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Advancing Safety Performance: Using Change Management Principles to Implement Safety Management Systems in Air Carrier Operations

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ADVANCING SAFETY PERFORMANCE: USING CHANGE MANAGEMENT PRINCIPLES TO IMPLEMENT SAFETY MANAGEMENT SYSTEMS IN AIR CARRIER OPERATIONS

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This paper focuses on providing a theoretical answer to the question, how can an air carrier effectively implement a Safety Management System (SMS) in its operations? The core assumption of this study is that the value of a well-structured SMS in enhancing air carrier operational safety is axiomatic. We argue that air carriers, through the use of change management can successfully transform existing systems into SMS compliant systems.

Introduction

Safety is typically described as a non-negotiable attribute in the aviation industry. It is the cornerstone of any aviation operation and expected by customers, governments, and the public in general. Civil Aviation Authorities' *raison d'etre* is to safeguard, proactively, the safety of aviation operations. Commonly perceived as lack of accidents[1] or incidents, aviation safety is primarily achieved by an organization through compliance with prescribed standards. Airlines are subject to strict regulatory oversight from their national authorities, which prevents them from deviating from safe operating standards. Furthermore, airlines and their suppliers are constantly audited by regulatory agencies, manufacturers, and other airlines, often following international standards such as IATA's Operational Safety Audit Program.[2]

Likewise, regulatory agencies themselves are overseen by ICAO's Universal Safety Oversight Program (USOAP). As a result of standardization initiatives, such as ICAO's Standards and Recommended Practices (SARPS) and other regulatory oversight, the airline industry has achieved considerable safety improvements since the 1960s. During these last decades, international aviation has witnessed an improvement in the rate of civil aviation accidents.[3]

Despite this, operators are still susceptible to error, which is not always preventable through regulatory oversight. Air carriers are still responsible to follow safe operational practices to prevent accidents or incidents and are mandated by its national authority to monitor their internal processes constantly to ensure that deviations are adequately addressed.

Air carriers are required to manage their operations adequately to ensure that their service, transporting passengers or cargo, is delivered in an efficient manner in order to satisfy stakeholder expectations.[4] An airline can be perceived as an intricate network of departments, employees, contractors, and regulators interacting with each other. To conduct a safe operation, an airline's management needs to understand the complexities associated with its operations and develop, implement, and monitor control systems that will ensure compliance with safety standards. Moreover, the management of safety requires the organization to manage hazards particular to its operations proactively. Safety management has been recognized as a key aspect of an airline's operation and is now a regulatory requirement in countries like Australia, Canada, and the United Kingdom. It is now recognized that the implementation of a Safety Management System (SMS)[5] is a contributor to further reductions in aircraft accidents and incidents.

Is an SMS a panacea or just another buzzword that will be replaced with something new in a few years? How can an operator effectively implement an effective SMS in its operations? In this paper, we consider the value of a well-structured SMS in enhancing operational safety as an axiom and

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[1] ICAO (International Civil Aviation Organization) defines an airplane accident as the following: "an occurrence associated with the operation of an airplane that takes place between the time any person boards the airplane with the intention of flight and such time as all such persons have disembarked, and in which 1) the airplane sustains substantial damage; 2) death or serious injury results from being in or upon the airplane, direct contact with the airplane or anything attached thereto, or direct exposure to jet blast."

[2] International Air Transport Association.

[3] Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations 1959 – 2004, Boeing Commercial Airplanes, May 2005.

[4] Stakeholders are the general public in addition to regulatory authorities.

[5] For national authorities, a draft SMS manual has been released by ICAO (Doc 9859).

consider SMSs as nothing new. SMSs are deeply rooted in organizational behavior theory, and we propose that aviation operators, through the use of change management, can successfully transform existing systems into SMS compliant systems. Therefore, our argument focuses on how change management can be used as an effective technique in implementing a safety management system in an operator that is used to a non-SMS type system of regulatory compliance. Thus, we describe what change management is and how it can be utilized in an SMS transformation. By extension, though not a focus of this theoretical paper, our argument presupposes that an adequate management of safety is an indicator of the overall performance of an organization and, as such, a quality to be desired.

First, we briefly discuss organizational culture, define what an SMS is, and then proceed to define change management and propose ways the concept applies to the implementation of an SMS in an airline environment. In our discussion of organizational culture we propose that the stronger the culture in an organization, the more effectively the organization addresses change. By extension, the more effectively the organization addresses change, the more successful it can be in implementing a new SMS in its operations and the less it will need the deployment of radical change management techniques.

Defining SMS

Effective safety management emphasizes the importance of managing safety in a systematic, proactive and explicit manner. Systematic means that safety management activities are conducted in accordance to a predetermined and well-documented plan and applied in a consistent manner throughout the organization. The existence of an integrated and strong company culture is an essential enabler in achieving this consistency. A strong and uniform company culture comes together with high morale amongst employees and good interdepartmental links and communication systems throughout an organization. Being proactive means adopting an approach which emphasizes prevention through the identification of hazards and the introduction of risk mitigation measures before the risk-bearing event occurs and adversely affects safety performance. If this type of an organizational practice already exists in a company culture that emphasizes incident and accident prevention, rather than a reactive culture that focuses on solving problems after they occur, then an SMS becomes easier to implement. Finally, what is explicit in an SMS system is the fact that all safety management activities should be well-documented

and in a clear manner. In addition, they should be visible both to inter as well as intra organizational stakeholders and be performed independently from other management activities. Safety becomes a uniform focus for the organization, rather than an afterthought, and responsibility for its management is delegated to a specific organizational unit whereas, at the same time, is pervasive in the practices of the organization as a whole.

Essential practices that are associated with safety management include the following: hazard identification and the closing of gaps in defending an existing system. This practice is related to the principle of proactive management in that quality assurance is a dynamic process that is achieved through the use of some sort of an ever evolving and improving total quality management system. Additionally, effective safety management is multi-disciplinary; it involves several departments within the organization. More specifically, even though the organization's safety department has core competency vis-à-vis safety and in promulgating a safety culture throughout the organization, the know how of technical experts in a variety of other areas is equally valuable. These experts are involved in the day-to-day practice of safety and should be allowed to offer input in the proactive solution of potential hazards. This approach requires that an appropriate and systematic application of a variety of techniques and activities are utilized in an array of situations, and this is done in a way that fits the specific problem. Thus, for example, if the problem is one of a human resource process, the appropriate expert with a disciplinary competence best suited to take a lead in identifying and solving a specific gap is called upon to contribute to the solution.

Effective SMSs are built across three defining cornerstone characteristics. First, a comprehensive corporate approach to safety has to be assured, which sets the tone for the management of safety, builds upon the safety culture of the organization, embraces the organization's safety policies, objectives and goals, and ensures that senior management is fully committed to safety. Secondly, effective organizational tools to deliver safety standards must exist. These tools are needed to deliver the necessary activities and processes to advance safety. They are also important in arranging organizational matters in order to fulfill safety policies, objectives and goals. They establish standards and allocate resources as well as focus on hazards and their potential effects on safety-critical activities. Finally, a formal system for safety oversight is needed to confirm the organization's continuing fulfillment of its corporate safety policy, objectives,

goals and standards. It is important, along the parameters of this discussion, that it is understood that the scope of the SMS be appropriate to the size and complexity of the operation. Therefore, a one-size and scope fits all approach is not commensurable with an effective SMS.

Moving to SMS as a Restructuring Exercise: What Is Change Management?

Restructuring implies change. So how is change at an airline that is moving to an SMS system managed? This study focuses on the theory of change as it relates to any organization. In this effort, we present definitions of change, models of the organization, an outline of the change process, and a diagnostic model for identifying where change should take place. Another study will have to be conducted where the theory and concepts of change are applied to a specific airline case study, which includes recommendations for managing the change process.

All organizations by definition take inputs from the external environment, transform those inputs internally through their existing organizational processes, and then produce outputs, which again are directed at the external environment. As such organizations can be considered open systems, and thus are susceptible to developments in their business environment since they are part of that environment. When an organization's internal structure and functions are organized such that they can exploit the external environment to their advantage, then an organization can be considered to be operating effectively. However, the external environment is in most cases more dynamic and fluid than that of a typical organization. Changes in the external environment can happen so quickly that almost overnight organizations can find themselves unable to deal effectively with the situation. If an organization wishes to survive it, too, must change. The ability of managers to guide and influence the outcome of changes is Change Management. These abovementioned statements are particularly true in the case of Safety Management System implementation by air carriers. The inability of an airline to transfer itself effectively in a Safety Management System, especially if it is a new regulatory standard or widely acceptable industry practice, will have a negative impact on its efficiency.

Types of Change

As mentioned earlier change is initiated in the external environment, and this requires firms to change in order to remain effective. In the case of an SMS, its acceptance as a good global safety practice through ICAO and IATA has been instrumental in its broader acceptance. The external environment with respect to any firm or collection of firms in a similar industry can be characterized by the amount of change that is occurring over time in the environment. Broadly speaking the external environment can be considered to be in either equilibrium (in the airline industry consider the era of regulation), which implies only small incremental changes in the way a firm operates. On the other hand, the external environment can be characterized by a period disequilibrium. Disequilibrium is often triggered by a destabilizing event, or set of events, that change the basic dynamics or relationships in a particular industry. The destabilizing event can be triggered from one of the industry participants (as it attempts to gain a competitive advantage) or it can come from outside the industry (fears of terrorism, for example).[6] September 11th (9-11) is a prime example of an external destabilizing agent for the airline industry.

Thus two types of change can be considered to affect the organization: incremental and discontinuous. Incremental change is a type of change associated with those periods when the industry in equilibrium and the focus of change for the organization is to do things better, through continuous change, adaptation and modification.[7] In contemporary language this type of change is often referred to as continuous improvement.

On the other hand, discontinuous change is change that occurs in periods of disequilibrium.[8] This type of change is sometimes called transformational change, as the organization that undergoes such change must completely break with its past and find new ways to operate. In addition to new operational methods, an organization facing transformational change must also create and define a completely new set of strategies, since previous core competencies may have been undermined due to changes in the external environment. In essence this type of change requires the organizations to do things differently rather than doing things better. It may even mean doing completely different things[9] as can be the case with an SMS.

In addition to the concept of incremental and discontinuous change, two other categories of change

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[6] Haynes, J., *The Theory and Practice of Change Management,* Palgrave, Hampshire, 2002.
[7] Ibid.
[8] Ibid.
[9] Ibid.

can be defined, both of which incorporate the element of time. First, there is anticipatory change, which is initiated by a firm without a clear external demand. This type of change might be undertaken by a firm in order to gain a competitive advantage in the market place or to prepare for a likely future event. Anticipatory change happens before an event in the external environment. Secondly, there is reactive change, which is a firm's response to a clear and present danger that already exists at present in the external environment. Movement towards the design and implementation of a safety management system for an airline can be attributable to either anticipatory or reactive change and depends on how the airline in question brings it about. For example, if an SMS is mandated by a national regulatory authority as the new regulatory standard, an airline that has not taken steps to change its existing system to an SMS type system must react to the new regulatory standard. On the other hand, an airline that starts using an SMS system in anticipation of regulatory change or in order to self-generate more efficiency in its safety management operations is said to engage in anticipatory change. Efficiency here is defined as the internal ability to do more with less or the same with less while maintaining or improving safety outcomes.

Combining the concepts of equilibrium together with that of time, a change matrix for organizations can be constructed as seen in figure 1:

Defining a change matrix as above is a useful tool that enables us to make preliminary diagnoses of the type of change facing an organization. As will be illustrated later, knowing the type of change facing an organization will greatly assist directing resources and time to the appropriate places within the organization.

Tuning is simply a change that is undertaken when there is no immediate requirement for change. Essentially this type of change is associated with fine tuning an existing strategy. *Adaptation* is similar to tuning but is undertaken due to the presence of some external factor. This type of change essentially means "doing things better." *Re-orientation* is a wholesale change undertaken by an organization in anticipation of some future event. The aim of this type of change is to ensure that the organization remains aligned with the external environment. Finally, *re-creation* is a fundamental realignment of the firm due to events currently taking place in the environment. Both *re-orientation* and *re-creation* require the organization to dramatically change all of its elements. This includes a change in strategies (corporate and business), and thus implies old core

competencies may need to be abandoned in order that new, more effective competencies be developed. SMS implementation in a non-SMS environment falls under any of the abovementioned categories. The magnitude and type of change that is required depends on the degree to which an air carrier's existing system is already aligned with specific SMS requirements. By this we mean how close the air carrier's existing system is to an SMS compliant system from an organizational or safety culture strength perspective.

	Incremental	Discontinuous
Anticipatory	Tuning	Re-orientation
Reactive	Adaptation	Re-creation

Figure 1. Types of Organizational Change[10]

Why Do Organizations Need to Change?

Thus far, basic definitions of change have been described and defined. What has not been discussed, however, is why organizations need to change. From the preceding discussion it is probably obvious to the reader that an organization's ability to navigate change is directly related to its organizational effectiveness and performance.

Figure 2 describes a typical decline process that occurs when an organization fails to give proper regard to changes in its external environment. In the first stage (Blinded), organizations are unable to recognize internal and external changes that may affect the long term survival of the organization. In the second stage (Inaction), organizations fail to

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[10] Ibid.

respond to a need for change despite signs of worsening performance. In the third stage (Faulty Action), the organization takes actions but these actions are inappropriate. In the fourth stage (Crisis), after failing to deal with the problems facing it, the organization finds itself in crisis. Finally, failure to respond to the crisis results in the eventual death or dissolution of the organization. While Figure 2 makes obvious the process of decline, another point is worth mentioning. It seems intuitive that an organization in decline should respond to the change it faces, which has put it in a position of vulnerability, in an appropriate manner rather than over or under react. For example, adequate identification of threats in the external environment may prompt the organization to make small incremental changes (*tuning*), rather than large scale transformational changes (*recreation*).
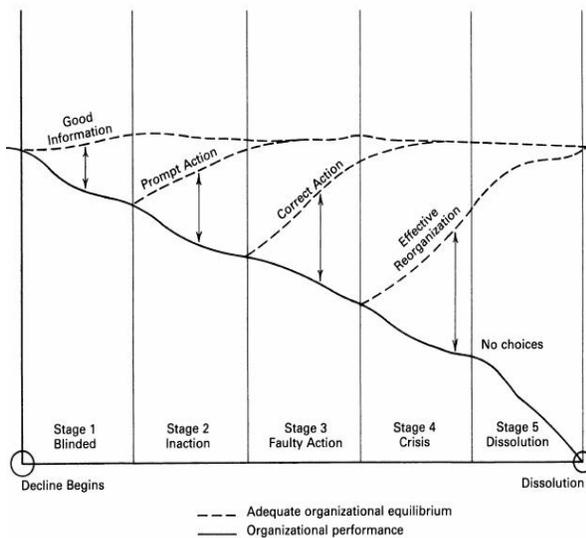

Figure 2. Widening Performance Gap[11]

The Change Process

The change process is a dynamic and fluid one. Generally, change can be categorized into three basic stages. The first stage is the unfreezing process where the organization leaves or alters its existing levels of behavior. The second stage involves moving to a new behavioral level. The third stage is refreezing at this new level. By refreezing what is meant is that new behaviors have supplanted old ones resulting in a new set of behaviors for the organization. For example, the management of safety

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[11] Hall, R., *Organizations: Structures, Processes, and Outcomes, 8th edition,* Prentice-Hall, New Jersey, 2002.

requires the organization to manage hazards particular to its operations proactively. If proactive management does exist, an airline that wants to move in this direction can "unfreeze" current processes which prevent it from doing so (for example, unwillingness to speak up if a mistake is detected for fear of management or colleague retaliation), then, through a training program, re-align the behavioral pattern of its employees (moving to a new behavioral level), and finally refreeze the organizational process once adequate evidence is presented that behavior modification has taken place (refreeze).

Note that this model reflects on and extends the three stage model for change presented earlier. The first of the three steps of the process view essentially represent the unfreezing stage as the organization first observes changes in its external environment, translates this perception into a need, and thus begins the change process. The diagnosis and implementation planning represent the movement from the previous state to the new state. The implementation and review stages of the process model represent the beginning of refreezing where new behaviors are absorbed into the organization. Finally, we should note that this is a continuous process, and that refreezing does not mean that the organization is locked into a new behavior, but rather that new modes of operation have been learnt and integrated into the organization. It is like a dialectic process, where continuous change and adaptation are not just necessary but inevitable if the organization is to survive.

The most critical steps of the change process are the diagnosis stage and the transition to the implementation phase. The diagnosis phase is important as the organization must determine where organizational performance is being adversely affected and needs to be changed. The implementation plan then sets out to correct or modify the defects noted in the diagnosis and represents a crucial step towards re-establishing organizational effectiveness.

Diagnosing Where to Change

There are several models available in order to diagnose change. The Burke-Litwin model (Figure 3) is very useful as it describes twelve interrelated elements of an organization. At the top of the diagram is the external environment, and this represents the inputs for an organization. At the bottom of the diagram is the performance of the individual and organization and as such represents the output. The area in between represents how an

organization turns inputs into outputs and, thus, represents the key activities and elements of an organization. Furthermore, the model is organized in a vertical fashion to indicate the relative impact that one element has over another element in the organization. For example, the organizational culture will affect both the work unit climate and individual needs and values. While the work unit climate can affect the organizational culture, this model posits that organizational culture has a much greater weight or force on the work unit climate than vice-versa.

What makes this model most interesting for diagnosing change, however, is the fact that it inherently distinguishes between transformational change and transactional change. Earlier in the paper change was broadly categorized into either Incremental or Discontinuous. An organization faced with the former need only to modify itself in order to do things better (transactional change), while the latter required the organization to drastically remodel itself (transformational change).

As transactional change is focused on minor "tuning," change efforts need to be directed at the structures, management practices, and systems, which affect the work climate unit that in turn affects motivation and performance of both the individual and organization.[12]

On the other hand, it is clear that when an organization is confronted with transformational change efforts for change must be directed higher up in the organization. In other words, this type of radical change calls for a reworking of the organization's mission and strategy, its leadership and its organizational culture. As the model implies, changes at this relatively high level will be transmitted through the lower levels and, thus, may well cause incremental change to occur as well.

Conclusions

This theoretical study advocates but does not empirically prove that an SMS is a concept that has existed in academic literature for quite sometime and that its application in the aviation industry in transforming existing safety compliance systems is tied to the application of change management principles to administer the SMS procedures. We assume, but do not prove, that the existence of strong organizational cultures would make change management in establishing SMS systems entertain higher likelihoods of success. The most critical steps

of the change process for an airline that moves from a conventional system of safety compliance to an SMS type system are the diagnosis stage and the transition to the implementation phase. The diagnosis phase is important as the organization must determine where organizational performance is being adversely affected and needs to be changed. The implementation plan then sets out to correct or modify the defects noted in the diagnosis and represents a crucial step towards re-establishing organizational effectiveness. Empirical research through case studies of SMS implementation will be necessary to test the hypotheses presented in this paper.
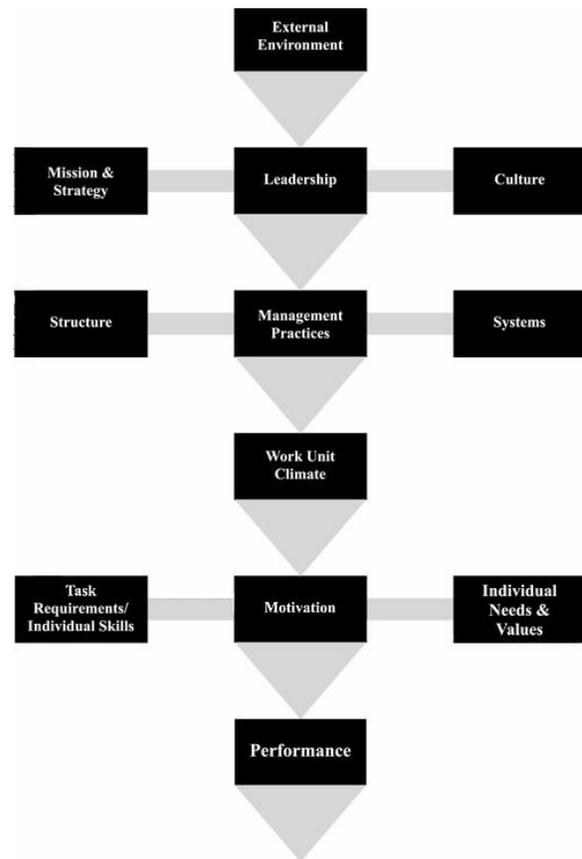

Figure 3. The Burke-Litwin Model

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[12] Ibid.