Information Systems Implementations : Models to Determine what Constitutes Success and Failure

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FACULTE DES SCIENCES ECONOMIQUES ET SOCIALES
HAUTES ETUDES COMMERCIALES

INFORMATION SYSTEMS IMPLEMENTATIONS : MODELS TO DETERMINE WHAT CONSTITUTES SUCCESS AND FAILURE

MISE EN ŒUVRE DES SYSTEMES D’INFORMATION : MODELES POUR DETERMINER CE QUI CONSTITUE SUCCES OU ECHECS

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ABSTRACT

This paper proposes Information System (IS) Implementation success criteria according to stakeholder viewpoints using Enterprise Applications Implementations as an example. Besides models for each type of stakeholder, a bi-polar model for gauging overall success of the project is proposed. A body of research exists which identifies Critical Success Factors and lately the relationship between these factors. In this paper we examine from a different angle the measures and determination of project success.

Keywords: IS Implementations, Enterprise Applications, Success Criteria, Stakeholder.

RÉSUMÉ

Ce papier présente les critères de succès de mise en œuvre de systèmes d’information selon le point de vue des différentes parties prenantes en utilisant comme exemple les E.A.I (Enterprise Applications Implementations). En dehors des modèles pour chacune des parties prenantes, il est proposé un modèle bipolaire pour jauger le succès d’ensemble d’un projet. Si un corps de recherche existe pour identifier les facteurs critiques de succès et plus récemment les relations entre ces facteurs, les mesures et les facteurs déterminants le succès d’un projet sont examinés ici sous un angle différent.

Mots-clés : Mise en œuvre de systèmes d’information, E.A.I., Critères de succès, Parties prenantes.
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Introduction

Evaluating success is not an easy exercise. Success is temporal and not an absolute and can differ according to the beholder. A consensus is likely for what we term unqualified success or failure but most results lie between the two opposites.

For large scale Information System (I.S.) Implementations significant academic research has concentrated on the identification of Critical Success Factors and more recently the relationship between these factors. One objective of this research is to respond to a failure / challenged percentage of projects which remains high. Shaw (2003) suggests that certain questions are unanswered: ‘why do some implementations “fail”, even though most of the critical success factors were controlled?. Similarly, why are some implementations considered “successful” by some people while considered “failures” by others?’

In this paper we address for I.S. Implementations, using as an example Enterprise Applications implementations (ERP [Enterprise resource Planning] and associated CRM [Customer Relationship Management] and SCM [Supply Chain Management] applications) a definition of success and a proposal of how it can be measured. This is based on different stakeholder viewpoints expressed as individual models. Seddon et al. (1999) argue that it is not meaningful to talk of benefits of IT (Information Technology) systems without identifying the stakeholder group in whose interest benefits are judged and explain that ’very different measures of value are needed for different stakeholders’.

A further model is developed, unifying perceptions and results in a sliding scale with two extremes (Unqualified success, Unqualified failure), a suggested mid-point of Qualified success, and gradients between.

Based on ten years experience of ERP project implementation management in multinational companies in the pharmaceutical and medical device industry, we propose success criteria according to different stakeholder groups. These are likely to find an echo in other vertical industry sectors just as they find an echo in Critical Success Factors and their interrelationships already researched. But we propose that each implementation be viewed on its own merits and according to the initial project Software Requirements Specifications. The success criteria for the models therefore need to be changed or complemented for each project situation.

1. Defining success and failure.

Success, definition.

Dictionary definitions of success include the following:

1. something that ensues
2. a group which proceeds in temporal sequence
3. the degree or measure of attaining a desired end
4. the accomplishment of an aim or purpose
5. favourable termination of a venture
6. the attainment of wealth, position, esteem, favour or eminence
7. a person achieving a success
The origin is mid 16th century and is from the Latin ‘successus’ and ‘succeedere’ (to come close after)
Associated words can be:
   Good/happy result/outcome, good fortune, triumph, attainment, ascendancy, prosperity.

Failure, definition.

Dictionary definitions of failure include the following:
1. lack of success
2. the omission of expected or required action
3. the action or state of not functioning
The origin is mid 17th century and is from Latin ‘fallere’ (to deceive)
Associated words can be:
   Breakdown, ruin, slump, fall, collapse, death.

I. S. Success Review.

(Success and Failure in the context of I.S implementations and the subset Enterprise Applications implementations)

The dictionary definitions which appear to have the most relevance in the context of I.S.implementations are:
- the degree or measure of attaining a desired end
- the accomplishment of an aim or purpose
- favourable termination of a venture
(Failure being the reverse).

Examples of success definitions for ERP (Enterprise Resource Planning), an important subset of IS implementations, take us further. Marcus and Tanis (2000) consider that optimal success refers “to the best outcomes the organization could possibly achieve with enterprise systems, given its business situation, measured against a portfolio of project, early operational, and longer term business results metrics”.

Esteves et al (2003) suggest that this construct is operationalised as “finishing on time, on budget, obtaining the expected functionality, the system is being used by its intended users, and implemented in the correct way taking into account the organizational and cultural values of the organization”. In an annotated bibliography concerning ERP systems research (Esteves et al. 2001) several authors are cited who identified or developed on critical success factors. Included in current unpublished PhD thesis work, Esteves identifies 23 CSFs:
Critical Success Factors

- Sustained management support
- Effective organizational change management
- Good project scope management
- Adequate project team composition
- Comprehensive business process reengineering
- Adequate project sponsor role
- Adequate project manager role
- User involvement and participation
- Trust between partners
- Dedicated staff and consultants
- Strong communication inwards and outwards
- Formalized project plan/schedule
- Adequate training program
- Preventive trouble shooting
- Appropriate usage of consultants
- Empowered decision-makers
- Adequate ERP implementation strategy
- Avoid customization
- Adequate ERP version
- Adequate infrastructure and interfaces
- Adequate legacy systems knowledge
- Formalized testing plan
- Adequate data migration process

**table 1**: Critical Success Factors, ERP Implementations

Echoes of certain of these factors can be found in the findings of the Standish Group (1995 and later updates) for their CHAOS report, which uses the criterion for judging I.S. Implementations as the fulfilling of three requirements: **On Time, On Budget, With the required functionality**. (JOHNSON, 2001). But this poses a problem. Firstly applying these criteria makes for poor statistics: two thirds of I.S. projects would fall into the challenged or failed category. Is this too bad to be true? Secondly, to be meaningful, the initial time and cost budgeting and needs requirement has to be realistic and complete (with no scope creep). This in turn can be jeopardized by the lag time between budget setting requirements stipulated and project Live date. It may be fairer to see the meeting of these criteria as only an indicator and not as a means of classification between Succeed, Challenged and Fail.

Hyde (2000) questions the category of failed projects, and defines success based “more on the value of the end result for the business, such as competitive advantage, increased knowledge, changed culture, and happier staff than purely on the hard financial performance of the project”.

Another factor which may explain why, despite much research, success is difficult to determine can be resumed by Willcocks (2002) and the net effect of five paradoxes:

- the difficulty to see a correlation between I.T. spend and productivity (this refers to the Solow Paradox. Solow, a Nobel Laureate in Economics, stated that “You
can see the computer age everywhere these days, except in the productivity statistics”).
- risk assessment associated with I.T. introduction is rare
- the tendency for I.T. spend is not to do a detailed evaluation
- over the last decade I.T. evaluation has rarely improved
- if anything evaluation becomes worse as spend increases 1998-2001
(McLean et al., 2002)

Skewing in favour of ‘Success’ instead of admitting to qualified success or even failure.

Should success be seen as an absolute anyway, if it depends on the viewpoint of different stakeholders and if measures of success are not clear at the outset of a project?

Management can tend to skew results in favour of a fictive success by various legal and aboveboard means, the most obvious is to not to count in the first place:

Example:

<table>
<thead>
<tr>
<th>Vague or incomplete Needs Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrealistic and unrevised initial budget considerations</td>
</tr>
<tr>
<td>No Cost Centre or Cost Center roll-up to capture a complete picture of project costs</td>
</tr>
<tr>
<td>Compensation between cost centers and / or line account items</td>
</tr>
<tr>
<td>No tracability from one accounting period to the next</td>
</tr>
<tr>
<td>No Return On Investment (ROI) calculations attempted</td>
</tr>
<tr>
<td>Scope creep uncontrolled and not reflected in budget revisions</td>
</tr>
<tr>
<td>Combination of the above.</td>
</tr>
</tbody>
</table>

For projects that last several months or years, that cost several million or tens of millions of dollars or dollar equivalent, there is no real incentive for upper management to be accountable and brought to account when eventual costs escalate.
In order to be able to assess the degree of success at a later date, it is necessary to:

<table>
<thead>
<tr>
<th>Have a complete set of Needs Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a realistic budget in the first place and allow for revisions to take into account controlled changes in scope</td>
</tr>
<tr>
<td>Reflect budget and actual costs in the Management Accounting and comment deviations</td>
</tr>
<tr>
<td>Have transparency in the accounts and a means of tracing across accounting periods</td>
</tr>
<tr>
<td>Perform ROI calculations at least as an indicator, recognizing that payback may be in the form also of qualitative criteria being met</td>
</tr>
<tr>
<td>Control changes in scope and reflect in budget revisions where there is an impact</td>
</tr>
</tbody>
</table>

And as Staehr et al. (2002) point out for ERP implementations, “surprisingly few organizations know whether they have made a positive return on their investment due to their failure to build a business case prior to ERP implementation”.

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2. Assessing success according to stakeholder viewpoint

In order to assess the level of success achieved it is necessary to have a perspective from the viewpoint of different stakeholders.

Fraser and Zarkada (2003) remark that “stakeholder theory posits that sustainable success rests, to a great extent, with a systematic consideration of the needs and goals of all key stakeholders”. Phillips et al (2003) state that managing for stakeholders involves attention to more than simply maximizing shareholder wealth and classify normative and derivative stakeholders, normative stakeholders including for example financiers, employees, customers, suppliers, local communities. Seddon et al. (1999) classify stakeholders as an independent observer, an individual user, a group of users, the management / owners and a country or mankind.

For Valerdi and Majchrzak (2003) stakeholders of Information System related projects include direct users, developers, vendors, tangential users, beneficiaries. In the same context, Singletary et al. (2003) identify stakeholders as managers, information technology professionals, end users. Metcalfe and Jenkins (2002) define a stakeholder as anyone without whose input a particular project would be unable to function. They also include in the definition those who have no formal role in a particular project but are still affected (positively or negatively) by its functioning.

Ideally stakeholder analysis (identification of stakeholders, weighted by importance and influence) will have occurred in earlier project stages and stakeholder needs / requirements taken into account. The stress is on the word ‘ideally’. We suggest that often for Enterprise Applications implementations, certain stakeholders are disinterested or unaware of the implications until later project stages. (This is echoed among the general public: few men or women in the street will be able to explain what ERP (Enterprise Resource Planning) is or will recognize main vendors such as SAP. In this paper we suggest that at least the degrees of success and failure post project should be seen in the light of stakeholder perspective.

The following models can be adapted according to each project and serve as examples. Once the stakeholder model is created, a weighting can be applied first to the model, then to individual criteria within the model.
For the purpose of our analysis we use the following stakeholder categories:

Model 1 – Upper Management focus  
Model 2 – Customer and Business focus  
Model 3 – Key User, User and I.T. staff focus  
Model 4 – Middle Management and End User focus  
Model 5 – Viewpoint of Employees who are not system Users  
Model 6 – Viewpoint Consultants, Solution editors, etc.  
Model 7 – Viewpoint partners such as State, Bank, Competitors, Suppliers, Shareholders

Upper Management focus

![Model 1: Upper Management focus](image)

1. On time, on budget, with functionalities required.
2. Platform (point in time) examples: avoiding unsupported version, several solutions in tandem, cost of upgrading in-house systems; achieving compatibility with web technology…
3. Specific criteria (point in time) examples: accommodating Y2K, Euro, Head Office requirement …
4. Leveraging increased business volume without corresponding linear increase in overheads

*figure 1: Upper Management focus model*

In figure 1 we start in the centre with fairly classic criteria – the success of the project being evaluated in terms of on time, on budget, and with the user functionality requirements in place. If the specifications have been done completely and thoroughly, these requirements should be measurable. As the ripple effect (analogy of a stone thrown into a pond) spreads, we include I.T. platform considerations, less easy to measure, and which concern issues such as the cost of doing nothing and therefore having to maintain existing systems, or the extra costs associated with a platform incorporating different editor solutions in parallel (for example extra resulting data entry, integrity controls between sys-
tems, etc.). There may also be goals such as to get on a platform which better accommodates web technology and the internet as an additional sales channel. The circle further still from the centre includes objectives which are important but unlikely to be measurable until some time after the Go Live. For a company expanding and profitable this may include the leverage effect of accommodating increasing business without a corresponding increase in overheads. For a company that is challenged the accent may be on reducing costs radically in order to survive.

What we term Overiders need to be identified: the success criterion which demands to be met for an overriding reason at a point in time. In other words, whatever the composite picture of success factors, this factor is paramount. (There can be more than one overider).

Overider examples may be or have been:
- current systems do not pass Y2K
- current systems do not accommodate the €uro
- Head Office directive (for example to align affiliates on one platform)
- Editor no longer supports current system

**Customer and business focus**

![Model 2: Customer and Business focus](image)

1. Service level to remain the same. Customer is not to be inconvenienced. If noticed at all, the change in system should only show advantages,
2. Specific improvements asked for in place,
3. Gains for customer (asked for and/or not asked for) noticed and reflected in higher Customer satisfaction index.
4. The ‘wow’ factor

*figure 2: Customer and business focus model*
The customer focus is likely to be: are they receiving the goods, services on time to the quality specified and at the negotiated price? The change in system is not to have repercussions other than positive. This actually can pose a problem as the tendency is that after Go Live there can be a drop in functionality momentarily while the system is stabilized and then a return and surpassing of what the prior system could achieve. This drop on Go Live needs to be managed by communicating well with Customers and managing expectations. Even otherwise successful Go Lives can experience several days of minor crises, for example the system suggesting that there are out of stock items or negative stock when there is the stock. A difficult scenario is when there is little control over stock, backorders are difficult to manage and customers have to be asked if they have been delivered, invoiced, etc. because there is a lack of confidence in the data generated by the new system.

Certain larger customers may have been involved in the implementation and have greater expectations, even to the extent of a seamless integration or interface with their own systems.

Ideally the new system should allow continuous improvement / transformation that produces a ‘wow’ factor in the customer relationship (perhaps due to CRM Customer Relationship Management modules or interfaced applications) which distinguishes performance in a big way.

**Key user, user and I.T. staff focus**

![Model 3: Key User, User and I.T. staff focus](image)

1. Project teamwork a success; good working atmosphere
2. Functionalities in place to better respond to business needs; empowerment.
3. Their contribution valued and remunerated; their job market value enhanced
4. Pride in a successful implementation

*figure 3: Key user, user, and I.T. staff focus model*
The focus for key users, users and I.T. staff is linked to the focus of their management but in this model the criteria are perhaps more qualitative than quantitative. Their perception of overall success is likely to be a by-product of good teamwork, leadership, and pride in a job well done. They share in the business success and business survival. They will want to see their jobs becoming more interesting and meaningful, and this to be reflected in their packages, in their value in the job marketplace, in their acknowledged expertise (enhanced by internal and external training).

If they have been part of the project team and return to operational functions, then the excitement when they were in project mode must be maintained by personal development. Experience shows that usually ex project members are promoted or fulfill a new role, rarely do they reintegrate the day-to-day operations in their former role.

Middle management and end user focus

The models are not necessarily distinct. The perspective of middle management and end users is linked to other models and stakeholder interests. The focus here is probably on the system enabling them to be more performant at their jobs. It is having the information
they need to know, pertinent accurate and on time. Response time and user friendliness of the new system are likely to be criteria. Their perception of success will also be influenced by the training and preparation they have received, the smoothness of Go-Live and the period afterwards while the new system stabilizes. The fact that customers are better served by the new system will make their life easier especially if they have direct contact with customers.

Again, Maslow’s hierarchy of needs is central; as employees they will also want to be personally successful and perceive that they are fulfilling their potential. If top management focus is short term, cost-cutting, headcount cutting and success equals fewer headcount then there could be a conflict between models.

Hess and Hightower (2002) point out that the End-User Computing Satisfaction (EUCS) model (Doll and Torkzadeh, 1988; Doll et al. 1994) and its focus on five physical system attributes (content, format, accuracy, ease of use and timeliness) give a partial answer to gauging end user satisfaction. They add that ERP being a system often forced on the users, the fact that it is involuntary can also have incidence on attitude to the system. Another model that Hess and Hightower allude to is the Equity-Implementation (E-I) model (Joshi 1991) which suggests that users look also at the distributive fairness of the new system at three levels

1. their inputs (effort required, time required)/outcomes; new system compared to old system
2. their versus organization net change inputs / outcomes and
3. their versus co-workers net change inputs / outcomes. In other words, are there benefits and are they equally shared?
Viewpoint employees who are not system users

Model 5: Employees who are not system users

1. Ripple effect of project success
2. Increase in morale if company has achieved transformation/continued improvement

figure 5: Employees who are not system users viewpoint

Whereas for prior models we use the word ‘focus’, we now use the word ‘viewpoint’. This is to make a distinction between stakeholders who have a vested interest in the level of success achieved and those who are interested, one step removed.

Those employees who have not been involved in the project team, or later as users of the system will still have formed an opinion as to success. Certainly unqualified success or unqualified failure, the two extremes, will have a ripple effect.
Although perhaps less essential, the perception of success by consultants who have helped integrate the new system or the solution editors can be helpful long after the project is live. Often a close relation is forged which means the client participates in user groups (vertical by industry or regional), helps the editor by contributing to advertisement features or by receiving the editors’ prospect clients. In return the editor will listen and adapt their future product versions, negotiate advantageous rates, make sure the favoured consultants are available, etc. Since it is likely that periodically there will be new versions to install (projects in themselves) this maintained relationship can be vital.
Again, the level of interest is one step removed. However the ability of these stakeholders
to sanction failure (shareholders) or to take advantage of failure (competitors) can be of
significant impact.

As each project is singular and unique the model criteria can be adapted – in this paper
we have simply illustrated some generic success criteria. Also a weighting can be done,
for example using a Likert scale, giving an assessment 0 to 5 (0 being of low significance
to 5 being of high significance for each criterion and then a multiplier by a factor also
from 0 to 5 for the model. For example the perception of the Customer and Business may
be of more importance than the perception of the Partners or Employees who are not
system users, etc.)
3. **Assessing overall success of the project**

The models based on stakeholder viewpoint contribute to the overall assessment. Unqualified success implies that the consensus of all stakeholders is that the implementation, Go-Live and Post-live (including evaluation one year after) were a success.

Our model for assessment is in complement to the model developed by DeLone and McLean (1992) which identifies six categories:

- system quality
- information quality
- use
- user satisfaction
- individual impact
- organizational impact

and the temporal and causal interdependencies between those categories.

To get an overall evaluation of success we use a bi-polar model with the two extremes being unqualified success (which includes each individual stakeholder model perceiving success) and unqualified failure.

Again the rating (in this case the gradients) can be adapted for each project.

![Bi-polar Model to assess overall success](image)

*figure 8: Bi-polar Model to assess overall success*
It can be noted that actual experience for several projects is likely to show a bell curve, with the majority experiencing mid point qualified success and fewer instances of unmitigated success or failure. Some implementations slide toward failure, for example if individually manageable situations combine at a moment in time to become cumulatively unmanageable. Contingency planning can help to move back along the gradients towards success. Loss of confidence (for real and/or imaginary reasons) can also compound to result in a slide toward failure.

Research exists as to benefits that ERP implementations should bring and which could constitute grades on our bi-polar model. For example, Shang and Seddon (2000) propose a framework of five dimensions (twenty-one sub-dimensions) of benefits (Operational, Managerial, Strategic, I.T. Infrastructure, Organizational).

4. Revisiting the measurement of success

While a first measure of success criteria can be made post Live, it makes sense to revisit the measure of success one year, two years, three years later. The Go-Live is the end of the implementation as an implementation project and the project team may disband to concentrate on the day-to-day operations. However the real benefits or payback start to occur after Live, not so much in the short term when performances may in fact be more of an issue than with the prior system, but in the longer term. In the lifecycle for the ERP implementation process proposed by Markus and Tanis (2000) this would be evaluation in the onward and upward phase i.e. after the system is live and stable and operating under normal conditions up to when the system is upgraded or replaced.

The gradients in our bi-polar model which need some time to have elapsed before meaningful measuring may include:

Targets or anticipated benefits in the following areas
- Increased sales and improved planning
- Reduction in lead times to deliver
- Improved Supply Chain management
- Reduction in logistics and transport costs in relation to sales
- Rapidity in reporting of accounts
- Lower cost of maintenance in relation to sales
- Improved customer relation management
- Reduction in supply costs in ratio to sales
- Improved productivity
- Reduction in ratio I.T. costs to sales
- Improvements in profitability
- Improved treasury management
- Reduction in ratio headcount to sales
- Reduction in inventory levels to sales
(adapted / translated from a list by J-L Tomas 2002)
It is important to note ‘in ratio to sales’ since the reductions may not be in absolute terms but a leverage effect of increases in business without a corresponding linear relation to overheads/costs. In an organization without growth or in decline the reduction may need to be absolute in order for the organization to survive.

Conclusion

A literature review shows that I.S. implementation research to date has concentrated on Critical Success Factors identification and lately on the relationship between factors. In this paper we explore ways of measuring success, firstly according to the perception of different groups of stakeholders and then by a bi-polar analysis using gradients toward unqualified success or unqualified failure. This allows an organization to pinpoint according to criteria they have pre-established where they fall between success and failure. In turn this helps to identify areas for transformation / continued improvement. Underpinning this exercise it is necessary to set targets / expectations upfront (but not be locked in to achievement if reasons are valid for a deviation actual to budget; for example, if the deviation is a logical result of a controlled scope change mid project). The metrics we illustrate may be common to different organization experiences; but as each project is unique, metrics need to be adjusted so that they are meaningful. We introduce the notion of ‘overiders’ i.e. criteria (often relating to a point in time) which if not respected are showstopper.

The setting up of metrics beforehand, and then a measuring at the right time (some measurements being appropriate a year or more after Live) helps to prevent the project ‘stopping’ or inertia at Go Live when in fact that is the very moment when the project (in terms of making sure benefits are derived) is supposed to start.

For the models we present to have relevance, to contribute to benchmarking and a plan of action to achieve further benefits, there are certain prerequisites:

- A willingness to evaluate.
- A complete and precise specification of needs with measurable expectations (for example using IEEE Std 830-1998 as a guide). This is vital since if what is to be achieved is unclear so will whether or not it has been achieved…
- A control over eventual scope change integrating impact into measurement process.
- An incorporation into the evaluation process of all stakeholders.
- Objectivity; the aim is to assess the degree of success and improve upon it rather than to name and shame where success is less evident.
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