

Existing perceptions of Information value

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Lecture # 32

Existing perceptions of Information value

OVERVIEW

- The Value of Information
- Existing Information System Types
- Value factor in Traditional *IS*: Its Absence
- Value factor in Quality *IS*
- Value factor in Quality *IS* – Issues
- Value factor in SEU Theory
- Summary
- What is needed then?
- Exercises

THE VALUE OF INFORMATION-1

- Given the reality that systems (businesses) are required to perform in environments, which are ever changing and growing in complexity, **it is recognized that information and Information Integrity are increasingly becoming more and more important.**
- This brought in the need to study certainty, risk, uncertainty, information value and value of I^*I .

THE VALUE OF INFORMATION-2

- As a step by step approach to this study, we first studied the existing perceptions of certainty, risk, and uncertainty within the framework of information economics (Ref.: Lecture #11).
- Next step in our analysis then is to study the question of information value in information systems.
 - Expectation is information will deliver improved system performance.

THE VALUE OF INFORMATION-3

- Specifically, this calls for study of *IS* models that deal with determinants of the economic value of information.
- Such models, in turn, derive from theories of decision making (collective and individual), because information is used to make (better) decisions.
- Within this framework, in this lecture we study the existing perceptions of information value.

EXISTING INFORMATION SYSTEM TYPES –1

- Information flows through information flow lines, which are genotypes - a matrix, a structure, a mechanism, a rule - considered over long periods of time (Lecture # 5).
- Information flow lines exist in genetic, social, and exosomatic domains and give rise to information flow systems – information systems – in and across these domains.
- Information system (*IS*) is an orderly machine for actionable information, which is for *use* (Lecture # 4).

EXISTING INFORMATION SYSTEM TYPES-2

- Organizations develop a variety of systems, including information systems, to provide for their survival in an increasingly complex environment.
- This makes organizations complex in their structures.
- The degree of complexity that an organization can sustain and control depends on the cost and availability of effective and economic information systems.

EXISTING INFORMATION SYSTEM TYPES - 3

- There are two paradigms in the field of information systems:
 - Technical: It assumes that people behave rationally and focuses on creating systems with the best technical capabilities.
 - Behavioral: Here the main emphasis is on political, organizational, and human elements that impact information systems.
 - This paradigm argues that what seems rational and technically correct may not work in an organization due to the existing barriers created by human and behavioral elements within the organization. For example, if a user deems the system threatening, he or she may enter the wrong data or complain about the non-existent inadequacies of the system.

EXISTING INFORMATION SYSTEM TYPES - 4

- Accordingly, there are two types of information systems:
 - **Traditional IS:** Information system based on technical paradigm decides the way needs should be met and the problems should be solved. With the advent of computers, use of these information systems – termed as “applications” - by organizations reached its heights. We shall call these “traditional” information systems.

EXISTING INFORMATION SYSTEM TYPES - 5

- **Quality IS:** Quality information systems create a synthesis between the behavioral (human) and technical aspects of information systems, while enhancing both in many directions. The quality information system framework does not replace what is already developed and working in the field of traditional information systems. Rather, it takes the existing successes of traditional information systems and adds to them TQM framework to combine behavioral and technical aspect.

VALUE FACTOR IN TRADITIONAL *IS*: IT'S ABSENCE-1

- Designed within the technical framework, Traditional *IS* assumes static environment and is concerned with processing structured and periodic (i.e., fixed) information only.
- Focus of error discovery is on observed failure.

VALUE FACTOR IN TRADITIONAL *IS*: IT'S ABSENCE-2

- And, approach is to develop *IS*, which has **good enough reliability** (Approach factor).
- As a result, in Traditional *IS* little attention is paid to the type of information systems needed for managing quality.

VALUE FACTOR IN TRADITIONAL *IS* : IT'S ABSENCE-3

- In other words, *IS* is ad hoc and no effort is made to process information 'smarter' so as to add value.
- For competitive advantage, recourse is taken to cost reduction only by seeking to improve productivity and economy of "fixed" information processing.

VALUE FACTOR IN QUALITY *IS* - 1

- The literature identifies major ingredients of quality by dividing them into facts and perception.
- The factual aspects of quality are that the product or service should be the right thing, function the right way, function right the first time and be delivered on time.

VALUE FACTOR IN QUALITY *IS* - 2

- The quality perception is that the customer must believe that the product or service is the right one, satisfies his or her needs, meets his or her expectations, and is delivered with integrity, courtesy, and respect.
- Further, quality is also described by a number of dimensions, durability, performance, competitiveness, process capability, freedom from errors, and reliability being just some of them.

VALUE FACTOR IN QUALITY *IS* - 3

- Thus there is no unique definition of quality.
- Further, these dimensions (elements) vary in their importance as a commonly accepted dimension of quality. However, they form the foundation of the total quality management (TQM) approach.
- TQM as a framework is a collection of ideas, concepts, and tools, all designed to promote quality management throughout an organization in all its functions and aspects.

VALUE FACTOR IN QUALITY *IS* - 4

- The word *total* underlines the all-encompassing nature of quality, and the word *management* extends quality from its purely technical scope and generalizes it to include organizational and behavioral components.

VALUE FACTOR IN QUALITY *IS* - 5

- The concept of Quality *IS* has been created by applying quality ideas, concepts, and techniques to the field of information systems.
- (a) In Quality *IS*, quality is an integral goal of an organization with a quality commitment.
- Specifically, in quality systems, major participants in the subsequent phases take part in the design phase, and plan for their functions as the design progresses (Process factor for Design).

VALUE FACTOR IN QUALITY *IS* - 6

- This provides the basis for the design phase of Quality *IS*, which includes two additional aspects that are missing in the design of Traditional *IS*: **reliability** and **robustness** and requires that major participants in the subsequent *SDLC* model phases take part in the design phase, and plan for their functions as the design progresses.

VALUE FACTOR IN QUALITY *IS* - 7

- Goal is “Right for the First Time”(Process factor for Manufacturing).
- Once a system becomes operational, it is monitored by regular collection of data for early detection of service failures (Process factor for Service).
- Monitoring data becomes the basis for process improvement before any major problem arises in the system, hence improving the system on a continuous basis (Process factor for Service).

VALUE FACTOR IN QUALITY *IS* - 8

- (b) Within this framework, in dealing with the changing environment, many large and successful corporations take an approach to organizational and functional design that is called *reengineering* the corporation.

VALUE FACTOR IN QUALITY IS - 9

- It (reengineering) is defined as: *The fundamental rethinking and radical design of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed.*
- (c) In such undertaking, information systems play a critical role in implementing the innovative and creative approaches in business processes.

VALUE FACTOR IN QUALITY *IS* - 10

- At the corporate level, information systems play the role of broker, in that almost all creative ways of redesigning business processes require an innovative way of using information systems.
- At the functional level, the information-system function looks at its own processes and operations to find out the innovative ways of delivering services to its users.

VALUE FACTOR IN QUALITY *IS* - 11

- (d) Corporate level reengineering has a top-down policy implication – there is a general design of the business process at the top, and the information system is designed to fit within the business-process design.

VALUE FACTOR IN QUALITY *IS* - 12

- (e) On the other hand, function-level reengineering is bottom-up process in that the information-system function comes up with innovative methods of service delivery that would add **value** to the corporation, and has the potential to become an impetus for reengineering business processes.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 1

- In summary:
 - 1. To begin with there is underlying issue that there is no unique definition of quality (Lecture # 11).
 - Also whatever quality dimensions are identified in literature, they vary in their importance as a commonly accepted dimension of quality.
 - 2. Further quality has the objective to deal with changing environment (Lecture # 11).

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 2

- Accordingly, in Quality *IS*, quality is an integral goal of an organization with a quality commitment (Slide No. 77).
- For this purpose in quality systems, major participants in the subsequent phases take part in the design phase, and plan for their functions as the design progresses (Slide No. 77).

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 3

- This is the basis for Quality *IS*:
 - with attributes of **reliability and robustness**, and
 - requiring that major participants in the subsequent *SDLC* model phases take part in the design phase, and plan for their functions as the design progresses.
- However *IS* is an open system, and environmental considerations affect all stages of a system's life, and not the design stage *alone*.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 4

- In fact environmental considerations affect everyone who is connected with any of the stages and the with the total *IS*, either directly or indirectly.
- This suggests a need to go well beyond design phase, and consider environmental implications for each of the stages of system life and implementation cycle model.
 - Those affecting (the integrity of) the system include customer, the designer, and those responsible for testing, production and commissioning. Maintenance staff, and the operator, as well as direct user of the system also both affect and are affected by the level of integrity of the system. Also to be considered are the general public, who might suffer the effects of any system failure. In extreme cases, as seen in nuclear accidents, this group can potentially include the population of the entire world.

VALUE FACTOR IN QUALITY IS – 13: ISSUES 5

- As a result, what is really required to be recognized and acted upon is that in case of each stage (S_i) of the system development and implementation life cycle (*SDILC*) model of the *IS*, denoted by $\{S_j, j=[1, \dots, i, j, \dots, n]\}$, all major participants from the rest of *SDILC* model stages, i.e., $\{S_j, j=1, n; j \neq i\}$ take part in the implementation of stage (S_i) and continuously observe, plan, and review their respective functions as the *SDILC* progresses.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 6

- In other words, even during say Maintenance stage of the *SDILC* model, there is a need to experience say Design Integrity Risk (which is a component of Information Integrity (I*I) Risk) and continuously observe (obtain feedback), review, further plan, and correct (i.e., improve integrity of) relevant design stage decisions.
- This provides the basis to go beyond Quality *IS* and have Integrity *IS*. In Integrity *IS*, each *SDILC* stage includes two yet additional aspects that are missing in Quality *IS*: **accuracy** and **consistency** over and above **reliability** and **robustness**.

VALUE FACTOR IN QUALITY IS – 13: ISSUES 7

- Thus need is for continuous interaction among available complex information systems across the *SDILC* model stages to ensure information flow by the way of decisions that help adapting to the environment as it changes over time (environment, i.e., the real world is ever changing).

VALUE FACTOR IN QUALITY IS – 13: ISSUES 8

- 3. Once again, to deal with the changing environment, Quality *IS* is based on organizational and functional design that is called *reengineering* the corporation (Lecture # 11).
- Corporate level reengineering has a top-down policy implication – there is a general design of the business process at the top, and the information system is designed to fit within the business-process design.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 9

- On the other hand, function-level reengineering is bottom-up process in that the information-system function comes up with innovative methods of service delivery that would add **value** to the corporation, and has the potential to become an impetus for reengineering business processes.
- The top-down policy implication for the corporate level reengineering fitting the *IS* design in the business process design leads to a *closed system* view of the business process under static model of environment.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 10

- True, the function-level reengineering is bottom-up process in that the information-system function comes up with innovative methods of service delivery that would add **value** to the corporation.
- However, given that *IS* is made to fit into the pre-determined business process design, improvements delivered by the *IS* are in the manner of ensuring “exactness” of business process design decision.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 11

- And, in that case, the environmental changes addressed by the Quality *IS* are linear and of incremental nature, which can also be described as expected changes.
- Though this linear, incremental value addition is necessary, it is not sufficient to cope with implications of *unexpected* changes, which are the hall mark of business processes that are recognized to be open systems characterized by complex and ever changing system environments.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 12

- 4. Data monitoring function as adopted by Quality *IS* also emphasizes its *closed system* view.
- Specifically, once a system becomes operational, Quality *IS* monitors it by regular collection of data for early detection of service failures (Process factor for Service).

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 13

- That is monitoring data becomes the basis for process improvement before any major problem arises in the system, hence improving the system on a continuous basis (Process factor for Service) (Lecture # 11).
- However, as a result of fixed business process design decision, this data collection and monitoring is done in a pre-determined manner, thereby processing data and information, which are structured and periodic, i.e., fixed.

VALUE FACTOR IN QUALITY *IS* – 13: ISSUES 14

- This leaves Quality *IS* in the end analysis addressing environmental changes, which are predictable, i.e., structured and periodic, and, in the process, value added (by the Quality *IS*) inadequate to deliver competitive advantage in the wake of ever changing environment.

VALUE FACTOR IN SEU THEORY- 1

- SEU Theory attempts to quantify **value** of information in monetary terms. It defines the monetary value of perfect information as amount of money, which renders the decision process indifferent between using and not using information (Lecture # 10).

VALUE FACTOR IN SEU THEORY- 2

- Without going into the details of SEU Theory, we only state the abstraction from Lecture # 10 that SEU Theory equation of information value does not account for information analysis and evaluation costs, which are the reality when information is seen as a workable mechanism for decision-making under complex and changing environment.

SUMMARY -1

- Traditional *IS* is ad hoc and no effort is made to process information ‘smarter’ so as to add value.
- True, in Quality *IS*, the function-level reengineering is bottom-up process in that the information-system function comes up with innovative methods of service delivery that would add **value** to the corporation.

SUMMARY-2

- However, given that Quality *IS* is made to fit into the pre-determined business process design, improvements delivered by the Quality *IS* are in the manner of ensuring “exactness” of business process design decision.

SUMMARY-3

- And, in that case, the environmental changes addressed by the Quality *IS* are linear and of incremental nature, which can also be described as expected changes.
- Though this linear, incremental **value** addition is necessary, it is not sufficient to cope with implications of *unexpected* changes, which are the hall mark of business processes that are recognized to be open systems characterized by complex and ever changing system environments.

SUMMARY-4

- Data monitoring function as adopted by Quality *IS* also emphasizes its closed system view.
- Specifically, once a system becomes operational, Quality *IS* monitors it by regular collection of data for early detection of service failures.

SUMMARY-5

- That is monitoring data becomes the basis for process improvement before any major problem arises in the system, hence improving the system on a continuous basis (Process factor for Service) (Lecture # 11).
- However, as a result of fixed business process design decision, this data collection and monitoring is done in a pre-determined manner, thereby processing data and information, which are structured and periodic, i.e., fixed.

SUMMARY-6

- As a result, in the end analysis, Quality *IS* is left addressing collective decision situation and that, too, in the face of environmental changes, which are predictable, i.e., structured and periodic, and in the process **value added** is inadequate to deliver competitive advantage in the wake of ever changing environment.

SUMMARY - 7

- The individual decision situation under SEU Theory considers *ex ante*, exact and correct information on which to base its choice of a prospect.
- However this view is not adequate for individual decision situation that open system is in a complex and changing environment.

WHAT IS NEEDED THEN? -1

- In fact there *is* the issue of Information Integrity (I*I) risk that the decision making process in a complex and changing environment experiences.
- Specifically, I*I risk is of making a decision choice *ex ante* which will, according to the *ex ante* estimate of the decision-making process, perhaps turn out to have been sub-optimal *ex-post*.

WHAT IS NEEDED THEN? - 2

- This kind of risk has to be caused by insufficiently full and perfect information, which is either misleading (biased, i.e., distorted) and/or incomplete (noisy).
- Such information is with inadequate integrity, hence with a requirement for additional information value, which improves value of available I^*I .

WHAT IS NEEDED THEN? - 3

- Search for *IS* model that helps analyze I^*I risk (and uncertainty) and hence value of information and of I^*I defined as above is then the concern of study through the rest of the course.

EXERCISES –1

- (E12.1) Given the reality that systems (businesses) are required to perform in environments, which are ever changing and growing in complexity, why is it importance to study information system models that add value to information and to Information Integrity?
- (E12.2) What are technical and behavioral paradigms of information system designs?
- (E12.3) What is meant by “Traditional IS”?
- (E12.4) What is meant by “Quality *IS*”?
- (E12.5) “Traditional *IS* is ad hoc and no effort is made to process information ‘smarter’ so as to add value”. Discuss.

EXERCISES –2

- (E12.7) What is the dominant attribute in design of Traditional *IS*? Discuss.
- (E12.8) What is the quality perception in engineering applications?
- (E12.9) What do you understand by the term Total Quality Management?
- (E12.10) What are the features of Quality *IS* derived by application of TQM methodology?
- (E12.11) What are the dominant attributes in design of Quality *IS*? Discuss.

EXERCISES - 3

- (E12.12) What is meant by the term business process *reengineering*?
- (E12.13) In reengineering, what is the role of quality information systems at corporate level?
- (E12.14) In reengineering, what is the role of quality information systems at functional level?
- (E12.15) How does Quality *IS* add value to business?
- (E12.16) List various inadequacies of Quality *IS*?

EXERCISES - 4

- (E12.17) “Improvements delivered by the Quality *IS* are in the manner of ensuring “exactness” of business process design decision. Therefore, the environmental changes addressed by the Quality *IS* are linear and of incremental nature, which can also be described as expected changes. Though this linear, incremental value addition is necessary, it is not sufficient to cope with implications of *unexpected* changes, which are the hall mark of business processes that are recognized to be open systems characterized by complex and ever changing system environments”.
Discuss.

EXERCISES - 5

- (E12.18) “In quality systems, major participants in the subsequent phases take part in the design phase, and plan for their functions as the design progresses. However *IS* is an open system, and environmental considerations affect all stages of a system’s life, and not the design stage *alone*. In fact environmental considerations affect everyone who is connected with any of the stages and the with the total *IS*, either directly or indirectly. This suggests a need to go well beyond design phase and, therefore, well beyond Quality *IS*, and consider ever changing and complex environmental implications for each of the stages of system life and implementation cycle model”. Discuss.

EXERCISES - 6

- (E12.19) “Data monitoring function as adopted by Quality *IS* also (i.e., like reengineering approach) emphasizes its *closed system view*”. Discuss.
- (E12.20) “Quality *IS* in the end analysis addresses environmental changes, which are predictable, i.e., structured and periodic, and, in the process, value added (by the Quality *IS*) is inadequate to deliver competitive advantage in the wake of ever changing environment”. Explain briefly.

EXERCISES - 7

- (E12.21) “In SEU Theory equation of information value does not account for information analysis and evaluation costs, which are the reality when information is seen as a workable mechanism for decision-making under complex and changing environment”. Discuss.
- (E12.22) Briefly summarize the information value factor perception as under Traditional *IS*, Quality *IS* and SEU Theory, indicating why it fails to account for value of $I \cdot I$.

THANK YOU