Development of a Startup Business — A Complexity Theory Perspective

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Abstract

Complexity theory provides new perspective from which we can observe the development of new business startups, and allows us to discover that the development of new startups is indeed a nonlinear, chaotic process. This is completely at odds with the accepted wisdom of life cycle theory. This study uses a real case to first explore the development process of a startup business and then extract several management implications from this case for the reference of entrepreneurs.

The management implications derived from this research include embracing chaos, harnessing and not controlling, organizational reform, resources patching, sharing information, developing core values, empowerment, encouraging experiments, and tolerating members' mistakes.

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Introduction

This is the age of discontinuity. While change has become the normal condition, change usually occurs in a disconnected fashion, change is sudden and irreversible (Hamel, 2000). Zohar and Marshall (1994) use the phrase "quantum society" to emphasize the ambiguity and uncertainty of our current environment. On the other hand, uncertainty also brings with it new opportunities for profit. Individuals, groups, or organizations that can locate and take advantage of these opportunities can obtain high levels of economic compensation (McGrath and MacMillan, 2000). The economy of an "entrepreneurial society" (Drucker, 1985) will be characterized by a high state of development; the US [1] has had such an economy since the 1970s and Taiwan since the 1980s.

Timmons (1999) points out that 23.7% of new startups fail within two years, and only 37.3% of survive past their sixth year. This shows that enabling a startup business to survive has always been formidable management challenge. Entrepreneurial management tasks include raising funds, finding partners, performing product development and testing, and launching products on the market, etc. While these tasks can be laid out in advance in a startup's business plan, such plans need constant revision over the course of the startup's development.

While past research has devoted extensive attention to the resources, finances and business plans, etc., of new startups, there have been few detailed descriptions of startups' nonlinear development. Most such descriptions are rather sketchy, including "full of risk and uncertainty" (Timmons, 1999; McGrath and MacMillan, 2000) or "a process involving a series of extemporaneous performances (Baker, Miner and Eseley, 2003). Furthermore, while business startups can be considered a type of context-dependent social process (Low and Abrahamson, 1997), most past startup research employed a relatively linear and static theoretical viewpoint. For instance, the theoretical model of organizations (Greiner, 1972), strategic model (Porter, 1980), and organizational stage theory or organization developmental stage startup model (Timmons, Smollen and Dingee, 1977) shed little light on the dynamics and detailed

[1]Peter Drucker (1985) quoted the *Economist* in his book "Innovation and Entrepreneurship": "Over 600,000 new businesses are started in the US every year. This number is seven times the equivalent figure during the prosperity 1950's and 60's. America's new businesses create a large share of new employment opportunities."

developmental processes of business startups. Timmons (1999) points out that "Whenever we want to rely on conventional models (such as psychological models or competitive strategy models) to analyze the developmental process of a new startup, we inevitably find that these models don't work." Timmons offers three reasons for this:

1. One-dimensional models attempt to isolate the common factors that enable new startups to succeed. This kind of approach can usually only find a small piece of the whole story.
2. Some systematic research attempts to find "the characteristics of successful new startups." Unfortunately this scientific approach is still in its infancy and is not very accurate; economics and strategic management researchers have devoted little attention to the development and performance of new startups.
3. Startups usually occur in the real world, and this environment lacks determinacy, predictability, stability, and constancy.

Because of this, we need a new theoretical viewpoint from which to investigate startups; this new theoretical viewpoint should help us determine the developmental process of new startups and extract management implications for the reference of entrepreneurs.

Literature Review

Up until recently scholars have mainly used "life cycle theory" to explore the development and growth of new startups. Nowadays, however, more and more scholars feel that "complexity theory" is better able to explain the development of new startups. The following section introduces these two types of theoretical viewpoints and examines the differences between them:

The Development of Startups According to Life Cycle Theory

Scholars commonly use "organizational life cycle theory" to investigate the issue of startup development[2]. In summary, this type of theory assumes that the startup

[2]Organization life cycle theory takes organizational growth to be a consistent and predictable process, similar to the human life cycle of birth, maturity, aging, and death. This theory's basic argument is like this: The organizational growth process consists of different stages, and an organization faces different problems in each stage. An organization must therefore possess different management skills, make different decisions, and have a different structure during each stage (Adizes, 1989; Greiner, 1972; Kazanjian, 1988; Miller and Friesen, 1984). While diverge greatly concerning how many stages there are in an organizational life cycle, all hope that life cycle models can be used as long-term planning and

development process follows predictable patterns, and these patterns can be developed into several sequential stages (Smith et al., 1985). This study compares some of the models proposed by various scholars in the following table. In this table, "stage content" lists management behavior and activities that should be noted by entrepreneurs.

In spite of the differences between the various life cycle models, their developers typically feel that the growth and development of enterprises is a progressive and linear process, and that all enterprises must face certain key problems during each stage (Kaulio, 2003; Kazanjian, 1988; Kazanjian and Drazin, 1990). Because entrepreneurs must overcome these problems before their business can enter the next developmental stage, this theoretical outlook assumes that startup development is predictable, and that entrepreneurs can plan management activities and adjust organizational structure ahead of time.

Table 2-1 Comparison of Accounts of Startup Development According to the Life Cycle Theory

Model	Scholars	Stage content
Three-stage	Bhave (1994)	1. Opportunity stage 2. Technology setup and organization stage 3. Exchange stage
Four-stage	Kazanjian (1988)	1. Conception and development 2. Commercialization 3. Growth 4. Stability
Five-stage	Galbraith (1982)	1. Proof of principle/Prototype stage 2. Model shop 3. Start-up 4. Natural growth 5. Strategic maneuvering
Ten-stage (Milestone model)	Block and MacMillan (1985)	1. Development of concept, completion of product testing

forecasting tools (Scott and Bruce, 1987). For instance, it is thought that managers can use these models to predict and understand problems that their organizations may encounter in a future stage, allowing them to formulate various response plans and strategies (Churchill and Lewis, 1983). Refinements of this model include the five-stage model of Greiner (1972), the ten-stage model of Adizes (1989), the four-stage model of Hanks and Watson (1993), and the three-stage model of Smith et al. (1985).

		2. Completion of product prototype 3. Initial financing 4. Completion of initial plant testing 5. Market testing 6. First batch production 7. Early sales 8. First competitive activities 9. First redesign or adjustment of direction 10. First major adjustment of prices

Complexity Theory

1.Nature of Complexity Theory and Influence on Management Theory

Since corporate organizations are a type of complex system (Stacey, 1996), we can use complexity theory to re-evaluate the applicability of past management theory. Due to the influence of macroeconomics, management theory originally developed in line with the concept of "closed equilibrium systems"[3]. While this type of management theory could be a reasonable and useful tool in the agricultural and industrial ages, the applicability of conventional management theory is severely challenged by the innovation, change, and uncertainty that prevail in today's business environment. Marshak (2002) has pointed out that, due to the emergence of information technology development and changes in the environment, major factors underpinning success in the industrial age, such as production and technological ability, certainty and stability, and independence and autonomy, have been supplanted by market- and customer-orientation, speed, flexibility and innovation, and mutual dependence and partnerships in the information age.

In its simplest form, conventional management theory addresses the question of why and how change occurs (Van de Ven and Poole, 1995). In contrast, complexity theory applied to management addresses the problem of "why and how a complex system can suddenly manifest as stable and orderly." What does this imply about the thinking of a modern corporate manager? Lichtenstein (2000b) compared

[3]Beinhocker (1997) proposed that such well-known management theories as five-forces analysis, structure-conduct-performance (SCP), and sustainable competitive advantage are all derived from industry organization (IO) theory, and industry organization theory is derived from macroeconomic theory. Contemporary macroeconomic theory felt that equilibrium is a kind of steady state; three major assumptions underlie a stable equilibrium: (1) the industry structure is known; (2) the law of diminishing returns; and (3) all companies are entirely rational.

conventional management thinking with management thinking influenced by complexity theory and uncovered six new types of management ideas: (1) Because change is the essence of a corporate organization, a manager's chief task is not to perform management and control, but to make best use of organizational and learning strengths to help the organization employ "order in the midst of chaos." (2) Organizational behavior is nonlinear: A tiny input can have a very large impact, while a great input may not yield any result at all. Because of this, a manager cannot use linear regression analysis to find variables. (3) The constituent elements of a system are mutually interacting, which also implies that activities and structures are mutually constituting: They occur simultaneously and have mutual cause and effect relationships. (4) An organization's deep structure is even more important than its visible surface structure. This deep structure includes, for instance, managers' intentions and the organization's identity. (5) Pressure, information flow, and authorization can be used to set off organizational change. (6) The job of a manager is to maintain an organizational structure allowing free information flow and changes in pressure.

Furthermore, many scholars stress the importance of self-organization in organizational development (Stacey, 1996; Wheatley and Myron, 1996; Beinhocker, 1997; Brown and Eisenhardt, 1998; Kelly and Allison, 1999), Here Wheatley and Myron (1996) proposed three important mechanisms–identity, information, and relationships–by which a corporation can achieve self-organization. So-called identity, which can also be termed organizational "sense-making" ability, refers to the tendency of employees to adopt actions while in the course of work or decision-making on the basis of their impressions of peripheral objects and events or their expectations of results. As Dutton and Dukerich (1991) explained, the degree to which organizational members understand the organization's image and identity will affect their actions. So-called information can also be termed the medium of the organizational process. While the flow of information may seem chaotic, self-organization can only be achieved when information is fully accessible to individuals. Relationships can also be termed the path to organizational construction. Information can be created and transferred, and identity can be expanded, as soon as an organization has relationships.

2.Development of New Startups from the Point of View of Complexity Theory

Startup development is dynamic, nonlinear, and unpredictable. Bygrave (1989)

used chaos theory as a metaphor for the process of group and organizational develop, and further suggested that chaos theory can be applied to the startup or new product development process. Chaos theory is what is defined as complexity theory in this study. In addition, since the development of a startup must begin with an initial event, as soon as this event occurs, the startup's development is in a dynamic state of co-evolution with management (Mckelvey, 2002), and it never achieves the type of equilibrium point seen in biological evolution. Furthermore, the development of a startup can be seen as the "creation of order" (Mckelvey, 2004); the use of complexity theory to study a startup's development allows us to observe how a new startup constantly creates new order.

How does a business startup create order? According to Prigogine's (1955) account, a complex system is a type of "dissipative structure," where the "self-generating" and "self-renewing" processes produced by the "dissipation" (rapid influx and consumption) of large amounts of resources cause the system's structure to be maintained. For instance, a whirlpool is a dissipative structure and the process of heating water to the boiling point also creates a dissipative structure. The effect of the influx of resources on a complex system is to cause the system to stay in a state of "continuous change." This is the way that an organization can continuously create new patterns in response to changes in the environment. In contrast, a more conventional system viewpoint would state that "an organization is a subsystem of the environment, and takes its resources from the environment; its goal is to maintain the harmony and consistency of the system and environment."

3.Comparison of Life Cycle Theory and Complexity Theory

Life cycle theory looks at the development of a startup from a relatively holistic point of view. It is specifically concerned about changes in the organization's structure from its birth to its death (Katz and Gartner, 1988). It should be noted, however, that Eggers et al. (1994) found that 30% of businesses do not have the progressive and linear growth process assumed by life cycle theory. Slevin and Covin (1998) found this to be the, " for an even higher 40% of businesses. While development of a new startup is subject to varied, inhomogeneous, dynamic, and complex phenomena, theories of the developmental stages of startups fail to account for the dynamism of this process.

The following table summarizes the different views of life cycle theory scholars and complexity theory scholars concerning startup development. Generally speaking, the basic assumption of life cycle theory is a holistic viewpoint. Life cycle theory regards organizations as stable systems that can achieve a state of balance. This theory also assumes that the environment is predictable and that change is therefore an "exception." In contrast, the basic assumption of complexity theory is an individual viewpoint. Complexity theory regards organizations as dissipative structures in a state of disequilibrium, and assumes that environmental change is a rule.

Table 2-2 Comparison of Two Views of Startup Development

Theoretical Perspective	Life cycle theory	Complexity theory
Basic assumptions	1. Holistic viewpoint 2. Organizations are stable systems, and can therefore achieve a state of balance 3. The environment is predictable and change is an exception	1. Individual viewpoint 2. Organizations are dissipative structures, and are therefore always in a state of imbalance 3. The environment is unpredictable and change is the rule
Main arguments concerning the development of startups	1. The development of a startup a progressive and predictable process 2. This process is constructed from different stages. Because an organization faces different problems during each stage, it should possess different management skills, make different decisions, and assume a different form during different stages 3. Startups will encounter a crisis during each stage. Whether a startup can survive and continue to grow hinges upon whether it	1. The development of a startup is a chaotic process 2. This process consists of a series of new emergent orders, and an organization therefore exhibits discontinuous growth. 3. Startups may encounter "thresholds" or "transitions"; a startup can exhibit a new order only after it surmounts such a threshold 4. It is difficult for entrepreneurs to make advance plans because they cannot predict what new order emerge. Entrepreneurs can rely on their vision, however, to guide the actions of other members of the organization and

	can manage these crises. 4. Entrepreneurs can predict what problems the organization will encounter in the future and map out response strategies and plans ahead of time, which will eliminate all uncertainty and change	maintain flexibility with regard to future development.
Relevant research and scholars	1. Greiner (1972) 2. Webster (1976) 3. Galbraith (1982) 4. Churchill and Lewis (1983) 5. Miller and Friesen (1984) 6. Block and MacMillan (1985) 7. Smith, Mitchell and Summer (1985) 8. Flamholtz (1986) 9. Ruhnka and Young (1987) 10. Scott and Bruce (1987) 11. Kazanjian (1988) 12. Adizes (1989) 13. Kazanjian and Drazin (1990) 14. Bell and McNamara (1991) 15. Dodge and Robbins (1992) 16. Holt (1992) 17. Hanks, Watson, Jansen and Chandler (1993) 18. Bhave (1994) 19. Carter, Gartner and Reynolds (1996) 20. Flynn and Forman (2001) 21. Kaulio (2003)	1. Bygrave (1989) 2. Stevenson and Harmeling (1990) 3. Gersick (1991) 4. Smilor and Feeser (1991) 5. Eggers, Lehey and Churchill (1994) 6. Stacey (1995) 7. Slevin and Covin (1998) 8. Lichtenstein (2000a) 9. Lichtenstein (2000b) 10. Lichtenstein (2001) 11. Peterson and Meckler (2001) 12. McKelvey (2002) 13. Dent (2003) 14. Chiles, Meyer and Hench (2004) 15. McKelvey (2004) 16. Lichtenstein, Dooley and Lumpkin (2005)

Research Methodology

Case Selection

This study is a qualitative, single case research. Compared with other research methods, a single case study can provide us with an in-depth understanding (March? et? al., 1991), and an in-depth look at the complex and dynamic phenomena involved is exceptionally important. In addition, by focusing on accuracy and validity, and not on generalizeability (Yin, 1984), a single case study can provide us the basis for a formative theory.

F company selected as the subject of this study (at the company's request, the company name and the names of respondents are given in the form of a code) is Taiwan's third largest manufacturer of flexible printed circuit boards (FPCs)[4] and has a market share of 10.85%. It currently has over 2,000 employees. F company had been in existence for six years in 2003. F company thus meets the condition of Timmons (1999) that "ventures are most suitable for research on startup development when they are in their first six years." F company began making a profit during its third year and went public during its sixth year. Its average income growth rate over the past four years was 95.31%. These facts show that it is successful and rapidly growing startup.

Data Collection

After confirming F company as the subject of this study, we then made the decision to collect data via interviews with company personnel, participative observation, and collection of on-file documents. The data collection period was from August 8, 2003 to February 2, 2005. This study organized a research team to perform data collection (e.g., Pettigrew, 1988). The use of multiple researchers offered the following two benefits (Eisenhardt, 1989): (1) The case could be investigated from different angles, making it easier to make new discoveries. (2) It inspired a relatively

[4]FPCs are manufactured from a soft dielectric base film, copper foil, and an adhesive. FPCs can be formed with a sandwich structure providing conduction, signal transmission, and connection functions and can accommodate the conductors and shapes of machinery. Because FPCs are made from light and soft materials, they are light, compact, bendable, and able to meet the needs of three-dimensional wiring arrangements. They are therefore commonly used in the internal components of light, thin, and compact electronics products. FPCs are widely applied in notebook computers, mobile phones, digital cameras, optical drives, and TFT-LCD monitors. They are a pillar of Taiwan's flourishing information industry and enable the design of light, thin, and compact 3C products.

high level of confidence in the research discoveries.

1.Personnel Interviews

The interviews conducted in this study were mainly with Mr. E, the company's founder. In addition, as the research probed more deeply, interviews were also conducted with four randomly-selected technology team members (P1, P4, P5, P6) and two managers (P2, P3). These persons all played important roles in F company's development; most of them are currently members of F company's upper management. The vast majority of interviews were recorded using an audio recorder and in the form of written notes. Records were transcribed as verbatim texts after the interviews were over. Annotations were made in each transcript to facilitate subsequent analysis. The transcripts were sent back to respondents to allow them to confirm their correctness (especially with regard to the use of terminology). Although a few interviews were not recorded, the researchers tried to write down the salient points of these interviews from memory as soon as possible after they had ended.

The following table summarizes the numbers of interviews and the positions of respondents, etc.:

Table 3-2 Summary of Case Interviews

Respondent code	**Position**	**Number of interviews**
E	President	19
P1	Vice president and head of Manufacturing Section	4
P2	Head of Financial Section	2
P3	Assistant manager, Audit Department	2
P4	Assistant manager, Sales Department	5
P5	Manager, Information Department	2
P6	Manager, Manufacturing Department	1
Total interviews		***35***

2.Participative Observation

The researchers observed the interaction between founder Mr. E and the upper management team when they first visited the company to conduct interviews, and found that this interaction was very open. For instance, Mr. E joked with P1 and patted him on the shoulder. Moreover P1 repeatedly emphasized that Mr. E is very willing to delegate authority. The researchers had an opportunity to tour F company's manufacturing areas with P3 as their guide during the fourth round of interviews, and this gave them a better understanding of the company's production equipment processes, and operating procedures. An even bigger opportunity occurred when founder E invited the researchers to attend two meetings at which venture proposals were discussed. A technology owner came to the first such meeting with a venture proposal and a sample of his product; this person explained his proposal to Mr. E in hope that the latter would provide funds enabling the owner to establish a startup and commercialize his product. The second meeting occurred after Mr. E visited a technology owner in hope that both parties could work together in establishing a startup.

3.Arichives

This study also used various other channels to collect secondary data. The collected secondary data included the company's annual reports, company bulletins, reports about the company and industry (in newspapers, management magazines, and the industry association journal), and industry analysis reports (ITRI ITIS and III MIC). This study paid particular attention to quantitative data when collecting secondary data, including data concerning the company's operating income, profits, capital, growth rate, number of employees, and scale of operations. This data was analyzed in different ways and is presented in this paper.

Data Analysis

This study first performed the preliminary coding of interview transcripts in order to conceptualize the raw data. Charts and graphics were used as much as possible to organize the data (Eisenhardt, 1989). For instance, this study organized major events in the company's history in chronological order, and then matched these milestones with a chart of the company's operating income growth. This approach

brought two major leaps in F company's development to the attention of the researchers. Furthermore, in order to put together a coherent account of the company's development, the researchers selected ten important events and activities and wrote "vignettes" about them (Bouwen and Steyaert, 1990). These vignettes became an important axis on which to chart F company's development.

It should be emphasized that this study's data collection and analysis were "overlapping" (Eisenhardt, 1989). This means that the researchers would perform data collection to find answers whenever they discovered additional questions during the process of data analysis. This iterated process also helped the researchers adjust the focus of their upcoming interviews in a flexible manner. For instance, apart from asking the respondents to clarify doubtful points via e-mail, the researchers felt after interviewing Mr. E that his "we still issue year-end bonuses even when we are making a loss" represented a key management action; as a result, subsequent interviews included asking respondents what they thought or felt about this policy. Any concepts obtained through data analysis were shared with the respondents because it was felt that this "co-inquiry" (Rowbottom, 1977; Bouwen and Steyaert, 1990) would let respondents become part of the research while also ensuring that the researchers did not misunderstand the respondents' meaning.

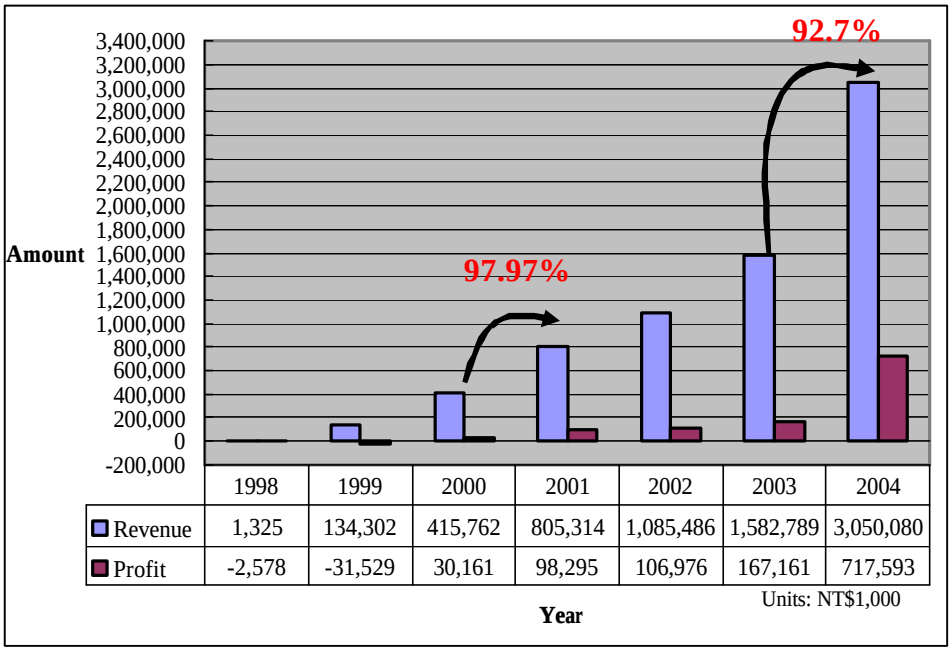
Analysis and Discussion

The development of startups is a chaotic process; startup growth tends to occur in leaps

This study discovered that F company had certainly not developed in a linear, continuous, and progressive fashion. F company tended to grow very rapidly after certain major events. In contrast to the "progressive development" assumed by life cycle theory, this growth process was nonlinear, discontinuous, and extremely rapid at times.

The two indicators "operating income growth rate" and "market status improvement" illuminated F company's growth leaps. F company first earned a profit in 2000, and enjoyed rapid operating income growth during each year thereafter. The company's growth rate stayed consistently above 30% (see Fig. 4-1). This study observed that the company's operating income growth was especially high during the periods of 2000~2001 and 2003~2004 (97.97% and 92.7% respectively). This

indicates that F company grew dramatically in size during 2000 and 2003. In addition, F company became the fourth largest supplier of FPCs in Taiwan during 2000, and its customers include such major information product manufacturers as Q company, Systex Corporation, ASUS, and Wistron, etc. Furthermore, F company became the third largest supplier of FPCs in 2003, and gained international customers including IBM, JVC, Sharp Matsushita, Optrex, Acer, and AU Optronics, etc. This clearly indicated that F company's market status had risen around these two points in time. F company first appeared on Commonwealth Magazine's "1,000 Largest Manufacturers" list with a rank of 907th in 2002, and advanced to 764th in 2003. This provides even more evidence of the company's growing clout in Taiwan's information hardware industry.



	1998	1999	2000	2001	2002	2003	2004
Revenue	1,325	134,302	415,762	805,314	1,085,486	1,582,789	3,050,080
Profit	-2,578	-31,529	30,161	98,295	106,976	167,161	717,593

Figure 3-1 F Company Operating Revenue and Profit Growth

Startups may encounter thresholds or transitions; startups can achieve create new order only by crossing these thresholds

Two indicators – "fiscal tension" and "internal conflict" – reveal when the system is facing the greatest pressure (Lichtenstein, 2000a), and confirm that a complex system may encounter thresholds in the course of its development. If a system cannot cope with pressure and tension, the system's internal perturbation and change will increase, and the system will fall into a state of chaos and may even

collapse. But a new order will emerge as soon as a system crosses a threshold (Dooley, 1997). The new order will bring with it something that the organization has not encountered before: A new organizational work framework (Gersick, 1988), a new controlling logic (Bettis and Prahalad, 1995), a new morphology (Katz, 1993), or new guidelines for the corporate strategy and culture (Lichtenstein, 1997; MacIntosh and MacLean, 1999).

A state of sustained losses caused F company to experience an unprecedented crisis. After seeing F company lose NT$20 million each month, the board of directors delivered an ultimatum to T1, demanding that he make F company profitable within three months. Conflict increased steadily as the technology team became more and more dissatisfied with T1, and the technology team almost fell apart. P5 explained:

> *When the four of them were at a meeting at that time…a lot of voices were raised. T1 was really frantic then, which was because he just had no control over a lot of things! It was also because rumors were going around that T1 was going to be ousted. So many employees weren't willing to go along with him. For instance, they didn't obey his orders or delayed shipments…that kind of thing.*

Founder E then decided to reshuffle the company's upper management in an effort to resolve the crisis. He demoted T1 to technical consultant, took over as general manager, and tried to ease the conflict in the technology team. E not only personally led sales personnel in finding orders from large manufacturers during this period, but also took the lead in establishing a cost control system. He had each product's target cost, price, and profit recorded in a database, so that departmental heads could consult this information at any time. E stated:

> *After we made our finances and cost control very transparent, our first grade managers and even all managerial-grade personnel were able to query detailed items for each month. I tried to make it clear which product items were earning money, which were profitable, and which were losing money. All the managers could look this up. Not many companies are so bold.*

After E became general manager, F company passed Q company's review in February 2000 and became a certified vendor. F company subsequently received its largest amount of orders to date in July of the same year; these orders were worth several tens of millions of NT dollars. Becoming a certified vendor to Q company made F company a member of the information industry's global division of labor system, and enhanced the visibility of its brand. F company afterwards began

receiving orders from other major notebook computer manufacturers, including Systex, ASUS, and Wistron. P1 recalled:

> *Because Q manufactured computers for Dell, receiving those orders from Q was like getting orders from Dell. Both of these companies are world-class manufacturers. Our name gained a lot of recognition after we received their certification. We also made sure that those FPCs were especially well-made. Afterwards Q basically took its orders away from its other vendor and gave them to us. The Q orders accounted for about 60%~70% of our entire output.*

A new order emerged after F company crossed this key threshold: F company enjoyed an average operating income growth rate of 95.31% and an average gross profit growth rate of 162.57% during 2000~2003, and it successfully went public in 2003. As far as market status was concerned, the company became a supplier to other major information product manufacturers, and was soon the third largest FPC producer in Taiwan. F company developed a "central kitchen strategy" to fit into the international division of labor. As for its organization structure, it acquired a new upper management team. Its corporate culture shifted from technology-oriented to cost-oriented and customer-oriented. These changes all appeared after 2000, which makes it clear that startup businesses must indeed surmount key thresholds before they can achieve previously unimagined results.

Because entrepreneurs cannot predict the emergence of new order, it is difficult for them to make advance plans; entrepreneurs can, however, rely on their vision to guide the actions of other members and maintain flexibility with regard to future development

Weick (1995) declared "we can rely on intense willpower to create an environment." Entrepreneurs must face an extremely uncertain environment, including market uncertainty, technological uncertainty, management uncertainty, and funds uncertainty (Gartner et al., 1992). In the face of this uncertainty, entrepreneurs can give rise to a blurred vision, and use this vision to guide corporate behavior and the actions of organizational members. An entrepreneurs' "vision" can be an important factor steering the development of a startup (Greenberger and Sexton, 1988). A vision lets employees know the startup has room in which to exercise its talents, and gives the company and the individual a future. A vision can causes employees to commit themselves to the company:

The better people were starting to think about jumping ship; they would look for a better industry if this one wasn't good enough. If the industry had promise, but the company had too much internal conflict, and there were a lot of competitors, they would look for a stronger company. The best way to keep these people was to show them some bright promises for the future. Just giving them raises wasn't necessarily enough to keep them.

After a vision has been established, an entrepreneur can delegate authority to the company's members and encourage them to try to take advantage of market opportunities. For instance, an entrepreneur can give managerial authority to the company's technology team and also pay them in stock options. After receiving authority from the entrepreneurs, the technology team can rely on its experience to perform design work for customers. Having been given this opportunity, and not having any predetermined target markets, the technology team at F company did its best to expanded the company's recognition. Thanks to the founder's authorization, F company had thirty or forty customers by the second year, and had designed more than one hundred product types. F company gradually accumulated recognition via this process, and came to understand the industry's characteristics. The founder felt that this learning process was necessary:

We didn't have a clearly-defined goal at that time. I gave the technology team the authority to pick markets for us, and they had opportunities to make designs for customers. They tried for a while, and their performance still wasn't very good, so I gave them another chance. I told them to propose a plan. That was a time of groping, and even I was groping. This learning process was very important to F company's development.

The founder was very tolerant of mistakes when he was encouraging members to try all kinds of possibilities. The following two examples show how the founder was tolerant of employee's errors. Although first general manager T1 failed to lead F company to profitability and was asked by the board to step down, the founder knew that T1 was an outstanding technologist, and asked him to serve as the company's "technical supervisor" with the same salary as he received while general manager. E even gave T1 some money as venture capital when the latter decided to leave the company and start his own business. And although F company suffered losses during its first two years, founder E still gave all employees year-end bonuses. He told his employees:

Everyone worked very hard throughout the year. Although our performance left

something to be desired, I still know that you put up with a lot of hardship. While you didn't perform well in the eyes of our stockholders, you are still a very talented bunch in my eyes. It would have been an absolute disaster if other people had been working here; as it was, it was bad but not that bad. I am going to tell the board that I will borrow more venture capital this year. Everyone must take care of their families, so we will still issue two months' salary as a year-end bonus.

The actions of founder E boosted morale and inspired employees to commit themselves to the company. It also created a sense of revolutionary solidarity:

We felt that if the company was willing to take such good care of us when it was losing money, it would certainly take even better care of us when it became profitable. This line of reasoning caused everyone's morale to rise steadily. Not more than ten people actually quit…We all experienced a sense of revolutionary camaraderie. We would exert our collective strength to hold back anyone who was thinking of leaving. This cohesive still exists at the company.

Management Implications

Complexity theory provides a new point of view from which to observe new startups. This theory shows us that the development of startups is indeed a nonlinear, chaotic process, which is completely different from what life cycle theory would lead us to expect. This study has used a real, " to shed light on the development of a business startup, and then extracted several management implications for the reference of entrepreneurs.

The development of a startup is a chaotic process. The environment is constantly changing, and even a tiny change may lead to completely different results. Entrepreneurs should remember that change is the rule and not the exception. They should try to embrace chaos and accept that a startup's development process and future are not under their control. They should try to steer the startup by adapting to conditions, and try to maintain balance while the startup grows in leaps.

A startup will certainly encounter thresholds, and crossing a threshold is the only way to let a new order emerge. An entrepreneur can try any of several approaches when confronting a threshold: Initiating organizational reforms, patching together resources, sharing information, and developing core values. These actions can give a startup lasting new energy and resources. Self-organization will arise as soon as information and resources can flow quickly through the organization, letting the startup cross the threshold and manifest a new order.

Although the future cannot be predicted, a vision can provide the members of an organization with a direction inspiring effort and teamwork. A vision can also guide the actions of an organization's members. Entrepreneurs should maintain a flexible, open attitude towards all market opportunities. They should grant members decision-making authority and autonomy, encourage them to try all kinds of experiments, and be tolerant of their mistakes.

This study obtained deeper insights concerning the development of startups via reasoning from the point of view of complexity theory and analysis of data from a real case. If entrepreneurs can use new methods to manage startups, they will be able to maximize their chance of success.

Perspective of life cycle theory	**Perspective of complexity theory**	**Management methods**
The development of a startup a progressive and predictable process	The development of a startup is a chaotic process exhibiting growth leaps	• Embracing chaos • Harnessing and not controlling
This process is constructed from different stages. Because an organization faces different problems during each stage, it should possess different management skills, make different decisions, and assume a different form during different stages	Startups may encounter "thresholds" or "transitions"; a startup can exhibit a new order only after it surmounts such a threshold	• Organizational reform • Resources Patching • Sharing information • Developing core values
Entrepreneurs can predict what problems the organization will encounter in the future and map out response strategies and plans	It is difficult for entrepreneurs to make advance plans because they cannot predict what new order emerge. Entrepreneurs	• Empowerment • Encouraging experiments • Tolerating members' mistakes

ahead of time, which will eliminate all uncertainty and change	can rely on their vision, however, to guide the actions of other members of the organization and maintain flexibility with regard to future development

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