



MITIGATING DELAYS IN THE OPERATIONS OF A BUSINESS ENTITY WHEN CONVERTING TO THE ISO 55000 STANDARD

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ABSTRACT

Existing business entities often employ their own operational procedures and guidelines regarding asset management. However, converting to the ISO 5500X standards can adversely affect the operational performance of these business entities. Most of these pre-existing asset management systems possess some degree of operational inertia. This operational inertia can lead to delays when change is introduced. These delays could also discourage further adoption of the ISO 5500X standards. This study sets out to describe a method that identifies sources of substantial delays within an asset management system, specifically those originating from converting to the ISO 5500X standards. The identification of these sources is achieved through the use of mathematical modelling methods. The aforementioned information can lead to appropriate planning prior to the conversion to the ISO 5500X standards. If potential delays are identified, they can be pre-emptively mitigated with said plan, thus ensuring minimal reduction in operational performance.

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1 INTRODUCTION

Modern organisations employ many different tools and methodologies to increase operational performance and ultimately value for the stakeholders. Adopting new or existing standards of operation can be a large contributing factor to achieving and maintaining a competitive advantage. This is especially true for areas of operation where international standards do not yet regulate the manner in which these operations are executed.

The International Organisation for Standardisation [1] states that international standards are tools and guidelines that bring benefits from technological, economic and social sectors. These standards aid organisations in enhancing their operations and accessing new markets. Adhering to international standards help reassure clients in an organisation's capabilities and products. Other benefits include cost savings, enhanced customer satisfaction, increased market share and environmental benefits.

The newly developed ISO 5500X family of standards is the first international standard for Asset Management, published by the International Organisation for Standardisation (ISO). According to ISO 55000 [2], this standard provides an overview of asset management and asset management systems. Through the adoption of this standard, organisations can accomplish its asset management goals through effective and efficient management of its assets.

Organisations possess operational inertia; a trait that describes the inability of an organisational entity to immediately adapt to changes implemented. Due to this operational inertia, complications arise when a new standard is implemented and an organisational structure is changed. Change can be met with resistance from the individuals it affects, as well as the organisational departments undergoing said change. This resistance may result in departments, specifically those in Asset Maintenance Management (AMM), experiencing delays in the adoption of the new standard. These delays negatively affect the performance of the aforementioned departments. Incorporating the ISO 5500X family of standards into an operating AMM structure without proper planning and consideration can lead to significant delays. This does not only occur within the separate AMM departments, but can ultimately delay the operations of an organisation. These delays can prove to be costly and discourage the further adoption of the ISO 5500X standards. It is thus the responsibility of the implementing body to properly plan and assess any possible risks involved when introducing change into an existing system.

A simple methodical approach is needed to assess the response of an AMM structure when the ISO 5500X standards are implemented. The method is required to identify the AMM departments that will possibly experience the most significant delays. Appropriate actions can then be taken to prepare these identified AMM departments for change, and ultimately mitigate their expected delays.

This paper offers a simple method to assess the adaptability of AMM departments when converting to the new ISO 5500X standards. It links a department's possible low adaptability to the increased chance of it experiencing operational delays. The method implements information gathered from the personnel associated with each individual department to construct an accurate "on-the-floor" opinion of each department. Upper-management is consulted to determine the departmental resources and capabilities on a managerial level, such as financial support. Inter-departmental relationships are also incorporated to account for the chain-effects an individual department's delay has on the overall AMM structure.

The aforementioned information is used to calculate a numerical value which represents the adaptability of each department. The data collected, as well as this adaptability numerical representation, can aid in formulating accurate opinions of the assessed AMM departments. Implementing these findings in the pre-implementation process of the ISO 5500X standards can help mitigate possible operational delays in an organisation's AMM structure.

2 PAS 55 AND THE TRANSITION TO THE ISO 55000 SERIES

The Public Available Specification (PAS) 55 is an international standard for the enhanced management of physical assets. It was first published by the British Standards Institution in 2004 due to the industry's request for a standard in asset management. However, it is not a British standard. PAS 55 was revised in 2008 to mirror the increased international consensus for required good practices in physical asset management. (PAS 55-1:2008 Asset Management [3]).

According to van den Honert *et al.* [4], PAS 55 has been a success since its introduction to the industry. It has provided a flexible but robust asset management framework that encourages a continuous improvement. However, PAS 55 lacks details. It provides guidelines on what needs to be done, but does not address how it should be done.

The International Organisation for Standardisation (ISO) recently produced the ISO 55000 series, a family of international standards for physical asset management. The ISO 55000 series bases its content on the primary concepts of PAS 55. It aims to make the standard more applicable and user friendly than PAS 55, attempting to rectify the pitfalls of PAS 55. Another benefit of the ISO 55000 series, stated by van den Honert *et al.* [4], is the alignment it has with other major management specifications. This allows the ISO 55000 series to be easily incorporated by an organisation who employs these other management specifications.

3 RESISTANCE TO CHANGE

Change is a necessity for any organisation who wishes to remain a competitor in its relevant field of operation. Change can present itself in many opportunities, and come in a wide range of magnitudes. Carrillo and Gaimon [5] writes that when change is correctly implemented, it can enhance an organisation's performance to better compete in current and future planned activities. One method where change is implemented to improve performance is the Kaizen method. Singh and Singh [6] states that Kaizen is a methodology using change implementation, whereby very small improvements and changes are made in processes to gain a competitive advantage. Toyota is a well-known user of the Kaizen methodology. According to Singh and Singh [6], Kaizen has contributed greatly to Toyota's and the Japanese's manufacturing success.

Change, however simple an idea, is usually met with some resistance when considering the individuals it affects. Personal preferences and perceptions differ from individual to individual, and it is thus difficult to predict how an organisation's workforce will respond to change. Departmental structures can also offer resistance, much like humans. Departmental structures often lack the ability to adapt effectively and quickly when change is implemented. As a result, an organisational structure can suffer as a whole.

Resistance to change (RtC) is defined by Ansoff [7] as a multifaceted phenomenon, that introduces into the process of strategic change unanticipated delays, costs and instabilities. RtC can thus be perceived as a critically important factor that can negatively impact the success of change implementation, a view shared by Waddell [8]. She continues to state that RtC is far more complex phenomenon than once thought; it is a function of a variety of social factors. Although a complex phenomenon, Bouckenooghe [9] states that it can be followed through a series of stages originating at the precontemplative and contemplative stages. It is thus possible, albeit difficult, to assess how individuals would react to implemented change, and whether they would offer substantial resistance to said change. Although Waddell [8] and Bouckenooghe [9] only address the human components of RtC, it is possible to adjust their assessment measures in order to assess how an organisation's department would respond to change.

4 SOURCES OF RESISTANCE

Pardo del Val and Martinez Fuentes [10] list different sources of resistance, which include leadership inaction, capabilities gap, communication barriers and denial. For the purpose of this paper, these listed sources are characterised into two general resistance groups. RtC can originate, as aforementioned, from the human element, as well as from organisational departments. Therefore the two general groups are Personnel and Departmental factors.

4.1 Personnel factors

Organisations are dependent on human input, and thus are exposed to the influences of human emotions and opinions. The assessment of emotional factors in an organisational change situation can be very complex, and sometimes inaccurate. Waddell [8] confirms the aforementioned in her paper:

“The conception of resistance to change benefited greatly from the application of psychological, sociological and anthropological disciplines to study of management. As the understanding of resistance became increasingly sophisticated, it became clear that resistance is a far more complex phenomenon than once thought. Rather than being simply driven by the parochial self-interest of individual employees, this research concluded that resistance was a function of a variety of social factors”

The aforementioned factors include, but not limited to, rational, non-rational and political factors. These are briefly discussed below.

4.1.1 Rational factors

A constant challenge in an organisation is that of aligning the workforce's opinions to that of the organisation to effectively work as a team. When change is introduced, resistance can be encountered when the change's outcomes are evaluated differently by the workforce to that visualised by the organisation's upper management. Waddell [8] states that these differences in opinion can influence the perceived merit and worth of the introduced changes. The differences in opinion may cause the employees to oppose the change, and even develop conflict between people, as discussed by Van Eemeren and Grootendorst [11].

4.1.2 Irrational factors

The prediction of an employee's reaction to change is difficult at best. It cannot be calculated, nor forecasted accurately. Each individual perceives change differently; some individuals welcome change, whereas others prefer unchanging environments. This individual perception of change also varies with circumstances in both the individual's working environment, and personal life. Human comfort zones, preferences and other irrational factors can therefore be powerful contributors to an employee's opinion and reaction to change.

4.1.3 Political factors

Opposition to change can be encouraged amongst employees when there exists internal conflict between those responsible for introducing the change, and those being affected by the change. Organisational politics can greatly influence the success of implementing and maintaining introduced change. Butcher and Clarke [12] speaks of recent study in which a general manager refused to co-operate with politically motivated managers. They continue to state that power is abused rather than used responsibly. All of these political factors can be seen as possible sources of resistance.

4.2 Departmental factors

An AMM system makes use of different departments to execute different tasks and responsibilities. AMM systems vary in complexity, but in general they all share the same core departments in order to achieve the same goals. For any system to operate efficiently and effectively, all the system components need to work together. This results in an inter-dependent relationship between sub-systems. The same can be said of an AMM system and its departments. *Figure 1* shows some of the core AMM departments, and their inter-dependent relationships.

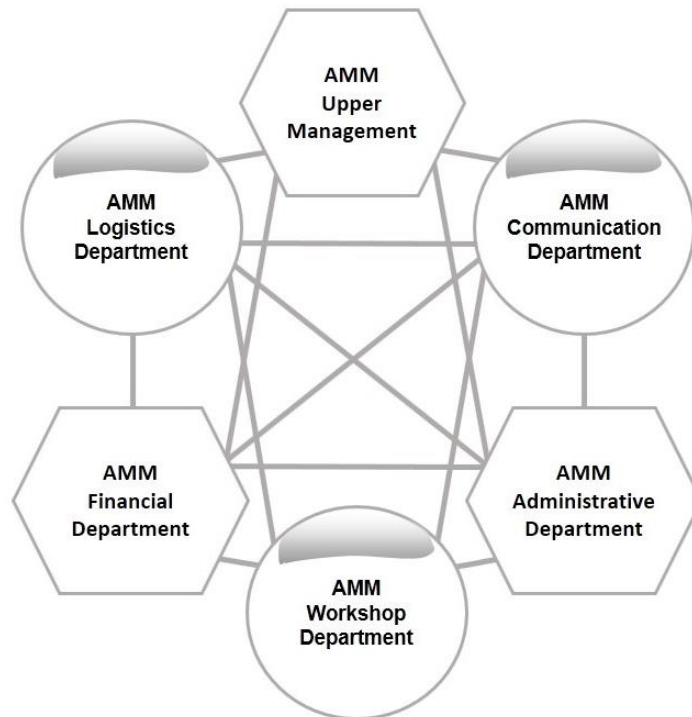


Figure 1: Departmental inter-dependent relationships

Each individual AMM department adapts to change differently due to many department specific characteristics, such as:

- Departmental operational flexibility
- Departmental structure
- Departmental regulations

In general, these factors can be listed under a single element, departmental flexibility. In order to streamline processes, organisations tend to put in place strict regulations and limitations. These regulations and limitations can, however, severely affect the flexibility of a department.

Most of the RtC encountered from a department is caused by its lack of flexibility. A single department that offers RtC can be dealt with individually. Therefore it does not seem to pose a large threat to the overall change implementation success as its problems are contained within the department's boundaries. That is not the case, however. A single department's RtC affects every department within an AMM framework due to the inter-dependence of the departments. One department's fall in performance results in an overall decrease in performance. Therefore, it does indeed pose a large threat to the successful implementation of change.

This paper does not aim to provide a method of identifying the flexibility limiting factors, but stresses the importance of structuring a department in such a way that flexibility is

improved rather than limited. Increased flexibility in all AMM departments contributes to the reduction of negative influences each department can have on an AMM structure.

5 ASSESSMENT METHOD

As previously mentioned, a methodical approach is required to assess how an AMM system would respond to the implementation of the new ISO 5500X standards; whether it will offer minute or great RtC. One method of doing so is to assess the ability of an entity to adapt to change. Assessing an entity's adaptability is less complex than directly assessing the entity's RtC; if an entity shows promise of good adaptability, the risk of RtC from that specific entity is reduced [13]. The Departmental Adaptability Assessment (DAA) method accomplishes this through investigating the departments within an AMM system, and the personnel of each. Through means of questionnaires, it collects data from each department being investigated. Unlike most data utilized in AMM frameworks, the data used to identify possible sources of RtC in a department is based on personal opinions. Thus it is very important to query individuals with specific questions, relevant to their roles in the AMM system, to yield data that is accurate and applicable to the investigation.

To gain data on the individual departments, the managerial personnel, as well as the respective departmental personnel, need to be questioned. This is encouraged because information gained by only questioning upper management is usually biased and lacks scope, as well as depth. Investigating relevant documentation is important, but rarely reflects the effects of human involvement and the RtC they can offer.

As the DAA method requires information on each AMM department in the AMM system, it suggests a simple starting point. *Figure 2* depicts a flow chart for the assessing method.

Departmental Adaptability Assessment Method

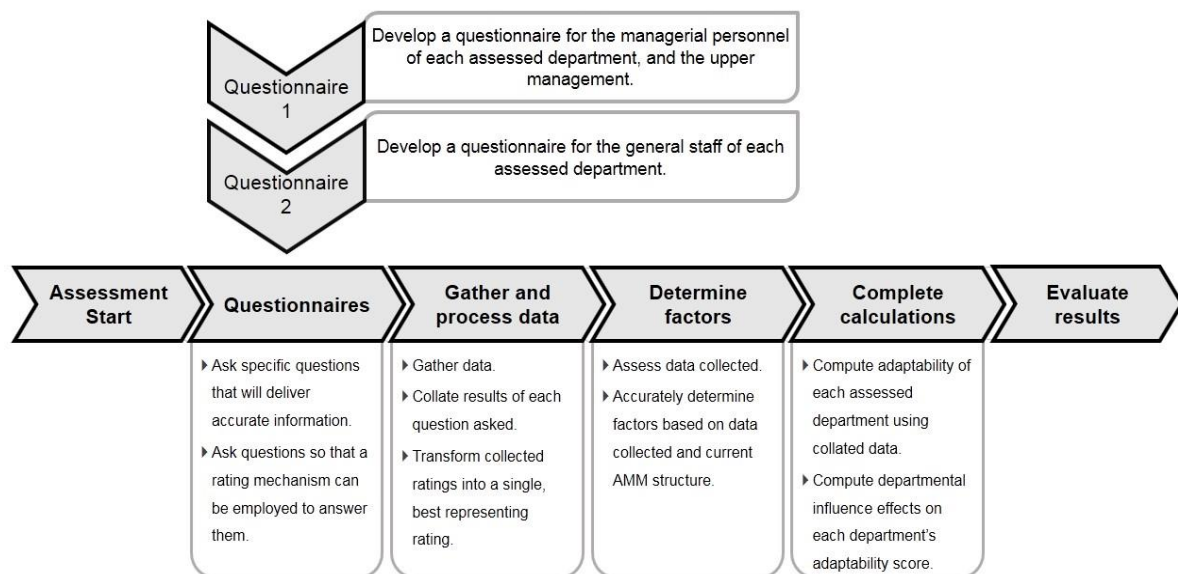


Figure 2: Adaptability Assessment Method

5.1 Evaluating elements

An AMM department's overall adaptability needs to be represented in a numerical manner. An effective way to calculate a numerical representation of adaptability is to rate a department against some evaluating elements. The evaluating elements used in the DAA method are as follows:

- Personnel adaptivity

- Personnel competency
- Departmental flexibility
- Financial resources
- Spare operational capacity
- Inter-departmental communication
- Administrative capability
- Workforce availability

If, however, an organisation wishes to include other evaluating elements they deem necessary, it will not affect the process of the method. For simplicity purposes, it is advised that the number of evaluating elements be kept to a minimum. The above elements will shed light on specific attributes of a department, and are deemed important components of this assessing method and are therefore the key elements to address in the DAA questionnaire.

5.2 Questionnaire development

The personnel working in each department can give valuable insight on the challenges being currently faced; insight that may not clear to the ISO 5500X implementing body. It is important to gather all available insight to create an opinion as accurately as possible. The DAA method requires that a comprehensive, but simple, questioning procedure be implemented to gather information on the aforementioned evaluating elements.

Confidentiality is of critical importance if honest answers are desired from the respondents. It is suggested that the level of confidentiality be communicated to the respondents prior to the distribution of questionnaires. This is to allow the sense of security manifest itself among the personnel being enquired.

The information required from upper management and the departmental workforce is similar. However, the workforce can be asked more specific questions about the department's inner workings which the upper management would be unaware of. The same applies to upper management. Upper management retains more specific information regarding the overall view of a department.

The different sources of information need to be approached effectively to gather accurate and trustworthy information. Thus it is of utmost importance to develop a questionnaire specific to each source of information. A simple, but effective, questionnaire method is one that employs a rating system. It enables the assessed to quickly complete the questionnaire, as well as deliver information in numerical format to the assessor. The main advantage of employing a rating system is that the assessing personnel does not have to transform written answers to the required numerical format. It also yield relatively accurate ratings of departments against the evaluating factors.

5.3 Collecting and processing Information

The information gathered from the different sources needs to be arranged into the relevant information groups. For a large organisation, this can be a large amount of data. Once all the data has been sorted, the assessor can process the information relevant to each question asked easily.

It is desirable that the ratings received on a single evaluating factor, or question, be transformed into a single value representing the overall opinion or result obtained from the personnel queried. This process demands that the assessor give great attention to the motivations behind the ratings to improve the determination of the single representing rating.

If, however, the questionnaires were not designed to incorporate a rating mechanism, then the assessor is required to study the data received thoroughly and determine the most appropriate rating for use in the calculations.

5.4 Determining the employed factors

There are two factors employed in this adaptability assessment method. They are:

- Influence Factor
- Departmental Influence Factor

Both of these factors have to be determined by the assessor. This is to allow as much flexibility in the method, as aforementioned, AMM structures differ in magnitude and complexity. It enables most AMM structures to implement this method effectively. It is important to note that these factors are crucial if accurate results are desired.

5.4.1 Influence Factor

The Influence Factor is intended to reflect the magnitude of the role each Evaluating Element plays in each AMM department. These factors must be determined through a thorough investigation of each departmental structure to see what roles these Evaluating Elements play.

5.4.2 Departmental Influence Factor

The influence each department's delays have on the rest of the AMM system is accounted for through the use of the Departmental Influence Factor. It is a simple attempt to account for the snow-ball effect delays have on an inter-dependent set of subsystems. Each department's influence on the other departments will be assessed, and the most appropriate factor chosen. Great care must be taken when allocating the factors, as mentioned before, to ensure that each organisation's AMM structure is accurately represented and trustworthy results is produced.

5.5 Calculations

The calculations to be carried out are kept simple and straightforward; keeping with the simplicity of employing this method. A detailed description of the mathematical steps taken is given in Step-wise Assessment Procedure below.

5.6 Evaluate results

The results obtained from this method yields information on two characteristics of the assessed AMM structure. The two characteristics are;

- Individual departmental adaptability
- Departmental effect on overall AMM operations

It is possible to identify which departments will have the lowest adaptability potential. This allows the ISO 5500X implementing body to notify these identified departments about their potential delays. These departments are then able to take action to rectify the problems revealed in the questioning process.

The latter characteristic listed above allows the ISO 5500X implementing body to assess the significance of each department's potential delays on a grand scale. A small delay experienced by a department can have a more severe effect on the overall AMM operations than another department's greater delay. The critical departments can thus be identified and steps taken to improve the adaptability of said departments.

6 STEP-WISE ASSESSMENT PROCEDURE

The implementation description of the DAA method can be best followed through the use of an example. The data used in the example was obtained from a confidential source, limited to only a few general departments in their AMM structure. The data collected from the source was simplified and generalized, as per request from the source, but maintained in an applicable format for use in this example. Any number of departments can be assessed in a similar manner, depending on the complexity and grandeur of the AMM under assessment. The general AMM departments assessed in the example are:

- Upper Management
- Workshop Department
- Administration Department
- Communication Department
- Financial Department

The motivation behind the choice of the above departments is merely due to the scope they cover in an AMM structure. These departments are not specific departments found in an AMM structure, but are merely basic representatives of AMM departments found. Large organisations will have specific AMM departments responsible for each facet of AMM, which allows the easy identification of departments. However, the DAA method is also intended to be implemented by small scale organisations, which may not have specific AMM departments. Using basic departments in the example allows small scale organisations to break up their AMM structures in a similar manner.

6.1 Data organisation

The initial stage of the assessment is distributing questionnaires to gather sufficient information to carry out the assessment. The questionnaires, as mentioned previously, are to be developed by each organisation to adhere to their regulations and requirements.

The questions used in this example's questionnaire were focused on obtaining directly applicable information regarding the Evaluating Elements listed in Section 5.1. The questions directed towards the personnel, to evaluate the adaptability of said personnel, were simple, such as:

- “Do you think the current AMM system is effective and efficient enough?”
- “Do you welcome change in your workplace, or do you prefer to continue to operate in your ‘practiced’ manner?”

These questions are aimed at revealing the adaptability of the workforce, as well as their opinions on the current methods of operation. The implementing organization can incorporate questions to reveal more aspects deemed necessary to accurately construct an opinion of each department and its workforce, but it is suggested that the questions be kept direct and simple.

The information gathered from the questionnaires can be substantial. It is desired that the data be compressed for ease of use in this case. One method for compressing the data is to average the rating scores of each question in the questionnaire. This allows a large number of scores to be transformed into a single value, however, the possible insight gained from assessing each individual rating score can be lost. It is preferable that a thorough study of the information gathered be completed. This allows any potential insight gained to be incorporated, and the most accurate single representing score to be determined.

6.2 Individual assessment

The DAA method individually rates each department against the aforementioned evaluating elements. These ratings are decided upon through the study process of the data collected; thus it is merely an implementation of the compressed data. The mathematical evaluation can be completed using Microsoft Excel®. Table 1 is an extract of the example given, showing the various components.

Table 1: Example of an Individual Department Assessment

| AMM Workshop Department | Evaluating Elements | Rating | Assessment Score | Rating: Influence Factor | Influence Factor: | Individual Score |
|-------------------------------|----------------------------------|-----------------------------------|------------------|--------------------------|-------------------|------------------|
| Personnel: | Adaptivity | Poor - Good; [1,5] | 2 | Low - High; [1,10] | 7 | 14 |
| | Competency / Training | Poor - Good; [1,5] | 5 | Low - High; [1,10] | 6 | 30 |
| Departmental: | Flexibility | Poor - Good; [1,5] | 3 | Low - High; [1,10] | 10 | 30 |
| | Financial Resources | Minimum - Excessive; [1,5] | 1 | Low - High; [1,10] | 4 | 4 |
| | Spare Operational Capacity | Minimum - Large; [1,5] | 2 | Low - High; [1,10] | 9 | 18 |
| | Inter-departmental Communication | Poor - Good; [1,5] | 3 | Low - High; [1,10] | 3 | 9 |
| | Administrative Capability | Poor - Good; [1,5] | 2 | Low - High; [1,10] | 4 | 8 |
| | Workforce Availability | Understaffed - Overstaffed; [1,5] | 3 | Low - High; [1,10] | 10 | 30 |
| Total Individual Score | | | | | | 143 |

Table 1 shows the assessment of an AMM workshop department. The evaluating elements are listed, as well as the Rating guide and the Assessment Score. The areas of input are the Assessment Score and Influence Factor columns. The Assessment Score is the final rating a department received when judged against the respective evaluating elements. The individuals responsible for rating a department are preferably representatives from upper management; individuals who have adequate knowledge of the assessed departments. This Assessment Score however does not sufficiently reflect the importance it has in that specific department, thus an Influence Factor is introduced. The Influence Factor scales the Assessment Score to appropriately represent the contribution each evaluating element has to the department's adaptability.

Great care must be exercised when choosing the most suitable Influence Factors for the different departments; the Individual Score contributes heavily to the final position of each department when ranking the department adaptabilities. The evaluating individuals must complete a thorough investigation of the influence each Evaluating Element has on the respective department. A meeting with the managing personnel in the department, in which the influences of each Evaluating Elements are discussed, would provide sufficient information to accurately develop the necessary Influence Factors.

The Assessment Score is multiplied with the Influence Factor to yield an Individual Score for each Evaluating Element. In essence, it represents the positive contribution to the overall adaptability of the assessed department. The Individual Scores are then added together to yield a number representing the overall adaptability score of an individual department, referred to as the Total Individual Score. Table 2 below contains the Total Individual Score of each assessed department in the given example.

Table 2: Summary of Total Individual Scores of the Assessed Departments

| Departments | Total Individual Score |
|-------------------------------|------------------------|
| Upper Management | 164 |
| AMM Workshop | 143 |
| AMM Administrative Department | 174 |
| AMM Communication Department | 177 |
| AMM Financial Department | 155 |

Assessing the departments based on their individual scores will result in an inaccurate conclusion. The larger the individual score does indeed mean that a greater adaptability is possessed by that respective department. However, the inter-departmental relationships has not been taken into account. It is required to incorporate the affects a single department would have on the remaining AMM departments.

6.3 Inter-departmental effects assessment

To account for what affects a department, with a low Total Individual Score, has on the overall AMM structure, a scaling factor is implemented. This scaling factor, named Departmental Influence Factor, represents the influence strength a department has on another. Table 3 below is an extract from the example, in which the Departmental Influence Factor is implemented on each of the respective departments. It shows two inter-departmental assessments on two departments, namely:

- AMM Upper Management
- AMM Workshop Department

Each department is evaluated against the remaining departments. The Departmental Influence Factor represents how much influence the evaluated department has on the other departments' operational capabilities. The evaluated department's individual score is then divided by the determined Departmental Influence Factor to yield the Adjusted Score. The Adjusted Scores are added and the Final Score is determined.

Table 3: Inter-departmental Influence Assessment Example

| AMM Upper Management | | | |
|--------------------------------|--|-----------------------|--------------------|
| AMM Departments | Departmental Influence Factor: Low - Large [1 - 10] | Adjusted Score | Final Score |
| AMM Workshop | 4 | 41 | 139 |
| AMM Administrative Department | 3 | 55 | |
| AMM Communication Department | 6 | 27 | |
| AMM Financial Department | 10 | 16 | |
| AMM Workshop Department | | | |
| AMM Departments | Departmental Influence Factor: Low - Large [1 - 10] | Adjusted Score | Final Score |
| Upper Management | 1 | 143 | 243 |
| AMM Administrative Department | 5 | 29 | |
| AMM Communication Department | 6 | 24 | |
| AMM Financial Department | 3 | 48 | |

As aforementioned, the factors employed in the DAA method needs to be determined by each organisation to make it applicable to their AMM structure. The Departmental Influence factor is determined using the information gathered from AMM upper management. Again, great care must be exercised to choose the most realistic factors employed in this method.

6.4 Interpreting results

The summary of the example's results is shown in the Table 4 below. Both the Total Individual Score values from Table 2 and the total Final Score values, a continuation of what is shown in Table 3, of all the departments are tabulated.

Table 4: Departments' Final Scores

| Final Scores for all departments | | |
|----------------------------------|------------------------|-------------|
| Departments | Total Individual Score | Final Score |
| AMM Upper Management | 164 | 139 |
| AMM Workshop Department | 143 | 243 |
| AMM Administrative Department | 174 | 194 |
| AMM Communication Department | 177 | 125 |
| AMM Financial Department | 155 | 151 |

Investigating the results of Table 4, conclusions can be drawn up based on the adaptability of each department, as well as the global affects each of department's adaptability possesses. Ranking the Total Individual Score results from highest to lowest, one can determine the most adaptable to least adaptable departments. In other words, the least adaptable department will stand the greatest chance to offer the most RtC. (Piderit, S.K. 2000. [13]).

For this example, the departments are ranked as follows according to their Total Individual Scores:

1. AMM Communication Department
2. AMM Administrative Department
3. AMM Upper Management
4. AMM Financial Department
5. AMM Workshop Department

Thus only consulting the Total Individual Score results one can conclude that the AMM Workshop and Financial departments will offer the most RtC respectively in the AMM structure. However, if the Final Scores are ranked, a different conclusion can be made:

1. AMM Workshop Department
2. AMM Administrative Management
3. AMM Financial Department
4. AMM Upper Management
5. AMM Communication Department

The departments with the lowest Final Scores will stand the greatest chance to cause the largest delays in operations of the organisation. The effects of their RtC are felt most severe by the other AMM departments. The initial conclusion was that the AMM Workshop Department would offer the most RtC. This is correct, however it does not cause the largest delay in the AMM structure. The AMM Communication Department experiences the least RtC, however, the little RtC it experiences will cause the greatest delay in operations.

7 CONCLUSION

This paper aimed to deliver a simple method of assessing an Asset Maintenance Management structure's potential delays, caused by experiencing RtC, when adopting the new ISO 5500X family of standards. Its results can enable an organisation to identify the AMM departments that will potentially offer significant resistance to implemented change, as well as which departments will have the most severe effect on the overall AMM operations.

A rough overview of some sources of RtC was provided to better comprehend the fundamentals on which the Departmental Adaptability Assessment (DAA) method is based. Many different components of an organisational structure can be originating points of resistance. This paper clustered these sources into two general groups, namely Personnel and Departmental Factors. This separation allowed similar sources to be briefly investigated in a similar manner, aiding in some understanding of what causes resistance to change.

The DAA method utilises the information gathered from the personnel involved in all AMM departments. It allows the voice of the workforce to shed light on possibly unknown problematic factors, as well as to gain a better understanding of each departmental structure. The information required is collected through the use of questionnaires, specific to each organisation and its AMM departments. The assessment is completed through the use of Microsoft Excel © whereby numerical representatives of a department's adaptability are computed.

The method offers two stages through the assessment where conclusions can be drawn up. First, each department's adaptability is determined separately. Studying the data of each department allows problematic areas to be spotted as well as further expands the understanding of its inner workings. Secondly, the departmental relationships are investigated, presenting the opportunity to assess the global effects each department has on the AMM system.

The DAA method remains a simple assessment method to understand and implement, however requires large inputs from the implementing organisation. Incorporating large organisational inputs does however have one main benefit. It enables the method to be employed by a wide range of different entities. The intended deliverable from the DAA method was the identification of any department that would possibly critically delay operations when the ISO 5500X standards are implemented. The DAA does present other benefits when employed. It offers a method to better understand the complex mechanisms an AMM system, specific to each organisation. Implementing the knowledge gained through this method can be of great benefit to ultimately mitigate delays in operations when converting to the ISO 55000 standards through identifying the greatest possible sources of RtC.

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