



Novelty and Strength of a Software Reuse Investment Model: (A Review)

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Abstract- *Strength of a software reuse investment model is not only a single factor, it is integration of various supporting features. Mainly recycle model's strength is hidden in its motivation, industrially validation, scope, risk adjustment, and market attributes. There are some other more factors such as scenario, organization, hypothesis, instantiation, investment functions, investment cycles, cost factors, viewpoints, reward and punishment, automate tool, COTS incorporate that characterise soundness of a reuse economic model. So before suggesting a novel software reuse based applications(projects) development model, all these success factors should be keep in mind.*

Keywords—*Software reuse model, Reuse Investment, Reuse Model's features*

I. INTRODUCTION

To make a reuse program successful, it requires good design, better documentation [1] and best investment decision management. A sound reuse model should incorporate maximum investment model's attributes. A model is said to be novel in the field of software reuse based development applications if it has some more prominent characteristics other than previous models.

II. RELATED WORK

Rare authors have discussed strength of a software reuse program. Researcher [2] has mentioned some features of a reuse economic model. An another author [3] has also explained some more other characteristics of an reuse investment model. This research review the strength of an investment model in an reuse based applications development organization. by extending and filling the gap left by previous studies.

III. PROPOSED WORK

In this research, some software reuse model's characterization factors are discussed that support strength of an investment model.

A. Strength of Model

A model is sound if it rich of many attributes. An economic recycle model should. should characterize following features[2][3]

1. Scenario
2. Reuse Organizations
3. Scope
4. Hypothesis
5. Market Attributes
6. Instantiation
7. Investment Functions
8. Investment Cycles
9. Cost factors
10. Types of Analysis
11. Viewpoints
12. Risk adjustment

1) Scenario

Scenario is an outline of the plot of a dramatic work, giving particulars of the scenes, characters and is an imagined sequence of events, detailed plans or possibilities[4]. A postulated sequence or development of events or a setting, in particular for a work of art[5].

A good software economic model should consider scenarios that may arise in context of the organization related to build vs. buy, development, evolution, and regeneration.

2) Reuse Organizations

There are mainly five types of reuse organizations in software reuse environment[6] [7]

- Lone Producer

In this organization , two consumer teams handle reusable components ' design, development and maintenance.

- Nested Producer

In this scheme, a product team for reuse services and for expertise there may be hierarchy of reporting lines.

- Pool Producer

Here two or more teams collaborate to produce and share components.

- Team Producer

In this organization , the reuse team handles the organizational structure.

- Experience Factory

In this scheme , goals are set to improve quality so suitable process is chose , data is analysed, processes are executed for products construction, practices are evaluated and experiences are packaged for the future use by focusing formalized reuse consolidated and integrated activities for which cost of instating the reuse program, continuous accumulation of evaluated experiences are required [6].

3) *Scope*

Scope is range of one's perceptions, thoughts or action . It is breadth or opportunity to function and is the area covered by a given activity or subject [8] .

In software economic model, scope may be in the sense of time such as short-term or long-term investment, life of the reusable artefacts . It may be coverage in software reuse modelling by the model.

4) *Hypothesis*

Hypothesis is tentative explanation for an observation, phenomenon or scientific problem that can be tested by further investigation. Something it is taken to be true for the purpose of argument or investigation; an assumption. It may be the antecedent of a conditional statement. [9]. According [10] hypothesis is a statement that explains or makes generalizations about a set of facts or principles, usually forming a basis for possible experiments to confirm its viability. In software economic model hypothesis summarizes what the model assumes or neglects to take into account with its model.

5) *Market Attributes*

Determinant attributes in marketing are those aspects about products and services that determine why consumers buy products. All determinant attributes are measurable within an organization. Small-business owners then use these data to make business decisions and develop marketing strategies [11]. An investment model should characterize following market attributes:

- Support technical and operational skills
- Support corporate profitability
- Support higher level business and marketing objectives.
- Customer focused
- Valuable
- Shareable
- Simple
- Integrated
- Forward thinking
- Inspirable
- Connectable
- Purposeful
- Good Quality

6) *Instantiation*

The term instantiation is used to represent (an abstraction) by a concrete instance [12]. In software economics it is an important property of a model.

Above mentioned investment model's features from 6 to 12 are characterized as investment functions and are discussed below.

7) *Investment Cycles*

Reuse may be applied at all the following four level (cycles) of software development.

- Component Engineering
- Domain Engineering
- Application Engineering
- Corporate Engineering

8) *Cost factors*

Both producer and user have to pay for reuse , so development as well as operational costs are taken into consideration for all four reuse engineering cycles.

9) *Viewpoints*

Viewpoint is a place affording a view of something. It is an attitude of mind or the circumstances of an individual that conduce to such an attitude. Viewpoint is that standpoint of a model from where things are viewed [13] The viewpoints may be different for the different reuse cycles and for system or subsystem.

10) *Investment Analysis Functions*

Numerous economic functions have been suggested in literature[83] for investment decision but generally following of them are practised to calculate the economic worth of a reuse model.

- Net Present Value (NPV)
- Return on Book Value (ARBV) /Return on assets (ROA) / Average rate of return (ARR)
- Internal Rate of Return (IRR)
- Return on Investment (ROI)
- Profitability Index (PI)

11) *Risk adjustment*

Risk adjustment refines an investment's return by measuring how much risk is involved in producing that return, which is generally expressed as a number or rating. There are five principal risk measures: alpha, beta, r-squared, standard deviation and the sharp ratio[14]. Financial managers adjust expected returns on various investment projects for risk in order to make them comparable [15].

A good software economic model should consider risks and uncertainties in their investment analysis process. Decision tree analysis or risk-adjusted discount rates are considered for this purpose .

12) *Types of Analysis*

Here, analysis means that the economic model supports for investment decisions . Generally software reuse model perform only cost estimation but some models of this field also support cost- benefit analysis.

Other than above mentioned economic model's features , some other characteristics that support soundness of a reuse investment model are discussed in coming section.

13) *Assessment*

An investment model should encapsulate the previous existing economic models in literature.

14) *Comparison*

An investment model should generalize the previous existing models at all four- component engineering cycle, domain engineering cycle, application engineering cycle and corporate engineering cycles decision levels by incorporating the various factors of economic evaluation for reuse.

15) *Motivation*

Motive of a reuse based software investment model should be to build a framework that motivates management to invest in this program by extending and filling the gap left by previous models in this field.

16) *Use Real Data*

Efforts should be made to industrially validate the model by using the real data.

17) *All Values Discounted*

In a economic model all revenues should be considered as discounted values to maximize profit.

18) *Reward and Punishment*

Increment and decrement in salary should be as reward and punishment respectively for enhancement and compensation.

19) *Automate Tool*

A automate tool facilitate archival and analysis functions of the investment model ,so this tool should be implemented in a reuse model for enhancement.

20) *COTS Incorporate*

COTS should be incorporated into the model.

B. Novelty of Model

Following may be some prominent characteristics of a reuse model for its novelty.

- Unique Methods
- Cost-Effective
- Enhanced
- Simple

a) *Unique Methods*

An economic model is unique as compare to others due to following reasons:

1. Unique Cost Estimation Method
2. Unique Benefits Estimation Method

1) *Unique Cost Estimation Method*

Cost estimation scheme may be unique as compare to others due to following reasons:

- a. Different cost estimation method consideration
- b. Enhanced cost effecting factors consideration

- 2) Unique Benefits Estimation Method
 - a. Different benefits estimation method consideration
 - b. Enhanced benefits effecting factors consideration
- b) Enhanced

A reuse model is considered enhanced if it possess some more good features than previously existing models in literature.
- c) Cost-Effective

An economic model is novel if it is more cost-effective as compare to others in this field.
- d) Simple

A reuse model is simple if it exhibit some easy attribute than previously existing models in this area. Simple means to avoid complexity but sake of completeness, some necessary and sufficient features are taken into consideration.

IV. CONCLUSION

Good modelling in software reuse investment is THE KEY to success and to achieve maximum benefits. A model should fulfil this fact up to a maximum extent to promote software reuse in applications developments and can be extended up to the excellence in this field if possess maximum above mentioned features .

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