Information Analysis and Business Intelligence Tools in Management

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ABSTRACT: *Globalization intensified throughout the world in the late eighties and nineties producing, particularly in Australia, a paradigm shifts in the corporate use of information. Organizations faced changes, not only in the areas of operations, product design, marketing and sales, but also the need to dynamically formulate and align strategies in response to a rapidly changing environment.*

As information technology developed, business placed increased emphasis on automated business processes, and transaction data capture. Competition remained the key business driver influencing the paradigm shift from data to information. A model, which embraces a Systems approach to Information Management, also requires alignment with reality and technology appropriate to the Systems approach model.

This paper provides an insight into the strategic importance of information in support of the organizational dynamics, which provide a competitive edge. The application of Business Intelligence technology will not only assist effective operational management, but also dynamic strategy formulation and implementation processes. An overview of the business and technical issues in implementing a business intelligence solution is discussed.

KeyWords: Business Intelligence, Information Analysis

INTRODUCTION

It can be said that the conduct of business in a competitive environment is like waging a battle. In business, the firms are armies, competitors are the enemy, and the outcome of the engagement may be fatal to one side or the other. As in war, the key to survival in 'enemy territory', is information.

"If you know yourself and knows your enemy, in a hundred battles you will never fear the result.
When you know yourself but not enemy, your chances of winning or losing are equal.
If you know neither yourself nor your enemy, you are certain to be in danger in every battle"

Source: 'Applying Sun Tzu's Art of War in Corporate Politics' by Khoo Kheng-Hor

Organizations must constantly scan their environment to protect themselves from unexpected or unforeseen attack. This requires information support, not only about the business transactions but also about all aspects of the internal and external environment.

This means that organizations must continuously capture a variety of relevant information about all aspects of the environment, not simply the transactional data, in a manner that is useable at all levels. Organizations must then establish a capability to use the gathered data in analytical models and tools, which are flexible enough to adapt to the changing environment and support both operational and strategic needs.

The combination of Business Intelligence technologies and Data Warehouse technologies provide the flexibility to support a dynamically changing competitive environment, provided the data is captured, cleansed and stored in a Corporate Data Warehouse designed with such flexibility in mind.

ORGANISATIONAL DYNAMICS AND CHANGE

Traditional Systems Approach to Strategy Development and Management

There is general recognition that competitive environments are changing at an accelerating rate culminating in a high level of uncertainty. In Australia, with the advent of Micro-economic reform in the late eighties, organizations in several industries were exposed to global competition due to deregulation. As a result, critical success factors are constantly changing. This calls for a constant adjustment of competitive strategies.

Subsequently, organizations can no longer afford to adopt a unidirectional, or lock-step approach to strategy development, entailing stages of data collection, development of strategy options, evaluation, selection and implementation. This approach embodies the traditional systems approach to management, having four major phases of Input, Transformation, Output and Feedback. The traditional approach requires that feedback from the environment be obtained after the outputs are completed and delivered. This approach relied on 'Simple single-loop learning'.

(a) Simple Single-Loop Learning

'Simple Single-Loop Learning' may be illustrated by review of a budget and corrective action.

Actual profit is compared with the desired outcome set in the budget. If the actual is below budget, the reason is discovered, corrective action is planned, and action is taken. This is simple or single loop management as the underlying assumptions are not questioned. The variables used in the analysis are not challenged (See Fig 1).

(b) Information Support

It is the Author's experience that, even today, many organizations continue to place emphasis on transactional systems, and rely on inflexible management information and reporting systems suited to the traditional feedback approach depicted in the 'Simple single-loop learning' model.
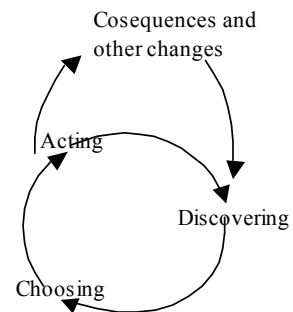

Fig 1: Simple Single-Loop Learning

Dynamics and Revised Systems Approach to Management

Strategy is a serious, exciting and often bizarre game that organizations play every day.

For example, in the late 1950s, Honda's managers forecast an interest in smaller vehicles, and made a move into United States market, in competition with General Motors. This led to (1990s) a decline in GM's profits and major contraction and restructuring. In response, GM identified the likely increase in fuel costs and foreign competition and chose to respond by downsizing its product range. Thus change in patterns and posture of competing organizations requires constant adjustments to their strategies.
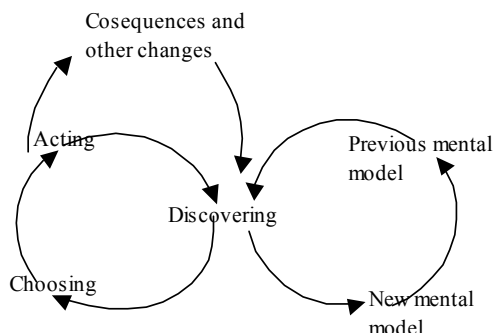
Although a dynamically changing industry environment is not something new, in earlier days, considerable time was required to recognize a changing market and reposition the company. This meant that revising strategy was high risk and not always implemented effectively.

In the face of a high level of uncertainty and change there is a need for a dynamic approach in which strategy formulation and implementation are carried out simultaneously. This also requires a fundamental paradigm shift in the approach to systems thinking in management. Organizations can no longer wait until the environment has provided feedback for corrective action. Facing uncertainty not only requires increased frequency of environment scanning, but also requires challenging the underlying assumptions in monitoring organizational performance against the competition; what is known as 'Complex, Double-Loop Learning'.

(a) Complex Double-Loop Learning

'Complex, Double-Loop Learning' approach requires challenging the model and developing a new model, mindset or paradigm to discover likely market challenges. This is illustrated in the figure 2.

In a double-loop learning model, the Systems approach must iteratively modify the inputs and processes so that interim assessment of the output can be predicted, without waiting for final output.

(b) Information Support

Fig 2: Complex Double-Loop Learning

In an uncertain and dynamically changing industry environment, the organizations that place high emphasis on transactional systems and rely on inflexible management information systems will be left behind by competitors who have adopted highly flexible information systems.

This approach requires a facility capable of supporting dynamic alignment of new parameters and new measures in the organizational management processes, resulting from changed industry conditions and competition.

STRATEGY FORMULATION TO OPERATIONS - ROLE OF INFORMATION ANALYSIS

Overview

Information technology has significantly reduced the strategy development time-cycle, from acquiring data through to supplying meaningful information, particularly in a dynamically changing competitive environment.

With the trend toward elimination of middle-level management and empowerment of operational level personnel, it is now necessary to provide appropriate tools at all levels to facilitate effective analysis and exchange of performance information to assist in rapid strategy formulation processes.

Dynamic Strategy Formulation

Some of the key requirements to achieve a dynamic approach to strategy formulation are:

- speedy, simultaneous and consistent evaluation of an organization's characteristics and its immediate and alternative competitive environment

- ability to monitor and measure the outcome without having to wait till complete implementation

These requirements cannot be met in a traditional transaction based system and pre-defined reporting environment. A toolset that is flexible enough to accommodate new parameters and provide a variety of perspectives, is required.

"Managers Make All Decisions" Versus "Decision Making is Part of Everyone's Job"

The Industrial Revolution institutionalized hierarchical decision-making. Traditionally, managers relied on their experience; instincts and information gathered over the years to analyze problems and made decisions. Information and knowledge was shared predominantly through personal interaction. Thus, information gathered and knowledge gained was made available to an organization through each individual.

Traditional, hierarchical decision-making, is no longer appropriate for organizations aiming to become globally competitive. The effort and time to gather information and knowledge from individuals is prohibitive, and time is now a critical element.

Companies now realize that frontline personnel must be empowered to make decisions, and this cannot be accomplished without gathering relevant data and engaging appropriate tools. With the advent of highly flexible information analysis tools, data is not only accessible, but with analytical tools and training, frontline personnel have sophisticated decision-making capabilities.

BUSINESS INTELLIGENCE CONCEPTS AND APPLICATIONS

Concept Overview

Business Intelligence (BI) is about synthesizing useful knowledge from large datasets. It involves integration, summarization, and abstraction as well as ratios, trends, and allocations.

It's about comparing generalizations based on data with model-based assumptions and reconciling them when they're different. It's about creative thinking facilitated by data and the monitoring of the creative ideas that an organization implements. It's about using data wisely, understanding how to calculate derived data, and continually learning and modifying goals and working assumptions based on data-driven models and experience.

In short, business intelligence should function as a virtuous cycle of information analysis and decision-making improvement.

The basic functions that comprise any BI framework include data collection, storage, synthesis and access processes; dimensional structuring; intuitive representations, access models, predictive models, and model verification; knowledge sharing; resource allocation strategies; scenario analysis; conflict resolution; prescriptions; and decision implementation capability.

BI technology evolved around the premise that managers think multi-dimensionally. Managers have a picture of the business in their minds, which may resemble the following:

WHEN	WHO	WHAT	WHERE	RESULT	
Time	**Sales Org**	**Product**	**Channel**	**Indicator**	
YTD	Country	Bus Unit	Channel	Revenue	What Managers See
Q3	Region 4	Prod Line	Customer	Units	Where the action is
	District 3	Brand		Cost	
	Bob Smith	SKU		Margin	

Fig 3. Managers think multi-dimensionally across all potential combinations

In the above example, we have 5 salespeople who sell an average of 20 products to each of 100 customers every month, and the organization tracks 10 key indicators. All the permutations add up to a sizable number, i.e., 100,000 combinations.

To deliver this information using traditional methods would mean multiple reports requiring significant effort of valuable resources. Moreover, if managers require detailed information, they may never see the real drivers, due to the need to iterate the same process to compile the new requirement.

To improve the manager's understanding of the business, the information must be in a format, where changing indicators is as easy as switching gears in a car.

Business Intelligence technologies deliver such capabilities in a seamless manner, where business data captured in transactional systems are transformed to provide meaningful information through a highly flexible analytical environment.

BI tools provide a variety of capabilities to navigate the business data, Drill up or down the preferred path within a parameter, slice and dice a set of data; Drill across a number of parameters and so on. BI tools support monitoring and measurement processes to constantly scrutinize a number of performance characteristics such as cycle time, quality, market share, sales and sales growth and more importantly the characteristics specific to customer behavior and relationship management, all in a timely manner.

BUSINESS AND TECHNICAL ISSUES

Financially Based

Traditionally, most business monitoring and measurement processes are financially based - designed by accountants for accountants (or regulators), not by or for managers. For example, Balance Sheets, Profit and Loss statements and ROIs. They tell us little about what we should do today or tomorrow. On the whole, traditional monitoring and measurement processes end up cluttering a manager's desk with reports, which did not really help the manager to manage. In the author's experience, this mindset is still prevalent in many organizations.

Transactional Data for Information Analysis

Information Analysis requires relevant data about not only business transactions, but also a number of aspects highlighted earlier, including the data about the data. Most organizations place a high emphasis on transactional systems and consider management information systems as secondary. Such management information systems are there to produce a set of pre-defined reports, which is left on manager's desk, if not for any other purpose, but to accumulate dust over time.

Data Quality

Due to the ad hoc approach to analysis and decision-making by traditional managers, the significance of data for information analysis is often overlooked. This approach lead many organizations to hold transactional data resulting from business processes that required enormous amount of additional effort to transform, so that managers could make effective use of the transformed data for business analysis.

Integration

Until recently, the goal of integrating information systems has remained theoretical. Organizations built islands of information systems around their business functions. This limits the ability of managers to analyze cross-functional influences over organizational performance.

CONCLUSION

Business Intelligence combined with Data Warehouse technologies, dramatically improved not only the cycle time to transform data and present meaningful information but also removed dependence on data accessibility and increased the flexibility to analyze information for a range of purposes from operational to strategic levels.

Such a capability is of increasing importance, where organizations must dynamically formulate and implement strategies in order to remain competitive. Future organization data management must capture data relevant to information analysis along with data about business transactions.

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