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Teamwork effectiveness factors in healthcare and manufacturing industries

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Abstract

Purpose – Teamwork is one of the most powerful tools to ensure success across any activity. The purpose of this paper is to examine the factors that actively contribute to the effectiveness of teams. This research looks at two different types of teams: care delivery teams representing healthcare and improvement teams representing the manufacturing industry. The aim is to provide greater knowledge about the application of team work factors in different environments.

Design/methodology/approach – Qualitative interviews about teamwork factors were conducted with 17 leaders of teams from healthcare and 22 leaders from manufacturing industries. The responses were categorized into different levels according to the application of each factor. Then, the factors were analyzed to draw conclusions about the different approaches to teamwork and their application.

Findings – Most of the factors analyzed are highly applied in both sectors. However, we found significant differences between hospitals and the manufacturing industry when it comes to factors such as strategies, feedback on results, leadership, participation and communication.

Originality/value – Measuring each factor in two different sectors (healthcare and industry) has yielded noteworthy findings and the best practices for their implementation.

Keywords Team working, Health care, Manufacturing industries, Spain, Team performance management, Effectiveness, Improvement, Integrated model

Paper type Research paper

1. Introduction

Teamwork is considered to be one of the most powerful tools for achieving goals in any area, sector or activity. It is also one of the most important elements in continuous improvement systems, as it facilitates the sharing of information, problem solving and the development of employee responsibility (Cooney and Sohal, 2004). Organisations nowadays are more complex than ever, and it is not uncommon for one person to be a member of several teams in different places and across organisations. Consequently, the importance of teamwork is growing, not only at an organisational or team level, but

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particularly when it comes to team members. Thorough research has been done on teamwork, its performance and measurement (Bacon and Blyton, 2000; Delarue *et al.*, 2008; Grütter *et al.*, 2002), but theoretical arguments about the effectiveness of teams are not enough. Research that tests those models and how organisations can apply them should also be carried out. New research incorporating quantitative and qualitative methodologies is needed in order to understand the complex dynamics of organisational teams (Mathieu *et al.*, 2008).

Teamwork factors are the elements or characteristics that contribute to the improvement of the team's effectiveness. This study aims to identify the most important factors and how they are applied in two different types of teams: care delivery teams and improvement teams. Both are intensive teams because they involve a high degree of interdependence and coordination among members (Tesluk *et al.*, 1997). However, their differences are significant: while care delivery teams work in a complex environment and with a high degree of accountability (Baker *et al.*, 2006), improvement teams in manufacturing organisations are more focused on improving processes and maintaining standards (Bhuiyan *et al.*, 2006).

The purpose of this article is to obtain relevant information through the identification and analysis of different teamwork factors in both types of teams. Differences between the two types of teams and their best practices in relation to the application of the factors are also described.

2. Team effectiveness model

Over the last few decades, several authors have illustrated teamwork through different models designed to illustrate the complex process of teamwork. Just within academia, more than 130 frameworks and models of team performance have been developed (Kozlowski and Ilgen, 2006; Salas *et al.*, 2008). Most of the models are based on input-process-output (IPO), originally formulated by McGrath (1964) and shown in Figure 1.

This model presents a framework for studying team processes. In this model, teamwork development is conceptualized as a process which is affected by different elements related to the composition and characteristics of teams (input), activities that

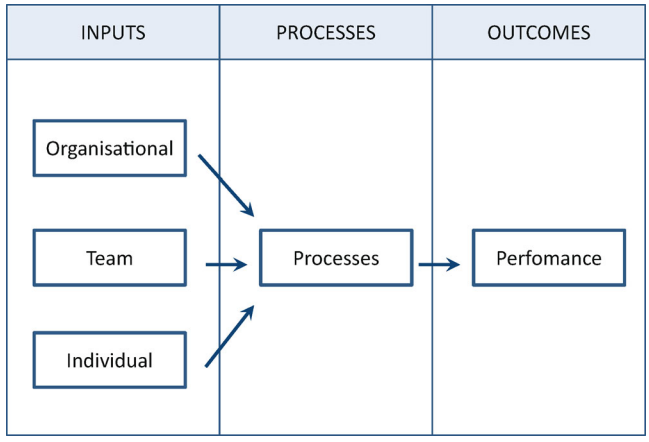

Figure 1.
IPO team effectiveness model

team members are engaged in (processes) and results and products of team activity (outcomes) (Kozlowski and Ilgen, 2006; Mathieu *et al.*, 2008). Although this model has been widely used to study and explain the nature team performance, nowadays the IPO model is insufficient for characterizing teams (Ilgen *et al.*, 2005). The IPO model has received substantial criticism based on the lack of temporal aspects in the development of teams as well as the lack of feedback systems for developmental processes, such as the learning process (Mathieu *et al.*, 2008; Cohen and Bailey, 1997; Kozlowski *et al.*, 1999; Marks *et al.*, 2001). Subsequent models have incorporated temporal elements as an important variable for teamwork effectiveness, along with the addition of the relationship between the different elements over time (Kozlowski and Ilgen, 2006; Cohen and Bailey, 1997; Brannick and Prince, 1997; Ilgen *et al.*, 2005). All those models highlight the complexity and dynamic nature of teamwork, expressed as a combination of different elements, characteristics and processes, which are also called factors. These teamwork factors can enable or constrain different member interactions, contributing to teamwork effectiveness (Mathieu *et al.*, 2008).

Those models describe teamwork as a process in which various factors affect both outcome and efficiency in a cyclical and interactive system. The most known and referred to model over the few years has been the input, mediators and output (IMO) model, which was reviewed by Ilgen *et al.* (2005) and updated by Mathieu *et al.* (2008). This model represents the process of teamwork in a clear and structured way and illustrates how teams qualitatively change and are differentially influenced by different factors as the team matures over time (Mathieu *et al.*, 2008; Kozlowski *et al.*, 1999). The IMO team effectiveness model is a framework that conceptualizes the relationships between the dimensions of team structure and process, as shown in Figure 2.

The IMO model describes teamwork as a developmental process that unfolds over time as teams mature. The model is divided into three main groups of factors: input (antecedent factors that affect the team before it begins to work), mediators (mediating

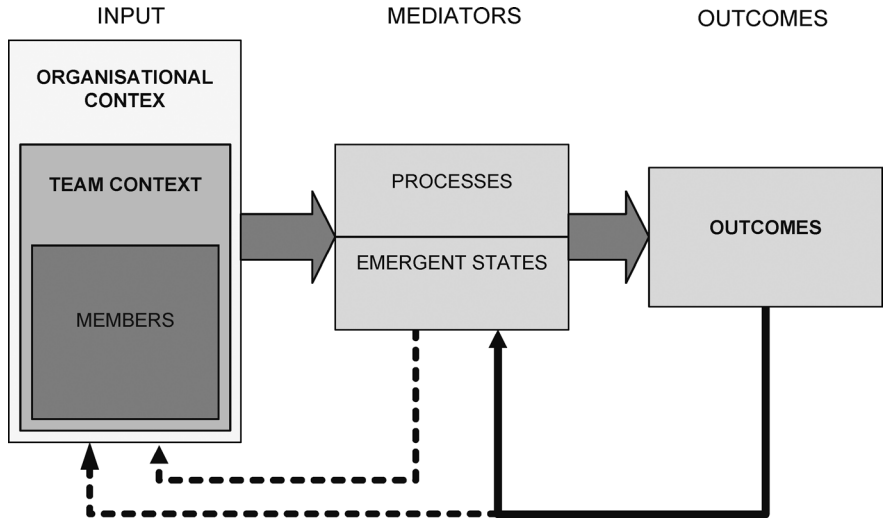

Figure 2.
Input-mediator-outcome (IMO) team effectiveness model

processes that affect the team's effectiveness during its development) and outcomes (outcomes of the teamwork processes). Input factors include the characteristics of the individual team members, characteristics of the team as a whole, and characteristics of the organisation the teams work within. Thus, input factors are divided into three groups: members, team context and organisational context. The three groups are nested to show the different levels of the teamwork input factors. Input factors are considered before setting up the team, and they affect the characteristics of the team and subsequent processes. The mediators are the factors that affect team processes and their effectiveness. Some of these factors represent the actions of members, while others are seen as affective or cognitive states or related to motivation (Marks *et al.*, 2001). For this reason the mediators are divided into processes and emergent states. Processes are important because they describe how team inputs are transformed into outcomes. Finally, outcomes are the results and the products of the team activity, which are valued from different perspectives (Mathieu *et al.*, 2008). Outcomes can be separated into organisational outcomes, team outcomes and member outcomes.

In addition to describing the developmental process that unfolds over time as teams mature, the IMO model also shows the feedback loops that illustrate cyclical or episodic processes, such as an evolution from one teamwork experience to another (Ilgen *et al.*, 2005). The solid lines suggest a rather influential feedback system from teamwork outcomes to teamwork mediators, which occurs when the team receives information about its performance and results. The dashed lines indicate the influence that outcomes, processes and mediators have on input factors, which are more difficult to modify.

Several studies and reviews have pointed out the importance of identification and taking into account the different factors of each group member in the model. Based on the publications of several authors, especially those by Cohen and Bailey (1997), Ilgen *et al.* (2005) and Mathieu *et al.* (2008), we identified the factors for each group. In order to be able of evaluate the application of the factors to different teams, a questionnaire was developed, including the definition and five levels of application. That questionnaire was used to assess the application of each of the levels in different teams.

3. Methodology

Although the IMO model is well-known, little research has been done on its application to modern-day organisational teams (Mathieu *et al.*, 2008). This study aims to obtain applicable conclusions about teamwork through the assessment of this model's factors.

The study was based on qualitative interviews with people responsible for different teams both in healthcare (care delivery teams) and the manufacturing industry (improvement teams), with the aim of obtaining different perspectives and practices related to the different types of organisations. This research technique is highly appropriate for studying or evaluating a process (Patton, 2002). Moreover, interviews allow us to get information that cannot be obtained by direct observation (Creswell, 2009).

The research was directed at the top companies in each sector (the healthcare and manufacturing industry) in the Basque Country region in northern Spain. Although the geographical size of this region is modest, Basque industry is recognised throughout Europe for its quality and prestige. The Basque Country was the highest-awarded region in Europe from 2000 to 2012, winning 26 European Quality Awards (Euskalit).

All the selected interviewees have received awards from Euskalit, the Basque Foundation for Quality, having scored more than 400 points in their EFQM assessment.

We developed a questionnaire on the application of the different elements related to the teamwork effectiveness. The elements were identified and defined based on a review of the literature on healthcare teams and improvement teams (Ilgen *et al.*, 2005; Jaca *et al.*, 2012; Mathieu *et al.*, 2008; Tanco *et al.*, 2011). With this information, the IMO model was developed into 36 factors. The questionnaire included the definition of each factor and also five levels for its application:

(1) The factor is not considered important for teamwork.

(2) Whether the factor is considered important for teamwork.

(3) Whether the factor is applied or considered in relation to teamwork.

(4) Whether the factor is registered or assessed, as well as whether there is any measure related to the factor.

(5) Whether there is some associated indicator and whether the information related to the factor is analysed and reviewed.

Prior to the interviews, team leaders from healthcare teams and from improvement teams reviewed and tested the questionnaire as the methodology recommends (Hess and Singer, 1995; Hughes, 2004). This was especially useful for adapting the questionnaire to each of the organisations. Afterwards, the questionnaire was sent to each of the team leaders, and the meetings were scheduled. The researchers analysed information from the hospitals' and companies' web sites and from related press. In our case the goal of the interviews was to gather information about the application of the factors relevant to teamwork. Subsequently, this general information was contrasted through an interview with the person in charge of the team with his or her comments and explanations. The interaction with the process manager facilitates the understanding of different aspects of the research and enables the obtaining of relevant data for the study (Patton, 2002).

Due to the widespread use of teamwork in healthcare, the analysis of the model's application was carried out firstly on care delivery teams, and afterwards on improvement teams in the manufacturing industry. In the healthcare sector, the model was measured in six different public hospitals in the Basque Country. This process also included 17 interviews with care delivery services. Four different services were selected: the emergency department, cardiovascular disease area, the intensive care unit and trauma surgery. This selection was made in accordance with criteria that cover different types of care delivery teams. The interviews were carried out with the heads of the selected teams in each hospital. A second group of interviews was conducted with the leaders of improvement teams from manufacturing companies. There were a total of 22 manufacturing organisations that described their organisation and procedures for their improvement teams. Within these organisations, interviews were conducted with the team leaders, who were typically external leaders. The interviews were conducted between June 2009 and January 2010.

After conducting all the interviews, the differences between the levels of application were examined, as well as the causes associated with those differences. As a result, this

paper offers a comparison of the application of teamwork factors between care delivery teams and manufacturing improvement teams.

4. Findings and results

The subsequent findings and conclusions emerged from the comments of the leaders when they were interviewed. The level obtained for each factor was assigned to allow a comparison between the differences of the two types of teams and to facilitate the general analysis, which was later completed with evidence from the interviews.

The different characteristics of the two sectors (healthcare and manufacturing industry) can help to explain the differences between the scores on the application of the factors. Team members in healthcare focus foremost on meeting patient needs, and their roles are clear. Healthcare employees work in groups daily and furthermore have a personal desire to learn, and they value meeting the needs of their patients (Mickan and Rodger, 2000). On the other hand, the objective of improvement team members is to improve operational performance, which does not always go hand-in-hand with client needs. Improvements should usually be incorporated into procedures or standards, and a hierarchy should not exist within the team. As a result, the development of teamwork is different in the healthcare and manufacturing industry sectors.

4.1 Overall results

Following the IMO model, the mean values for each set of factors are shown in a summary graph (Figure 2). In every case the average of the scores obtained for manufacturing companies in each group is higher than those for healthcare. This can be explained due to the fact that the highest score for each factor involves its measurement and analysis: manufacturing companies, which have a culture of normalisation and incorporate management practices, are more accustomed to applying the PDCA cycle to management, especially to their continuous improvement systems (Dahlgaard-Park, 2009). Another relevant finding linked to the average of the input and outcomes factors is that scores are higher for factors that are related to organisation, followed by those related to teams and members (Figure 3).

In fact, manufacturers are more focused on results related to the performance of the organisation, and consequently, on rules and other general aspects which affect teams, as will be explained in the next section.

Figure 4 shows the factors grouped by type and their scores related to the type of organisation, distributed in four quadrants. From this data we can see that most of the factors are located in the upper-right quadrant (results above 2 for both industries). This can be explained by the fact that the organisations interviewed are the best managed in the region (as evidenced by their Euskalit awards). Another group of factors is located in the upper-left quadrant, which means that manufacturing teams scored higher than healthcare teams in those factors. A third group of only eight factors have scores of less than 2 in both the healthcare and manufacturing industry, and finally four factors have obtained a slightly higher score when they were assessed in healthcare than when they were assessed in the manufacturing industry. Details for each of the groups and their factors are discussed in the following sections, including certain aspects related to the factors, which that can help them be understood.

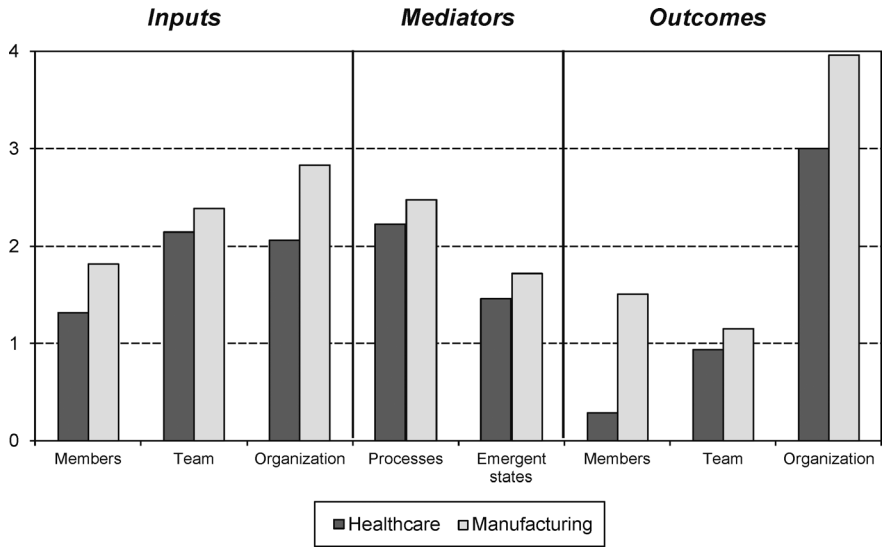

Figure 3.
Factor assessment averages

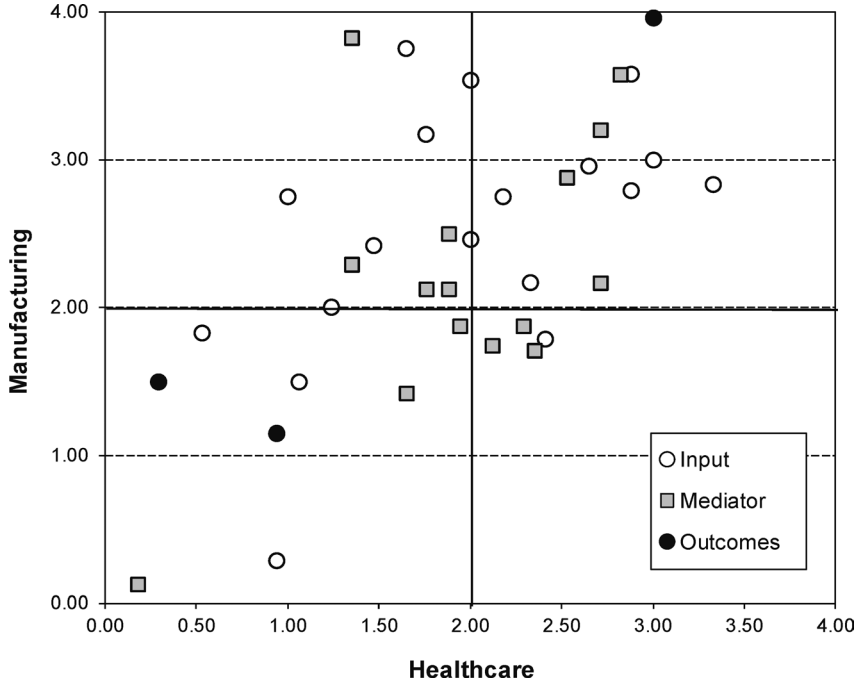

Figure 4.
Matrix with scores for the factors (**Note:** Healthcare vs manufacturing)

4.2 Results regarding the input factors

Table I shows the results for the input factors, which are classified into member factors, team factors and organisational factors. Input member factors are associated with the characteristics of future members, which are considered before creating the team. Manufacturing companies choose participants for their improvement teams by considering knowledge, skills and abilities (KSA). Commitment is valued but it is not always possible to take into account, and team diversity is rarely considered, although several authors (Cooper and Watson, 2011; Saji, 2004) have highlighted its importance for the team's performance. In the healthcare sector, people in each service are hired by a public system of competitive examination, which does not take into account certain aspects related to the ability to work in teams. Because of this, in the healthcare sector teams are made up of whoever is available and it is not always possible to have the most suitable person according to the teamwork criteria. However, all the member input factors are considered and valued as very important for both manufacturing and healthcare organisations.

Team factors are related to the performance of the team itself, which are previously defined or exist before the team begins to work together. Factors such as interdependence, autonomy and team structure (roles, assigned tasks and leadership) were highly scored. This result shows that most organisations consider those factors to be important for their teams to be able to perform well. However, in most cases they are not evaluated or measured. In terms of established rules, procedures and general guidelines for teams, most manufacturing organisations have at least some guidelines to regulate them. In contrast, it is accepted that healthcare professionals have the freedom to use the most appropriate technique or procedure for each case. Team

Level	Factor	Healthcare	Manufacturing
Members	KSAs	1.76	3.17
	Diversity	0.94	0.29
	Commitment	1.24	2.00
	Average for members	1.31	1.82
Team	Interdependence	3.00	3.00
	Autonomy	2.88	2.79
	Rules/procedures/guidelines	1.47	2.42
	Team training	1.06	1.50
	Team structure (roles, task, leader)	2.33	2.17
	Average for team	2.15	2.38
Organisation	Human resource system (acknowledgment)	0.53	1.83
	External leadership	3.33	2.83
	Openness climate	2.88	3.58
	Multi-team system coordination	2.00	2.46
	Goals/objectives/strategies	1.65	3.75
	Organisation standards/procedures/rules	2.18	2.75
	Training system	1.00	2.75
	IT systems	2.65	2.96
	Resources	2.00	3.54
	Environmental context (social, political, cultural)	2.41	1.79
	Average for organisation	2.06	2.83

Table I.
Scores for input factors

training is the factor that both industries have scored the lowest on (1.06-1.50). Although the literature has strongly suggested that team training be institutionalised and evaluated (Baker *et al.*, 2006), few organisations instruct their teams as a whole. In some cases, part of the team undergoes some instruction related to the objective of the team, but rarely do all team members receive training together.

Organisational factors are elements existing in the organisation that influence different aspects of team management, such as the establishment of objectives, a training system, etc. In healthcare organisations, the most valued factor is external leadership. The external leader is usually the head of the service. The actions of the leader affect the team and its success and all the team's processes. In healthcare, the service manager is both involved with and responsible for the team. Furthermore, the leader is evaluated by his or her organisation by considering several aspects of his or her team performance. Other factors which scored high in both sectors were: the climate of openness in the organisation, the multi-team system coordination (coordination among different teams in the organisation), organisation standards which affect the teams, procedures and rules (those that are common for the teams), information technology (IT) systems, and the resources that are available to teams. Nevertheless, the factors associated with the establishment of goals and objectives presented some differences: while objectives are clearly defined and communicated to improvement teams, care delivery teams do not receive the same level of information. Heads of service tend to be absorbed in day-to-day activities and focused on patient care, without taking into account other objectives related to the efficiency of the team (cost, time, etc.) that have been established by the organisation. In the same way, within the healthcare and manufacturing sectors training systems differences arise. While manufacturing organisations establish a training plan and evaluate the degree to which it is being complied with, in healthcare training is usually voluntary and focused on technical skills rather than teamwork.

Several authors have provided evidence that recognition and rewards have both a direct and indirect effect on group effectiveness (Mathieu *et al.*, 2008; Firth-Cozens, 2004). However, acknowledgement is complicated in healthcare due to the fact that promotion is regulated through a system that only considers certain individual achievements (Decreto 395, 2005). Basque manufacturers use diverse recognition systems, but few practices have been reported based on evidence from teamwork. The most common practice is individual and non-material acknowledgement. The different scores for input factors are shown in Figure 5.

4.3 Results regarding mediator factors

As explained above, mediator factors are divided into two major categories: processes and emergent states. Process factors describe functions and interactions that appear during the teamwork process and how they are managed by the organisation, the team and its members. Table II shows the average score given to each mediator factor.

Emergent states are dynamic factors that appear during the work process and vary over time according to the team context, input, processes and outcomes (Mathieu *et al.*, 2008). In general, emergent states are difficult to evaluate and measure. Organisations consider those factors to be important, but they are rarely incorporated when analysing team performance. For this reason emergent states score lower than processes, as shown in Figure 6.

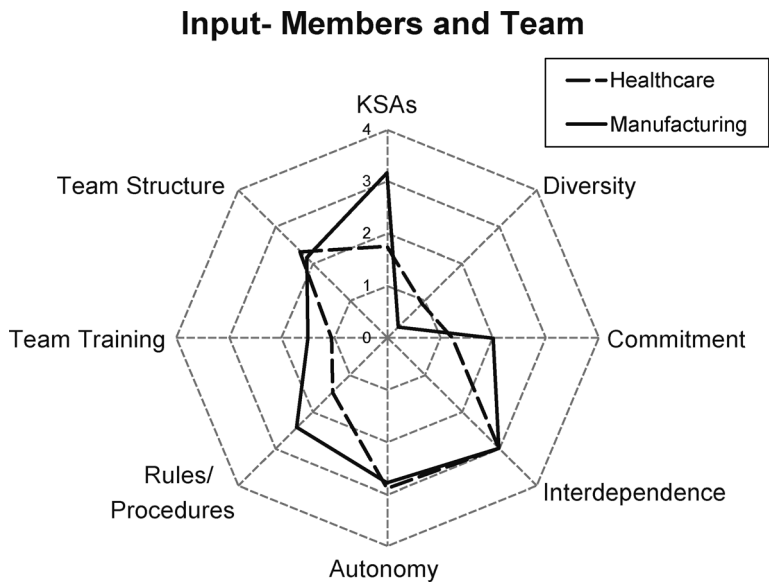

Figure 5.
Scores for input factors

Level	Factor	Healthcare	Manufacturing
Mediator			
Processes	Participation	2.71	2.17
	Conflict management	1.94	1.88
	Decision making	1.88	2.13
	Problem solving	2.29	1.88
	Internal communication	2.35	1.71
	External communication	2.53	2.88
	Cooperation and collaboration	1.65	1.42
	Coordination between teams	2.82	3.58
	Internal leadership	2.71	3.21
	Outcome feedback	1.35	3.83
	Average for processes	2.22	2.47
Emergent states	Team learning	1.35	2.29
	Team climate/cohesion	1.88	2.50
	Mutual trust	2.12	1.75
	Motivation	1.76	2.13
	Shared mental models	0.18	0.13
	Average for emergent states	1.46	1.72

Table II.
Scores for mediator factors

Regarding team processes, internal leadership and participation were the highest scored. The role of the internal leader is highly appreciated by manufacturing companies, which reported it as a crucial function within the organisation. In healthcare, however, the internal leader is identified as the physician in charge, so the function is clear and inherent to his or her work. Communication, both internal and external, is also highly valued and encouraged in teams in manufacturing and

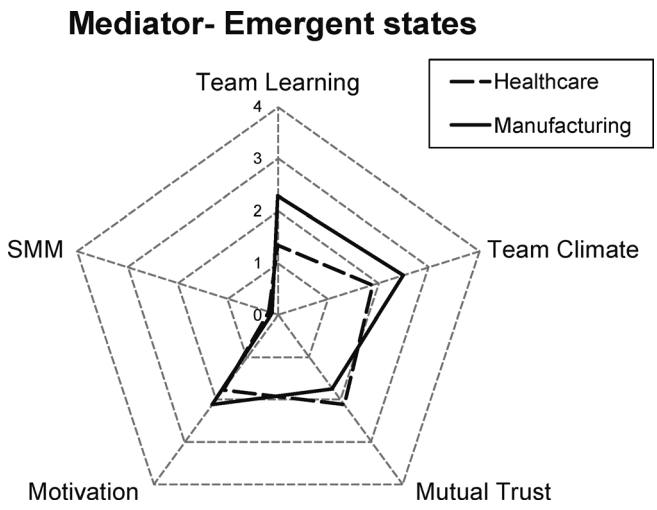

Figure 6.
Scores for mediator factors

healthcare organisations. One of the best tools used in healthcare for facilitating communication is the clinical session. Members usually present complex medical cases twice a week to be analysed and discussed during meetings. In addition to facilitating communication between members and different teams, these sessions promote training, coordination and cohesion. Decision making and problem solving depend on the ability to identify problems and opportunities, evaluate options and consequently weigh the necessary tradeoffs and make decisions about how to proceed (Katzenbach and Smith, 1993). Both factors were considered to be important and applied in the organisations interviewed. Whereas improvement team members resolve their problems and differences through consensus, in healthcare it is the leader of each care delivery team who tackles and resolves problems and who also makes all the important decisions. Finally, feedback is considered essential and it is regularly provided in manufacturing organisations, while in healthcare the people in charge are concerned about the lack of team performance feedback.

Among emergent states, the team learning factor presents the greatest difference between the sectors. Team learning is the process by which the team acquires, shares and applies knowledge. This process is valued by manufacturers who try to encourage it through different techniques, such as rotating roles among members. Moreover, a skill matrix is used to reflect the team abilities acquired by each member. Team climate, motivation, cohesion and mutual trust are scored lower because they are measured indirectly through satisfaction surveys, but few organisations establish actions to improve those aspects. In terms of motivation, it is generally assumed that members must motivate themselves or, in the best cases, it is the internal leader who must motivate and encourage his or her team members. Finally, shared mental models were known by very few leaders, and even those few lacked the knowledge to apply it. Shared mental models are defined as an organised understanding or mental representation of knowledge that is shared by team members (Mathieu *et al.*, 2005). However, one hospital described a training technique which included the uniformity of

criteria in certain medical treatments or surgeries, which can be considered a use of the shared mental model concept.

4.4 Results regarding the outcomes

Outcomes result from the process of teamwork, and they have different dimensions with regard to the members, to the team and to the organisation (Figure 2 and Table III). In all the organisations interviewed, results are analysed and compared with quantifiable objectives that had been previously defined. Hospitals publish annual reports with a quantitative analysis of the results, including indicators of cost, time and other rates of delivery care services. Moreover, all manufacturers check the results and take actions to improve them.

However, when it comes to the outcomes for teams and their members, hospitals collect performance data only at the service level, but few results from the team or individual are analysed. Furthermore, the lack of evidence and data about the performance of members is one of the main reasons why healthcare professionals become unmotivated. On the other hand, most of the manufacturers interviewed recorded and evaluated results related to members and team performance, usually those results dealing with the achievement of team objectives, leadership and team climate.

5. Conclusions

This paper illustrates the application of an integrated model for team effectiveness. The measurement of each factor across two different sectors (healthcare and manufacturing) has provided interesting findings about the application of these factors.

The organisations that scored high on many of the factors are managed according to the EFQM model, with well-administered processes, including teamwork. However, manufacturing organisations appear to be more accustomed to being managed by objectives. Therefore, they scored higher on factors related to the setting of goals and objectives, outcome feedback and the establishment of rules and objectives to teamwork.

It is interesting to note that the healthcare industry stands out when it comes to the role of the external leader. The main function of this role is to serve as team coordinator of performance. Healthcare is also characterised by the clear definition of roles, which is an advantage for decision making and conflict management. Furthermore, hospitals scored higher than manufacturers for factors related to internal communication and participation.

The findings indicate that the performance of factors that are important for teamwork must be improved in both sectors, such as team recognition and training. To

Level	Factor	Healthcare	Manufacturing
Outcomes	Organisation outcome	3.00	3.96
	Team outcome	0.94	1.15
	Member outcome	0.29	1.50
	Average for outcomes	1.41	2.20

Table III.
Scores for outcome factors

improve the effectiveness of both factors, they should be applied to the whole team. System recognition in manufacturing is often associated with the best performance (improvement of the year, for example).

With regard to outcomes, there was a big difference between organisation outcomes and team and member outcomes. Both manufacturing and industrial organisations are more focused on organisational results, and the evaluation of the aspects related to the performance of teams is not considered. Nevertheless, some manufacturing companies evaluate their team members while considering teamwork performance, and they include this assessment in their human resource evaluation system. On the other hand, healthcare organisations do not appraise their members in relation to teamwork performance. Therefore, very little teamwork performance feedback is given to the team as a whole or even to individual members. This is an important aspect that should be improved.

Future research should investigate the application of team improvement factors in more industries and include other aspects, such as the size of the company or the number of people involved. Based on the findings reported above, there is a real need to help companies to apply and support team training and its evaluation.

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