Using Innovative Information Technology Architecture for Entrepreneurial Success: The Case of “YCH” Logistics Company

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How can small businesses succeed in this age of large corporations, global competition, and the need for large investments in Information Technology? According to conventional wisdom, it should be pretty hard, if not impossible. Companies with visionary and ENTREPRENEURIAL leaders can do it by committing to provide the best possible services to the customers consistently. And do you do that without investing in IT in this information age? This case illustrates the success story of YCH since its inception in 1955 as a relatively unknown transport company to one of the most prominent companies in the ASEAN region today. YCH has accomplished this feat by innovatively using its resources and talents. One of these is the use of an innovative IT architecture for its various business operations. The case of YCH Logistics company demonstrates that small businesses can not only invest in IT, but they can use IT for competitive advantage. Furthermore, they achieved this by not buying a single mainframe or a mini computer. YCH company was one of the three proud winners of the prestigious IT awards by the National Computer Board of Singapore in 1992. This case provides a brief history of the company including the major turning points; and describes its business segments and the evolving role of IT to support and augment the business operations. It also describes the innovative and modular IT architecture adopted by its small, young and ambitious IT team.

How can small businesses succeed in this age of large corporations, global competition, and the need for large investments in Information Technology? According to conventional wisdom, it should be pretty hard, if not impossible. Companies with visionary and entrepreneurial leaders can do it by committing to provide the best possible services to the customers consistently. And do you do that without investing in IT in this information age? This case illustrates the success story of Yap Chwee Hock (YCH) Transport since its inception in 1955 as a relatively unknown transport company to one of the most promising companies in the ASEAN region today. YCH has accomplished this feat by innovatively using its resources and talents. One of these is the use of an innovative IT architecture for its various business operations. The case of YCH Logistics company demonstrates that small businesses can not only invest in IT, but they can use IT for competitive advantage. Furthermore, they achieved this by not buying a single mainframe or mini computer.

YCH was one of the three proud winners of the prestigious 1992 National IT Awards given by the National Computer Board of Singapore in recognition for their innovative application of IT to achieve business goals. This case provides a brief history of the company including the major turning points; describes its business strategy, business segments, and the evolving role of IT to support and augment the business operations; and finally documents the innovative and modular IT architecture and applications portfolio adopted by its small, young and ambitious IT team.

YCH was established as a small local passenger trucking company in Singapore in 1955 by Yap Chwee Hock — now 66 years old and chairman of the company. The company basically transported contract labor for the British forces in the post-World War II years. The first turning point came when the British forces withdrew in 1971. The choices considered at that time was whether to stick with passenger transportation business or change to cargo transportation. The first choice would require converting the existing fleet of trucks to be suitable for normal passenger transportation — since people had growing preference for riding in buses than in trucks. The second choice meant using the existing fleet of trucks. YCH decided on the second option to use its existing trucks to transport cargo.

The second turning point came in the late 1970s, when YCH shared in Singapore’s growth as a major container port and transshipment point. As a transporter, YCH had their trucks waiting for hours because there was poor coordination between the customer and the warehouse operator. That prompted the decision to move into warehousing in 1978 so as to have better control over warehousing operations and improve the efficiency of transportation.

In 1983, the company ventured into freight forwarding. This was YCH’s third turning point. Their customers were always canceling at the last minute when they could not get shipping; trucks will be loaded and ready to go, only to have them unloaded again. To overcome these problems, YCH acquired Regional Warehousing and Management Services. Thus, by the mid 1980s, the company started providing one-stop logistics service — container haulage, packing, crating, removals, shipping, insurance, warehousing, computerized inventory system, and computerized logistics management.

The fourth major turning point came in March 1990 when the company acquired 839,000 square feet of its own warehousing facilities called the YCH DistriPark in Tuas, a sprawling 7.8 hectare, $20 million collection of central distribution centers.

Prior to this, the company operated from rented warehouse premises — with 350,000 square feet of rented space from the Port of Singapore Authority. The provision of total logistics services combined with the YCH distripark have resulted in five major satisfied clients — Aiwa, DuPont, BHP, Maxwell MacMillan, and Becton Dickinson. YCH’s revenues grew from $8 million in 1988 to more than $37 million in 1992. YCH now employs more than 170 people, more than double the staff strength two years ago.

Business Strategy

YCH sees its key business mission as being a reliable and capable logistics partner to major business enterprises that have operations in the region. It seeks to forge strategic alliances with its multinational clients to become an integral part of their regional operations. As a total logistics partner, YCH provides transportation, warehousing, documentation, traffic, freight, and insurance arrangements for moving clients’ goods from Singapore to any part of the world. Diverse state-of-the-art IT applications are utilized for facilitating communications with clients, tracking of goods in automated warehouses, preparing and clearing of trade documentation, and forecasting warehouse and trucking capacity.

Robert Yap, Managing Director, explains YCH’s relationship with its clients:

Before we enter into a contract with a client, we would form a team to study the client’s business operations. We must understand the client’s business so well that we know what is in the best interests of the client. It is a relationship of trust. Our contracts are long-term contracts, which are typically five years or more. We share plans and information freely. For example, our clients keep us informed of their production schedules and any changes to plans. If we are considering a new client that may be competing in the industries of our existing business partners, we would discuss that with our partners and get their reaction to it. If they feel uncomfortable about our potential new client, we would not accept the new client. We have turned away a couple of new clients in the last two years because of potential conflict of interests with our existing partners. We are open about the whole thing. We want our partners to know that we are committed to them and that they can trust us. We also work hard to maintain our reliability and service levels. There are no compromises. We go all out to service our clients, even if we have to bear additional short-term costs.

Business Segments

Currently, YCH offers several services: logistics management and consultancy, transportation, international freight forwarding, bonded services and...
regional operations, and warehousing.

**Logistics Management and Consultancy**

The services offered in this area include Operations Research and Information Systems Development. These services include the capability to manage client projects from incubation to final completion.

**Transportation**

YCH offers comprehensive transportation services for its clients. It offers a modern fleet of vehicles and transportation equipment — prime movers, chassis, containers, and lorries. It also has well trained and experienced drivers.

**International Freight Forwarding**

YCH has a pool of experienced professionals and workers who provide a broad range of support services — door-to-door delivery, customs clearance, shipment tracking, warehousing, packing and unpacking, documentation, and insurance.

**Bonded Services and Regional Operations**

This area is an effort to expand the services into the region — mainly Malaysia and then into other countries in the Asean region (Malaysia, Indonesia, and Thailand) and eventually into other countries in the Asia region.

**Warehousing**

YCH boasts of highly sophisticated operations like narrow aisles, high rise stackers, weighbridges, dock levelers, temperature controlled warehouses, and high security standards.

**Role of Information Technology to Support and Augment Business Operations**

**Logistics Management and Transportation**

The real key to success in the area of transportation lies in the utilization of IT to its fullest extent — advanced software systems for accurate and effective fleet and traffic management, electronic data interchange (EDI) such as PortNet for online access to shipping information, use of radio communication link for efficient and effective coordination between operational staff and drivers.

**International Freight Forwarding**

This area extensively utilizes IT in terms of direct International Air Transport Association (FIATA) and Federal International Air Transport Association (FIATA) link-ups for communication and coordination of international freight forwarding. There is also an extensive usage of EDI through TradeNet for access to trade related information.

**Bonded Services and Regional Operations**

Several clients have approached YCH about setting up operations in other countries to handle clients’ regional needs, besides domestic needs. YCH’s Malaysian joint venture in West Malaysia — Melewari Logistics — is an example. This joint venture allows YCH to operate bonded trucking services between manufacturing facilities in Malaysia and Singapore. YCH has joint ventures with two companies in Malaysia and 25 licenses to perform bonded trucking operations. YCH was the first to introduce 40 footer trucking operations in West Malaysia. Currently, negotiations are underway to have such joint ventures in Thailand and Indonesia. In all these joint ventures, existing IT applications portfolio at YCH will be a significant enabler for coordination and control of expanded regional business.

**Warehousing**

In this area, YCH has computerized warehousing operations like narrow aisle tracking system, warehousing data communication systems, and inventory management system. These systems have enabled YCH to use high-ceiling warehouse facilities to maximize the use of warehouse space and also cut manpower needs — both are important competitive advantages in land and labor scarce Singapore. After an order is received to retrieve a certain quantity of stock, an operator climbs onto a stacker equipped with a computer terminal which will tell him not only how many of which items are required, but also along which aisle and on which rack these may be found. This computerized procedure saves 80-90% of the time taken with manual operation while substantially improving the reliability and accuracy by picking the right quantity of the right item expeditiously.

**Information Systems Organization, Information Technology Architecture and Applications Portfolio**

The IT architecture and applications portfolio has been devised and maintained by YCH’s computer department with its six systems analysts (IT professionals). See Figure 1 for YCH’s organizational structure.
Figure 1: YCH Group Organizational Chart

Figure 2: IS Organization Structure

Figure 3: IT Architecture
and Figure 2 for the IS group’s structure. The IT team is very young, average age being 25, is trained in the power and versatility of microcomputers, and is willing to adopt the state-of-the-art technology in a modular fashion. The IT Manager has an MBA from Australia while others are hands-on computer enthusiasts having qualifications ranging from Diploma to Masters and experience ranging from none to 5 years.

The push to be innovative and modular has come directly from the Managing Director, Robert Yap who confided that he was a computer zealot in his early entrepreneurial adventures. While in his twenties, Robert read a lot about computers through computer magazines like BYTE, and IBM PC. He started a company selling IBM PC compatibles in the early 1980s, which helped him a lot in learning about IT — especially microcomputers. Robert displayed his entrepreneurial spirit when he related the approach he took to learning about computers: “I knew that I cannot learn about computers by attending a course. So I started a computer business. The business did not work out and was liquidated after a few years. My family was actually happy that the computer business did not work out because they were concerned that I was taking YCH beyond the transportation and logistics business. But I had learnt a lot about computers by then.”

The adoption of an open Unix environment is a testimony to YCH’s aim to be innovative. All application systems are integrated by a state-of-the-art modular architecture — Local Area Network (LAN) and Wide Area Network (WAN). The modular network (see Figure 3) is based on an Ethernet telecommunications protocol (TCP/IP standard). The nodes in this network all use Unix operating systems. One node is a 486-chip computer which serves 30 “dumb” terminal connections for office automation: spreadsheets, word processing, time management etc. Two 386-chip computer nodes cater to the total logistics needs of the client — Maxwell Macmillan. Another 486 node handles Traffic Management, Freight Forwarding, Tracking, and Shipping Documentation; has 17 connections; and also has provision for dial-in from outside. Another 486 handles the total logistics needs of two of its clients — Aiwa and Dupont. A new 486 has been added for its newest client, Roche Pharmaceutical Company. Each client’s customized systems run on a new node — a 486 Compaq PC. That is the essence of the modularity of the IT architecture providing for easy growth without any capacity or compatibility constraints. The managing director, Robert Yap displayed his enthusiasm about their IT architecture this way, “a lot of success in IT is based on the fact that we chose the right platform...we chose an open unix operating environment...we can communicate to all in the world...can have total communication.”

By early next year YCH plans to add another PC on the network to handle Artificial Intelligence and Executive Information Systems applications. There are plans to recompile existing applications to use client-server architecture effectively. The evolution of the IT applications portfolio has a very short but ambitious history of just over 4 years. Prior to that, everybody shared one PC to do their business documents and everything was paper-based. It dates back to 1988 when YCH established itself as a pioneer in Singapore in the development of a PC-based Warehouse Management System (WMS) followed by the development of a PC-based documentation system in 1989. The 1990s saw the implementation of more piecemeal systems — Traffic Management, Shipmen Tracking, Fuel Management (from Siemens Nixdorf), TradeNet, and PortNet. In late 1990, the need for formal IT planning was realized. This led to the commitment of YCH to Open Unix-based modular systems utilizing relational databases. Most of applications development is done using 4 GLs like INGRES (only initially), ORACLE, and INFORMIX.

1991 was a big year for IT in YCH. In late 1990 and 1991, the company committed itself to office automation technologies — word processing, spreadsheet, graphics, electronic mail, and time management in that order. The year 1991 was also a year of expansion and integration of basic systems and system capabilities. The basic PC-based Traffic Management System evolved into a Total Logistics Management System by including freight forwarding, marketing, and quotation features. This logistics system was also integrated with YCH’s accounting system. The total logistics systems were also customized for individual clients — Maxwell MacMillan and DuPont. The customization is an ongoing systems modification activity — was done for another new client Aiwa in 1992. The Executive Information Systems project was also launched. First regular use of terminal at customer site to access information from YCH database was accomplished. By June of 1992, a total of 5 Unix PC-hosts were connected by the TCP/IP-based Ethernet network.

The IT evolution in YCH suggests a new paradigm for assimilation of IT for new companies. These do not have to go through the growing pains of implementing applications on mainframes followed by applications on minicomputers and then migrating or downsizing to microcomputers. These companies can
directly leapfrog into the latest economical modular approach of implementing applications on PCs interconnected by LANs and WANs as successfully accomplished by YCH.

Future plans for IT include the ability for the clients to dial directly into the YCH computer system via modem to get information about the status of a shipment, integrating clients’ manufacturing data with YCH’s inventory data. By the end of 1992, YCH will convert all existing applications to their Unix/Informix platform, complete first phase of Executive Information System, and complete implementation of bar code and scanning technology for the Aiwa and DuPont distribution centers. The plans for 1993 include development and implementation of Unix-based Airfreight Forwarding system; linking all related companies with WAN (UUCP); and develop and implement logistics, warehouse, and office automation for start-up subsidiaries in Malaysia and Indonesia. Ambitious plans for 1994 include satellite tracking of trucks within the ASEAN region; selective use of multi-media applications, change existing human resource management and accounting applications to Informix platform and integrate with other systems; and make use of bar coding and canning technology standard for all distribution facilities. YCH goes for an outside software package only if the package is well supported and the requirements in that area are likely to be relatively stable, otherwise they generally go for in-house applications development. Since almost all the software utilized by YCH is in-house developed and proprietary, it intends to spin-off its computer department as a profit center in its own right and assist in technology transfer in the region.

Innovative Information Technology Architecture and Entrepreneurial Success

What has been achieved by YCH in such a short time is a clear testimony to their deployment of innovative IT architecture and applications. Before we go into describing the contribution of innovative IT architecture to entrepreneurial success, let us first understand what we mean by entrepreneurial success. We will survey definitions of an entrepreneur from literature.

According to Joseph Schumpeter in 1934 (Hisrich, 1986), “an entrepreneur is an innovator and develops new technology.” To this definition, we will add that an entrepreneur is one who is willing to take the risks to use previously untried technology in a given business environment. David McClelland in 1961 (Hisrich, 1986) defined an entrepreneur as, “one who is an energetic and moderate risk-taker.” The concept of moderate risk-taker is important. One who takes undue and not calculated risks would be termed a gambler. According to Peter Drucker in 1964 (Hisrich, 1986), an entrepreneur is, “one who maximizes opportunities.” In fact, Enterprise is one of the four goals of YCH’s corporate RISE philosophy: Reliability, Integrity, Sincerity, and Enterprise. This philosophy existed prior to 1988, but was crystallized and documented in 1988 for the benefit of all stakeholders in the YCH company. The meaning of these quadruple missions was explained to us by Robert Yap. Reliability means the commitment by YCH and its employees to perform consistently at its best. Integrity means conducting full custody, care, and control of $150 million worth of goods in inventory or transportation with utmost honesty and accountability to customers. Sincerity means total commitment and service excellence to existing customers. Robert Yap
explained it as follows, “If I am a partner with HP (i.e., HP is our customer), I do not go for their competitor IBM... unless we have the blessings of our partner HP.” This can be interpreted as YCH’s commitment to their existing customers, however small. They do not leave their current customers in the lurch in search for a bigger catch. Enterprise, the most important mission, was articulated by Robert Yap as, “an organization that is not afraid to change......we try to create that as a culture within the organization....we want our employees to be always ready to look at new ways of doing the same thing...and IT has the strongest focus in that.”

In this information age, we would define an entrepreneur as one who deploys state-of-the-art IT in new and innovative ways to obtain and sustain competitive edge. We would even give a new label to this new breed of entrepreneur, we would call him an ITpreneur. In the words of Robert Yap, an entrepreneur is, “not only one who envisions new ways of looking at the business, but also one who uses IT in ways that have not been used before.”

Definition of entrepreneurial or ITpreneurial success should easily follow from the above definitions of an entrepreneur and ITpreneur. When the returns emerging from taking moderate risks in an investment opportunity in the spirit of entrepreneurship or ITpreneurship are more than the returns from a normal investment opportunity, we have a case of entrepreneurial or ITpreneurial success. That is easy to see from the rate of returns YCH has realized ever since adopting innovative IT architecture and applications since 1988. Tabgraph-1 (See Palvia et al, 1992 for a definition of this new term) depicts the relationship between Revenues and IT Investments since 1988.

Innovative deployment of IT has had a significant impact on YCH’s business. Since 1988 there has been a strong focus on using IT for all segments and steps of business. IT has helped significantly in achieving the mission of Reliability, Integrity, Sincerity, and Enterprise.

The use of Artificial Intelligence for trucks scheduling is the latest in a series of innovative uses of IT in YCH. To be on the top of potential AI applications, two of the six-member IT team have already received training for three months at the Japan Singapore Institute of Artificial Intelligence. The motivation for the current focus on such AI applications is described by Robert Yap as follows, “We are very very dependent on our key staff, as would any growing company.... definitely, the company became good because of certain very good key people...but what happens if these key staff leave, or if these key staff decided to be more demanding.....so we design such systems...the key staff are still there to make sure such systems work.” Mr. Yap also articulated the need for a systematic process to capture the knowledge of an experienced scheduling supervisor to build an AI system. YCH also has similar systems for Warehouse design based on the knowledge of activity levels of different types of goods. Such systems significantly contribute to YCH’s goal of reliability. IT has been also contributing significantly toward the goals of Integrity and Sincerity. In the absence of IT applications, the work of checking and verifying by supervisors started at the end of the day, when all transactions had taken place. With the IT applications, these checking and verifying goes on concurrently with the occurrence of transactions. All summarized information by a specific level can be retrieved at the stroke of a key on the terminal. To quote Robert Yap, “When the data entry is complete, we can go into auto-invoicing module and the invoice will be churned out automatically...this has allowed us to work very effectively, because the lower people do not know the rates, they don’t need to...so there is very matched consistency in service level.” Matched consistency helps in accomplishing YCH’s another goal of Sincerity. When the clerical people know the customer or if they know that the customer is a major one, they may pay more attention to such customers at the cost of smaller customers and that would then be contrary to the mission of Sincerity to all customers.

In terms of supporting the goal of Enterprise, IT really came into picture after 1988. Prior to that, the big turning point requiring entrepreneurial zeal was the adding in of regional forwarding and warehouse management to existing transportation business in 198?. This was a prelude to what YCH has developed into now with the help of IT applications — Total Logistics Management. Total Logistics Management requires total horizontal integration of freight forwarding, documentation, warehousing, transportation. This integration provides YCH’s customers the golden opportunity to do one-stop shopping. YCH’s strategy is to study each customer’s needs as a potential partner and whenever possible, they try to establish a long term contract. YCH calls this the incubation strategy. If some customers are not sure about their long term plans, YCH accommodates them with a short-term contract to start with. In the words of Robert Yap, “for Roche Pharmaceuticals, we built a brand new facility for them, with dedicated computer hardware and custom-
ized IT applications for Total Logistics Management for a 10-year contract.” With the help of IT, YCH has cut down substantially on warehousing costs by utilizing more and more vertical space. IT applications can keep track of all the numerous locations horizontally and vertically and currently the fork lift operator has to move his cart to that specific location. However, YCH has ambitious plans to have fully automated warehouse — when by just typing the item number and desired quantity, the automated vehicle will go to the right location, pick the right quantity and deliver it to the staging area. As an entrepreneur or ITpreneur, YCH is happy with payback period for their investments to be as long as 10 to 12 years.

This flagship facility along with Integrated Total Logistics Management has given YCH several regional possibilities. They can duplicate the same concept in other locations in the ASEAN region. Technology transfer will be really no problem. Same hardware is easily available at any location in the ASEAN region and software can easily be delivered since it is YCH-proprietary. Training can be easily provided by YCH personnel including IT professionals. Their joint venture possibilities include Malaysia, Indonesia, and Thailand with YCH having centralized control of proposed facilities in the region. The decision to have in-house software development for Total Logistics management also has an ITpreneurial flavor. YCH decided to own the core competencies and that includes specialized software. They could have gone to software vendors and procured off-the shelf software that came nearest to their needs. As explained by Robert Yap, “What you can buy, so can your competitors...on top of that we are trying to lead the industry....so we cannot buy off the shelf...we are developing new innovative software for conducting our business operations.” In fact, YCH has long term plans to spin-off their IT group as a profit center, since lot of IT companies are selling older generation software. That should be really termed as the climax of ITpreneurship.

Lately, IT has truly provided a competitive edge for YCH in attracting and retaining customers. “IT has played a very important role in roping the customer in”, says Robert Yap. Earlier on IT was deployed mostly for providing consistent reliability of services to its customers. Lately, IT has really become a marketing tool. Roche pharmaceuticals contract was really won on the basis of YCH’s IT capability. YCH does not really have any local competitors, only US or Europe-based multinational corporations. In summary, initially internal efficiency push was the reason for IT. Now it is really external efficiency push due to current or potential competition.

**Conclusion**

YCH is a novel case of how visionary and entrepreneurial leadership can be combined with the power of innovative IT architecture and applications to achieve business success. In this information age of fast technological change, a late comer like YCH enjoys significant advantages over older or larger firms. YCH could take advantage of the latest technology to develop low-cost IT platform that is also adaptive to fast growth. By utilizing open operating systems implemented in a modular fashion, YCH could serve its clients as it has grown without being burdened with large up-front investments. Small businesses that want to grow and succeed should consider innovative IT architecture and applications as part of their strategy. YCH has shown us that entrepreneurship ought to include ITpreneurship.

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