the essential lean instruments and tools used to identify and eliminate sources of waste, such as 5S, Andon, Bottleneck Analysis, Continuous Flow, Gemba, Hoshin Kanri, Jidoka, Just-in-Time, Kaizen, Kanban, KPI, PDCA, Poka-Yoke, Root Cause Analysis, SMART Goals, Total Productive Maintenance, Value Stream Mapping and Visual Factory.

Begam, Swamynathan and Sekkizhar (2013) conducted an analysis to identify the lean practices in various industries and to reveal the status of lean manufacturing implementation in various industries. They concluded that factors such as anxiety, resistance to change and inadequate training of personnel are responsible for the slow progress in lean implementation. Consequently appropriate lean education, training and research are needed to further lean awareness and benefit from decreased operating costs, better understanding of costumers' needs, more robust processes, empowered multidisciplinary teams and dissemination of knowledge throughout the supply chain.

Notwithstanding the benefits of lean systems, Vonderembse et al. (2006) shows that there is a market place for agile organizations, advocating responsiveness and flexibility. An agile organization is quick to respond to the volatility of its business environment. Flexible capacities and adaptable products in terms of volume, variety or lead time imply using modularity to postpone diversification. Speed and flexibility are also the most important criteria for selecting suppliers (Konecka, 2010). Same author shows that availability is paramount to achieving competitive advantage by agile organization. In this respect organizations rely on safety stocks to prevent shortages and the risks associated with stockouts.

Flexibility and responsiveness needed to respond to rapid market changes requires integration of organizational processes and structures and even across supply chain partners (Lu, 2011). Same author argues that market sensitivity is tantamount to agility which requires linking organizational performances to the final consumer.

Existing national research in the field focuses more on the problematic of supply chains (Antoncic and Scarlat, 2005 and Antoncic and Prodan, 2008). At international level a review of the literature on lean and agile organizations is presented by Konecka, 2010 and Begam, Swamynathan and Sekkizhar (2013).

In what follows we will follow the existing literature in the field to present the theory supporting that agile and lean organizations are not mutually exclusive and to document the emergence of a hybrid system benefitting the advantages of both lean and agile organizations.

We propose an empirical study using a dataset of Romanian firms which uses factor analysis and structural equation modeling to evaluate whether Romanian firms are agile, lean or hybrid. Further on, we document that Romanian firms present several characteristics of a hybrid system. However they still have to implement changes to promote flexibility and responsiveness, even if, obviously, there is a cost associated with it. We also conduct an analysis to identify what characteristics of managerial systems of Romanian firms are associated with higher performances.

Our research provides management with useful information on the measures necessary to attain the full benefits of lean and agile organizations.

## **2. HYBRID MANAGEMENT SYSTEMS AND THE STRATEGY OF POSTPONEMENT**

A comparative analysis of the two systems reveals that lean is best suited for scale economies, low variety and long supply lead-time characterizing a stable and predictable market whereas agility works best in volatile environments emphasizing flexibility, variety and short supply lead-time (Lu, 2011). Table 1 presents the main differences between lean and agile organizations.

**Table 1. Differences between lean and agile organizations**

	<b>Lean</b>	<b>Agile</b>
Competitive advantage	Costs	Availability, responsiveness
Suppliers selection	Costs and quality	Speed, flexibility and quality
Inventories	JIT	Strategic safety stocks
Production	High level of production capacity utilization	Buffer production capacity

Source: Adapted from Konecka, 2010, p. 25

As depicted in table 1 the performances of agile organizations depends on availability and responsiveness. Yet responsiveness cannot be achieved without cost and the cost is primarily given by strategic safety stocks and buffer production capacity. Consequently there is a tradeoff between responsiveness and efficiency. Responsiveness and availability do present decreasing returns to scale and optimization implies increasing responsiveness only until the point where marginal benefits are zero. The existing literature in the field proposes developing a hybrid managerial system, which is coined 'leagile' or 'league' (Christopher and Towill, 2001, Goldsby, Friffis and Raath, 2006 and Konecka, 2010). This hybrid system focuses on developing characteristics common to both lean and agile organizations: (a) costs reduction, (b) superior quality of products, (c) selection of suppliers based on quality and (d) reducing the lead time. A comparison among agile, lean and hybrid managerial systems is provided in table 2.

**Table 2. Comparison of lean, agile and hybrid organizations**

	<b>Traditional organizations</b>	<b>Lean organizations</b>	<b>Agile organizations</b>	<b>Hybrid organizations</b>
demand	unpredictable	predictable	unstable	unstable and unpredictable
products	standard	functional	personalized	personalized
most important costs	operations	operations	marketing	operations and marketing
elimination of waste	low priority	basic	desirable	arbitrary
quality	market winners	market qualifiers	market qualifiers	market qualifiers
costs	market winners	market winners	market qualifiers	market winners
web integration	not existing	desirable	necessary	mandatory
virtual integration	Low priority	desirable	necessary	mandatory
information decoupling	Not existing	beneficial	necessary	mandatory
responsibility for product design	producer	producer	producer and consumer	producer and consumer
quality performances	percentage of defective products	percentage of defective products	consumers satisfaction	consumers satisfaction
ability to absorb risks in the supply chain	moderate	low	high	moderate

Source: Konecka, 2010, p. 26.

Strategy of postponing offers the general framework for achieving a hybrid system which benefits the advantages of both lean and agile systems, without incurring the costs associated with them.

Postponing refers to performing operations as late as possible either within the organizational boundaries or within the supply chain, which ultimately is the extended organization. Postponing thereby implies the option for a decoupling point. Within organizational boundaries, the decoupling point implies high volume of products in a low variety and performing afterwards operations to customize products based on existing orders. Thus postponement allows for economies of scale, risks reduction and responsiveness (Constangioara, 2008).

Postponement is valid also at supply chain level. Here postponement is implemented through different supply chain designs. On the upstream of the decoupling point the supply chain is lean, featuring low variety, high volumes and consequently high efficiency. On the downside of the decoupling point the supply chain is agile, developing high market sensitivity and targeting a high responsiveness (Lu, 2011).

### 3. EMPIRICAL ANALYSIS OF THE ABILITY OF ROMANIAN FIRMS TO BENEFIT THE ADVANTAGES OF A HYBRID MANAGERIAL SYSTEM

Building upon the existing literature in the field we have conducted an analysis of the managerial systems of Romanian organizations. We focus on determining whether Romanian firms employ characteristics of a lean, agile or hybrid system. We also focus on identifying the determinants of organizational performances. More specifically we want to know which characteristics of the managerial systems of Romanian firms do have a positive impact on organizational performances.

#### 3.1. Conceptual framework

We formulate the main hypothesis of present research:

- Hypothesis 1: Romanian firms are developing characteristics of a hybrid managerial system;
- Hypothesis 2: There is a positive relationship between hybrid managerial systems and organizational performances.

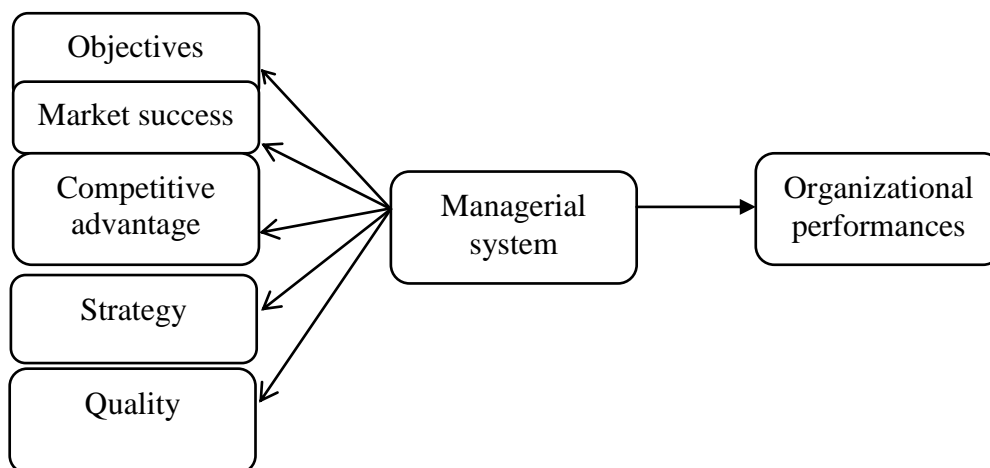
**Table 3. Scales employed in the analysis**

Superior objective	Meet the foreseeable demand in the cheapest way Respond quickly to changes in demand in order to reduce shortages of supply, price reduction and obsolescence of goods
Market success factors	Quality Total delivery time Cost Availability Flexibility Responsiveness
The most important element of competitive advantage	Cost Availability
Strategy regarding orders	Shorten lead-time without increasing costs Shorten lead-time even if investment is required
Suppliers selection strategy	Best selection criteria are costs and quality Best selection criteria are speed, flexibility and responsiveness

Inventories strategy	Inventories reduction Strategic safety stocks
Product developing	Costs minimization Responsiveness Involvement of suppliers Involvement of customers
Production strategy	Production capacity utilization Buffer production capacity
Postponement	Postponement
Performances	Percentage of defective products Stockouts Customers satisfaction

Following Konecka (2010) we identify the organizational characteristics that best describe whether a managerial system is lean, agile or hybrid (Table 3).

We propose the conceptual framework presented in figure 1.



**Figure 1. Conceptual framework**

Our proposed conceptual framework incorporates the following constructs:

- Objectives
- Marketing success
- Competitive advantage
- Strategy
- Quality
- Managerial system
- Organizational performance

We have followed Konecka (2010) to identify the indicator variables corresponding to each of the five dimensions of the managerial system. Consequently `managerial system` is a second order latent construct. Its factors are in their turn latent variables. Indicator variables corresponding to objectives, market success, competitive advantage, strategy and quality are presented in table 3. Based on Richard, et al. (2009) and Ho, Au and Newton (2002) we use accounting indicators to quantify organizational performances.

### 3.2. Methodology

As required by similar studies (Dunn, Seaker and Waller (1994) we first conducted a throughout review of existing literature in search of adequate measurement scales. We have conducted a research targeting an initial sample of 200 Romanian companies. As part of a bigger research, we collected data using a survey-based questionnaire. We have asked the respondents to assess different aspects of managerial systems in their firm using a five point scale (1=unimportant 5=very important). We also have asked the respondents to assess different facets of organizational performance in their firms as compared to those of the competitors by means of a five point scale (1=much worse than competitors, 5=much better than competitors).

In total we obtained 64 usable responses. Our response rate is 32%, similar to that in the field of supply chain management (Hsu, et al., 2011).

Analysis was conducted with statistical package SAS 9.3. Pre-testing and a throughout review of existing literature has ensured the content validity and the substantive validity of the scales, all the items being conceptually and theoretically linked to the construct. Factor analysis is used to test for the unidimensionality and reliability of the scales. In the second stage we have used structural equation modeling to analyze the structural model. Our choice for the proposed methodology is based on the complexity of the conceptual framework presented in figure 1. For its advantages, structural equation modeling is the most prevalent research methodology employed in supply chains research (Kumar and Nambirajan, 2013).

The analysis of frequencies of companies in the working dataset reveals that the proposed analysis uses a sample of firms from various industries, from production to commerce.

**Table 4. Frequencies by industry**

Industry	Frequency	Percent
Metallurgical	5	7.81
Electrical and electronics engineering	9	14.06
Chemicals	1	1.56
Furniture and wood	4	6.25
Constructions	9	14.06
Textiles	4	6.25
Food	7	10.94
Transport	5	7.81
Telecommunications	4	6.26
Commerce	8	12.50
Other	8	12.50

Table 4 reveals that only 8 firms are from commerce and 8 from other services.



### 3.3. Results

We use factor analysis to test for the reliability and unidimensionality of the scales used to measure the managerial system employed by firms and their performances. For the analysis we have used the input variables presented in table 3. Results are shown in table 5.

**Table 5. Factor loadings for the scale measuring managerial system**

Variable	Indicator	Loading	Variable	Indicator	Loading
v4	Superior objective: Meet the foreseeable demand in the cheapest way	-0.22	v17	Selection criteria: Speed, flexibility and responsiveness	0.824
v5	Superior objective: Respond quickly to changes in demand in order to reduce shortages of supply, price reduction and obsolescence of goods	0.57	v18	Inventories strategy: Inventories reduction	0.775
v6	Market success factors: Quality	0.57	v19	Inventories strategy: Strategic safety stocks	0.691
v7	Market success factors: Total delivery time	0.69	v20	Product developing strategy: Costs minimization	0.612
v8	Market success factors: Cost	0.65	v21	Product developing strategy: Responsiveness	0.696
v9	Market success factors: Availability	0.82	v22	Product developing strategy: Involvement of suppliers	-0.019
v10	Market success factors: Flexibility	0.62	v23	Product developing strategy: Involvement of customers	-0.181
v11	Market success factors: Responsiveness	0.75	v24	Production strategy: Production capacity utilization	0.693
v12	Element of competitive advantage: Cost	0.74	v25	Buffer production capacity	-0.190
v13	Element of competitive advantage: Availability	0.81	v26	Postponement	0.765
v14	Strategy regarding orders: Shorten lead-time without increasing costs	0.75	v27	Quality performance: Percentage of defective products	0.721
v15	Strategy regarding orders: Shorten lead-time even if investment is required	-0.10	v28	Quality performance: Stockouts	0.646
v16	Suppliers selection strategy: Selection criteria are costs and quality	0.82	v29	Quality performance: Customers satisfaction	0.644

Factor analysis of the scale measuring managerial systems documents the existence of only one factor.

Table 5 presents the loadings corresponding to all indicator variables considered initially. We see that not all the loadings exceed the threshold (0.4). More specifically, the following indicators have been discarded from our factor:

- Superior objective: Meet the foreseeable demand in the cheapest way
- Strategy regarding orders: Shorten lead-time even if investment is required
- Product developing strategy: Involvement of suppliers
- Product developing strategy: Involvement of customers
- Buffer production capacity

After removing these indicator variables, our factor analysis retains 22 indicator variables. The corresponding scale used to measure the construct of managerial system is reliable and unidimensional, with very high Cronbach's alpha (>0.9).

Based on Richard et al. (2011) we have considered three indicator variables corresponding to the construct of organizational performance. Results for factor analysis corresponding to the construct of organizational performances are presented in table 6.

**Table 6. Factor loadings for the scale measuring organizational performances**

Variable	Indicator	Loading
v1	Average profits for the last three years	0.91037
v2	Average costs for the last three years	0.86269
V3	Average sales growth for the last three years	0.85802

The factor loadings are above 0.4. In addition Cronbach's alpha is very high (>0.9). We can conclude that the scale used to measure the organizational performances construct is unidimensional and reliable.

To test the contributors to organizational performances we have employed structural analysis. Results are presented in table 7.

**Table 7. Standardized Results for PATH List**

Path			Parameter	Estimate	Standard Error	t Value
performance	<---	system	_Parm30	0.711	0.075	9.426

Simply put, our results document a positive and statistically significant relationship between managerial system and organizational performances.

## CONCLUSIONS

We have found evidence that in Romania managerial systems are closer to a hybrid system benefitting the advantages of lean and agile organizations.

Thus our results correspond to those presented in research papers in the field of lean and agile organizations, showing that the two systems are not mutually exclusive but rather present common characteristics, with a different focus.

Yet we have shown that Romanian firms still have to undergo a long way in order to maximize the potential of a hybrid managerial system. Thus our results show that Romanian firms do not involve their customers and suppliers in product development. Obviously this has the potential to increase the probability of errors and subsequently increase costs and induce customers' dissatisfaction.

In addition the commitment of Romanian firms to the principles of agile organizations is somehow questionable. We see that Romanian firms are reluctant to invest in order to promote responsiveness



and flexibility, although it seems that managers are aware of the importance of these factors for the organizations.

We consider that achieving the full performance potential of Romanian organizations requires changing the management approach to work culture and motivation within the organization. This change is particularly important insofar as our results document the positive and statistical significant impact of managerial system on organizational performances.

Finally, as a limitation we underline that the measures used in current research were based on perceptions of managers and the working dataset was relatively small. We mention that the practice of using perceptions of managers in analysis is common in ESC literature (Wang and Yen, 2012).

Notwithstanding its limitation, this study offers valuable managerial insight into the measures required for achieving the full performance potential of a hybrid managerial system in the context of Romanian organizations.

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