RFID PROJEKT MANAŽMENT

RFID PROJECT MANAGEMENT

Juraj Vaculík[1], Ivan Michálek[2]

Anotace:Článek si klade za úlohu definovat způsob řízení projektu (project management).v oblasti aplikace technologie RFID při zavedení do praxe, definici a vymezení jednotlivých rol a postů v oblasti řízení projektu aplikace RFID a životní cyklus projektu RFID.

Klíčová slova:RFID, životní cyklus, řízení projektu,

Summary:Topic is about a project management system in area of application of RFID technology in to praxis, define individual roles in area of project management and life cycle of RFID projects

Key words: RFID, life cycle, project management

1. INTRODUCTION

In adopting an RFID system, the temptation to follow the "slap and ship" approach can be overwhelming. While this approach may undoubtedly be successful for a few organizations, most organizations would do better otherwise. The unique aspects of each organization's process really demands additional RFID implementation project planning to help insure success. The implementation of RFID also presents considerations above and beyond the normal project planning process. The fundamental reason behind the additional difficulties is that RFID systems can represent a dramatic change in how the organization functions. In situations like this not only must the implementation be properly planned with respect to the project planning process, but the issue of new technology acceptance must also be addressed.

To put all of these issues in perspective, the RFID implementation project process will be divided into two separate sections. In the first section, we will briefly discuss the general principles of the project management process. In the section, we will provide specific guidance on planning the implementation of an RFID system for a number of different types of scenarios. Readers who are familiar with basic project management issues may wish to advance to the RFID project implementation section.

---

[1] doc. Ing. Juraj Vaculík, Žilinská univerzita, Fakulta PEDAS, Katedra spojov, vedúci oddelenia EKaS, tel.: +421 41 513 3132, e-mail: juvac@fpedas.uniza.sk

[2] Ing. Ivan Michálek, Žilinská univerzita, Fakulta PEDAS, externý doktorand, e-mail: imichalek@centrum.sk

2. RFID PROJECT SELECTION

Organizations contemplating implementing RFID projects may be doing so for two basic reasons. The first compelling reason to adopt RFID technology is as a response to a specific mandate. In recent years, both the U.S. Department of Defense and large retailers such as Wal-Mart have mandated the use of RFID technology to enhance their logistical train. In cases such as these, there is but little choice for the organization to implement RFID technology as the mandate requires. However, for other organizations, the choice of implementing RFID technology may begin with the selection of a specific pilot project to gain experience with the technology. Depending on the success and utility of the project, RFID technology may be expanded into other areas. Yet the question remains as to which specific RFID project should be selected for pilot purposes. To help resolve this question, the following section touches briefly on a few project management concepts associated with project selection.

3. RFID PROJECT PARAMETERS

Provided that the organization has decided to properly proceed with the RFID project a comprehensive project management plan must be developed. An RFID project plan will enable the project manager to properly manage the project with respect to time, cost and technical performance. The time parameter refers to the schedule allocated to the RFID implementation project. The cost parameter is the budget associated with the project. Lastly, the technical performance refers to the ability of the project to meet the required needs.

The three project parameters are frequently depicted as a triangle, with each parameter being represented by one side. The significance of modeling the project as a triangle is that any two of the three legs or parameters can seriously impact the outcome of the third. For example, if the project falls behind schedule and the same level of technical performance is required, in order to finish on schedule, the budget must be increased. Similarly, if the project needs to be completed before the scheduled finish and the same level of technical performance is required, the budget must also be increased. In both of these cases, if the budget is not increased, and the schedule must be maintained or finished early, the technical performance of the system must be compromised. This is a particularly dangerous situation, since the failure to achieve the proper level of technical performance may seriously compromise the original purpose of the project.

The same effect is realized with respect to the budget. If the budget for the project is reduced, the technical performance may have to be sacrificed. Alternatively, fewer resources could be assigned to the project, resulting in a longer completion time.

As a final comment on the project parameter triangle, the effects of the technical performance leg can be considered. If the technical specifications of the system are constantly being revised through engineering change orders, either the completion time or the budget must be increased. In such situations, sometimes both the time and the cost of the project are increased.

4. RFID IMPLEMENTATION LIFE CYCLE

Many projects such as RFID implementation projects follow a general project life cycle. In the case of technological implementations such as RFID systems, the cycle follows four phases. These include conceptual, planning, installation, and startup phases. These phases are illustrated in Figure 1.

4.1. Conceptual phase

In the conceptual phase, the organization is determining the basic objectives of the implementation project. This includes specifying what benefits the organization hopes to achieve by successfully executing the project.

4.2. Planning phase

In the planning phase, the project manager is creating an outline for implementing the project. This includes as a minimum developing a ***work breakdown structure* (WBS)**, a linear responsibility chart (LRC), and a Gantt chart. The work breakdown structure is a division of project tasks into increasingly detailed activities called *work packages.* The linear responsibility chart specifies who participates and to what degree for each work package. Lastly, the Gantt chart details the length and relationships between each work package. Each of these planning tools will be discussed in further detail.

4.3. Installation phase

In the installation phase, the organization begins by identifying and acquiring all of the hardware and software necessary to implement the RFID project. The installation phase continues by physically positioning all of the hardware and software in place.
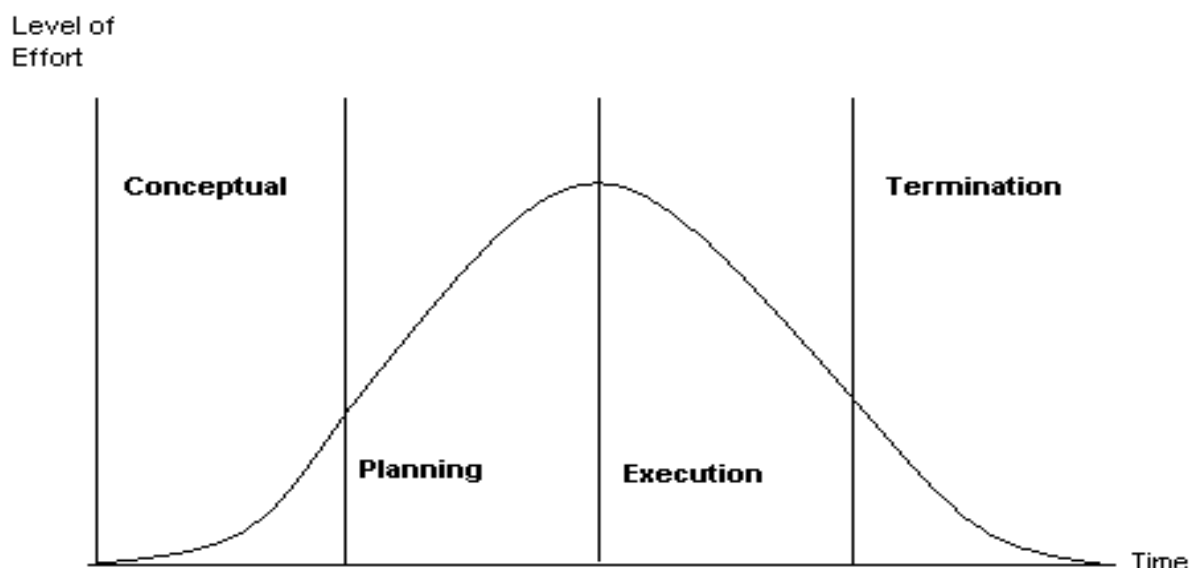

Fig.1 - RFID project life cycle

4.4. Startup phase

In the startup phase, the organization is going through the process of testing and debugging the installed hardware and software. The startup phase is completed when the

hardware and software are functioning properly. At this point, the project manager completely turns the project over to operational personnel.

5. RFID PROJECT MANAGER

The concept of the project manager cannot be discounted. As the primary individual responsible for the project, the project manager is largely responsible for the success or failure of the RFID implementation project. The success or failure of the project may depend on the cooperation of a variety of resources that the project manager may not necessarily have direct authority over.

5.1. RFID project manager authority

Authority is defined as the power to command others to act or not to act. With respect to project management, there are two different types of authority. The first type is de jure authority. This type of authority is that awarded by some official organizational document. De jure authority gives the RFID project manager the legal power to acquire and utilize organizational resources. This type of authority would typically be held by an engineering or production manager.

The second type of authority is de facto authority. This type of authority is based on an individual's personal knowledge or skills related to a particular task. De facto authority depends on other individuals to comply out of respect for the individual's unique knowledge or skills. This type of authority is typically the kind of authority held by some sort of analyst or engineer.

The RFID project manager may have either de jure, de facto, or both types of authority. However, the most likely scenario is that the project manager is not specifically a manager but an engineer who must undertake the RFID implementation project. In this case, as an engineer without specific de jure authority, the engineer must take particular care in project management, as he will not have the power to command others to act or not to act. In other words, the engineer is more likely to have to use his de facto authority and interpersonal skills to gain the cooperation of the different individuals involved at different levels and phases of the RFID implementation project.

5.2. RFID project manager functions

The project manager has five basic functions. These include :

- **planning,**
- **organizing,**
- **motivating,**
- **directing,**
- **controlling.**

5.2.1. Planning

This RFID project manager function is primarily performed during the planning phase of the implementation. As previously discussed, it involves creating an outline for implementing the project. This includes the work breakdown structure and the Gantt chart.

5.2.2. Organizing

Organizing involves the identification and acquisition of project resources. It most specifically includes identifying and arranging for the personnel that will be involved in the system design, specification, installation, and startup processes. The organizing function also includes the development of the linear responsibility chart

5.2.3. Motivating

The project manager motivating function involves providing the environment necessary to obtain the desired performance from the project team members, Classical motivation theory includes work by Maslow and Herzberg.

Maslow's Theory

According to Maslow's theory, people are motivated by a tendency to fulfill unfulfilled needs according to a hierarchical list. At the bottom of the list are basic physiological needs. These are followed by safety and security. In the modern world, this is analogous to receiving adequate pay and benefits. Next is relatedness and belongingness with respect to coworkers. Fourth is the need for esteem. This include-self-esteem and esteem from others. Last is what is known as self-actualization. This means that the individual is primarily motivated by a need to fulfill themselves by maximizing their potential with respect to individual performance.

The way that this theory works is that individuals start at the lowest level. They progress to the next level in terms of need importance only when the current level has been satisfied. Upper levels beyond the current level hold no motivating value to the individual. For example, if an individual is mired in the safety and security level because his pay is inadequate, offering rewards that generate higher levels of self-esteem are not motivating. Similarly, if the individual is receiving adequate pay but cannot relate to his coworkers, offering the opportunity to reach his intellectual potential would not have a motivating effect.

What this theory means to the RFID project manager is that he will have to identify what level of the hierarchy each individual on the project team is on. By offering or arranging for rewards or opportunity at that level, the project manager can best motivate his team members.

Herzberg's Theory

Herzberg's theory involves classifying motivating factors into intrinsic and extrinsic motivators. Intrinsic motivators are more internal to the specific job. Examples of intrinsic motivators are

- **work deemed as important,**
- **sense of accomplishment,**
- **responsibility.**

- **recognition,**

Extrinsic motivators are external to the job itself. They are more related to the context in which the job is performed. These include:

- **pay,**
- **benefits,**
- **working conditions.**

The significance of this motivation theory is that the extrinsic factors relate to the level of job dissatisfaction, whereas the intrinsic factors relate to the level of job satisfaction. The absence of extrinsic factors produces a worker with high job dissatisfaction, but their presence only results in low job dissatisfaction. However, the presence of intrinsic factors results in a worker with high satisfaction. The absence of intrinsic rewards results in low job satisfaction. In order to have a highly motivated team member, it is necessary to have the presence of both extrinsic and intrinsic factors. However, even if strong intrinsic factors are present, you can still have a highly dissatisfied team member. With this theory, the RFID project manager must make an effort to insure the presence of both extrinsic and intrinsic factors in order to obtain maximum satisfaction and, hopefully, performance from his team members.

5.2.4. *Directing*

The directing function involves proving leadership to the RFID project implementation team. Leadership is frequently defined as an individual's ability to influence the behavior of others to achieve a specific objective. Directing is a particularly important project manager function because the RFID project manager will not necessarily have de jure authority over the RFID project team members. Many texts have been written on both general leadership and leadership associated with high-technology projects.

Situational Leadership Theory

Situational leadership theory is founded on the concept that the project manager's leadership style should be based on the personnel situation surrounding the project. More specifically, the project personnel are evaluated with respect to ability and willingness.

With the first parameter, the personnel are categorized as being either able or unable. Able personnel have both the necessary intelligence and training to perform their responsibilities. Unable personnel are either missing the necessary intelligence training or perhaps both. With an RFID project, we would have to assume that all the engineers on the project have sufficient native intelligence to contribute to the project However, as the RFID technology may be new to the engineers, they might not have had the necessary training.

Similarly with the second parameter, the personnel are categorized as being either willing or unwilling. Willing personnel are motivated to perform their responsibilities. Unwilling personnel are obviously not interested in completing their job duties. Obviously, the RFID project manager would prefer to have mostly willing project team members. However, part of the inherent project management process is possible assignment of not necessarily willing team members. In some cases, the team members may have been taken from projects in which they had more interest. In other cases, the team members may not be familiar with RFID technology and therefore less interested in an RFID implementation.

The two personnel parameters result in a total of four different possible combinations of project personnel. These are:

- **able and willing,**
- **able but unwilling,**
- **unable but willing,**
- **unable and unwilling.**

Most project managers would naturally hope to obtain the able and willing team members. This would present the easiest but most unlikely of any of the four situations. In the able but unwilling personnel, the duty of the project manager is to find ways to motivate the project team members. In the unable but willing personnel situation, the project manager must seek ways of bringing the team members up to the necessary technical standards. If the team members have the intellectual and physical capacity, then just the necessary training is required. However, it is possible that team members simply do not have the ability to perform the job no matter bow motivated that they are. In the unfortunate unable and unwilling personnel situation, the project manager is in serious trouble. In this case, there is a significant possibility of project failure.

Depending on the individual combination of parameters, the most successful project manager will adapt his leadership style.

- **able and willing; use delegating style,**
- **able but unwilling; use participating style,**
- **unable but willing; use selling style,**
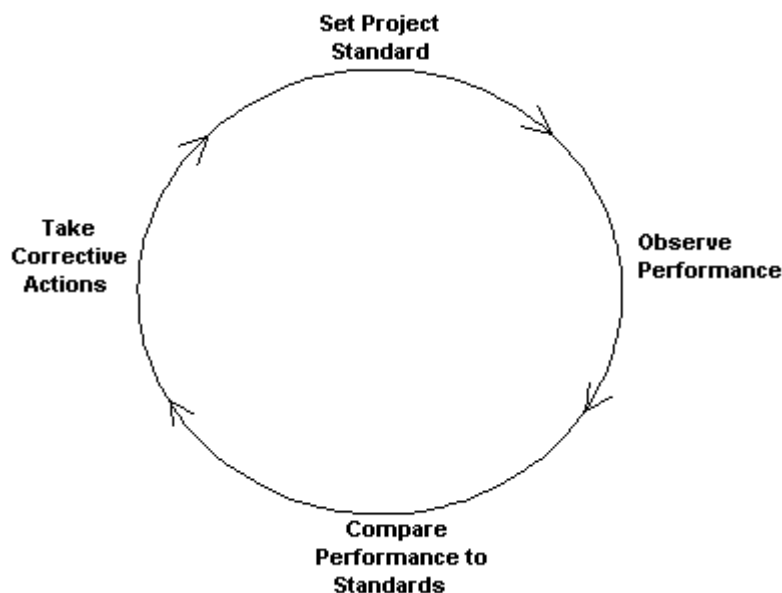- **unable and unwilling; use telling style.**

Fig.2 - RFID project control cycle

With the delegating style, the team members are able and willing. This means that the RFID project manager can take more of a coaching and assisting role with the project. With the participating style, the team members are able but unwilling. For this situation, the RFID project manager must encourage the sharing of ideas and authority. This will create an

atmosphere of ownership, which will help the team members buy into the project. The selling style is used when the team members are unable but willing. In this case, the RFID project manager must explain in more detail what must be done, since the team members do not have the necessary knowledge in order to perform their responsibilities. Lastly, with the telling style, the team members will be unable and unwilling. As with the selling style, with the telling style, the RFID project manager must explicitly direct the team members to do specific tasks. Since the workers are also unwilling, the RFID project manager must also expend significant effort in following up with respect to project progress and completion.

5.2.5. *Controlling*

The control function is essential to the successful completion of the project. This function involves the establishment of specific performance standards, the observation of performance, comparing the observed performance to performance standards, and taking corrective action. This process is then repeated as necessary for each significant work package. The control function is most often illustrated as a control cycle as shown in Figure 2.

6. RFID PROJECT TASKS THAT SHOULD NOT BE COMPRESSED

An RFID implementation project task should never be compressed or crashed when there is a significant possibility that it or a related task would compromise the technical performance of the project. Typical RFID project tasks that should not be compressed are :
- **hardware and software selection,**
- **pilot testing.**

6.1. Hardware and Software Selection

The RFID project manager should avoid compressing the hardware and software selection process. This is primarily due to the fact that the success or failure of the project may ride on correct decisions with respect to the specifications and suitability of the hardware and software. Making bad decisions at this point could easily result a problems that are not identifiable until much further into the project. At that point, it may be impossible to take corrective action and still successfully complete the project with respect to time, cost, and technical performance. A typical example would be deciding to acquire a system that is not capable of functioning properly with a specific type of product due to radio frequency transmission issues. By the time this is realized in a pilot implementation, the project manager has already configured the pilot system. Thus, a bad decision made during the hardware and software selection process could easily send the project back to the beginning.

6.2. Avoid Compressing Pilot Testing

The RFID project manager may decide that it would be beneficial to conduct a pilot tea implementation prior to wide operational deployment. If this is the case, the RFID project manager should attempt to avoid compressing or crashing the pilot implementation. The original purpose of the pilot implementation is likely to learn from equipment acquisition,

installation, and startup mistakes prior to full implementation. If sufficient time is not allowed to permit this process to be performed, the full-scale implementation may be put in danger. This would essentially be the same as not having a pilot implementation to begin with. There are probably few cases in recorded history where a full-scale implementation was more rapidly and effectively debugged than a smaller pilot implementation.

7. CONCLUSION

For organizations, the choice of implementing RFID technology may begin with the selection of a specific pilot project to gain experience with the technology. A comprehensive project management plan must be developed. An RFID project plan will enable the project manager to properly manage the project with respect to time, cost and technical performance. The three project parameters are frequently depicted as a triangle, with each parameter being represented by one side. The significance of modeling the project as a triangle is that any two of the three legs or parameters can seriously impact the outcome of the third. Many projects such as RFID implementation projects follow a general project life cycle with four phases : conceptual, planning, installation, and startup phases. In the conceptual phase, the organization is determining the basic objectives of the implementation project. In the planning phase, the project manager is creating an outline for implementing the project. In the installation phase, the organization begins by identifying and acquiring all of the hardware and software necessary to implement the RFID project. In the startup phase, the organization is going through the process of testing and debugging the installed hardware and software. At this point, the project manager completely turns the project over to operational personnel.

The concept of the project manager cannot be discounted. As the primary individual responsible for the project, the project manager is largely responsible for the success or failure of the RFID implementation project.

With respect to project management, there are two different types of authority. The first type is de jure authority and the second type of authority is de facto authority. The project manager has five basic functions. Planning is primarily performed during the planning phase of the implementation. Organizing involves the identification and acquisition of project resources. The project manager motivating function involves providing the environment necessary to obtain the desired performance from the project team members. The directing function involves proving leadership to the RFID project implementation team. The control function is essential to the successful completion of the project. This function involves the establishment of specific performance standards, the observation of performance, comparing the observed performance to performance standards, and taking corrective action. The control function is most often illustrated as a control cycle.

The RFID project manager may decide that it would be beneficial to conduct a pilot test implementation prior to wide operational deployment. There are probably few cases in recorded history where a full-scale implementation was more rapidly and effectively debugged than a smaller pilot implementation.

LITERATURE

[1] Erick C. Jones, Ch. A. Chung, RFID in Logistics: A Practical Introduction, ISBN 978-0849385261, 2007

[2] Judith M. Myerson, RFID in the Supply Chain: A Guide to Selection and Implementation, ISBN 978-08493301086, 2007

[3] V. D. Hunt, A. Puglia, M. Puglia, RFID: A Guide to Radio Frequency Identification, ISBN 970470107645 2007

Recenzenti: Prof. Ing. Tatiana Čorejová, PhD.
Žilinská univerzita v Žiline, Fakulta PEDAS, Katedra spojov
prof. Ing. Václav Cempírek, Ph.D.
Univerzita Pardubice, DFJP, Katedra technologie a řízení dopravy