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FAMILY SYSTEMS, FAMILY BUSINESS SYSTEMS AND SYSTEM DYNAMICS *

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ABSTRACT

This research seeks to understand the dynamics caused by the intersection between two systems that have been used as approaches to understanding the family and family businesses. Initially, approaches to understanding families taking a systematic or process approach have focused on the needs of family therapists often using communication roles or goal seeking behavior) as foci. Family business research has also taken a system approach with respect to both time and family sub-systems. This paper looks at the interactions of these two systematic approaches to examining families and families businesses using four concepts from system dynamics. The impacts of path dependence, carry capacity, goal adjustment behavior and the tipping point concept are applied to both systems, using a computer simulation model, to develop a more comprehensive approach to examining family business dynamics and the interactions between the family system and business system.

Keywords: Family business, Family systems, System dynamics.

INTRODUCTION

A number of frameworks have been used to help explain the degree to which a family is dysfunctional (White & Klein, 2008). These include functional (Swenson, 2004), rational choice (Sabatelli & Shehan, 1993), symbolic interaction (Burr, Leigh, Day & Constantine, 1979), family life course (Bengtson & Allen, 1993) and systems frameworks (Broderick, 1993; Pieper & Klein, 2007). An equal number of factors have been examined and shown to be important to the success of the family business. These include trust (Steier, 2001; Sundaramurthy, 2008), succession (Gantisky, 1995, Sharma, Chrisman & Chua, 2003; Stavrou, 2003), effective management of estate issues (Knight & Knight, 2002; Drake, 2008), governance (Neubauer & Lang, 1998), resources and capabilities (Habbershon, Williams & MacMillan, 2006; 2003) and the degree of family ownership and management (Westhead & Howorth, 2006). There has been a broadening in the number of factors considered important to the functioning of the family firm (Diebicki, Matherne, Kellermans & Chrisman, 2009) and the family (White & Klein, 2008), which indicates that there is a growing awareness of the complexity associated with examining both of these units. This is not to say that each

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field does not have some debates about their appropriate research boundaries (Moore, 2008). Debate about what is central to a field is important (e.g. Bowman, Singh & Thomas, 2002) but recognizing that what is considered central is also affected by external factors and those that are considered less central. Family business scholars often include the family in their research although the reverse, family scholars including family business, is much less common. However, there are only a few efforts that examine them in an interrelated or systematic way in family business research (e.g., Stafford, Duncan, Dane & Winter, 1999; Habbershorn, Williams & MacMillan, 2003) and none as a central theme in family research. For instance, Broderick's (1993) book length review of family process theories covers the topic in one subsection that covers a single page and suggests that the reciprocal effects need more research attention.

This research is focused on building on the existing system frameworks used in research on both the family and family business. Systems research has tended to view families and family businesses as open systems, at the theoretical level. However, at the research level boundaries are normally drawn in an effort to make the model more parsimonious. It makes it easier to understand interactive system-wide effects that affect the function of both the family and the family business (Ward, 1987; Gersick, Davis, Hampton & Lansberg, 1997; Distelberg & Sorenson, 2000; Pieper & Klein, 2007, Chirico & Colombo, 2008, Litz, 2008). The links between family systems and business systems and the degree to which they are interrelated can be more easily seen using a systems approach. This is especially important with respect to lagged effects where it is normally extremely difficult to effectively identify cause and effect.

There are a large number of system concepts but four are particularly useful in enhancing our understanding of the interactions between family systems and family business systems, especially with respect to their success or failure. These are path dependence (Pólya, 1931), carrying capacity (Hardin, 1968; Moxnes, 2000), goal seeking behavior and correction (Serman, 2004) and the tipping point concept (Andersson & Pearson, 1999; Repenning, Gonçalves & Black, 2001, Ford, Taylor & Johnson, 2005, Taylor and Ford, 2006). One of the objectives of this research is to incorporate these concepts into the family-family-business system model to see if they are useful in enhancing our understanding of the underlying causes that drive functionality in both of these complex systems.

SYSTEM THEORY AND SYSTEM DYNAMICS

General system concepts such as feedback have an extremely long history. Mayr (1970) dates them back to Ktesbios invention of a water clock in Greece in 250 B.C. Contemporary efforts to develop the basic concepts related to system approaches came from engineering and cybernetics (Wiener, 1948, von Bertalanffy, 1968; Richardson, 1991) but they have been found to be useful in a number of fields. One field that has fully embraced these approaches is system dynamics, which was developed by Jay Forrester in the early 1950s at M.I.T. (Forrester, 1961). Forrester believed that most social systems are complex multi-loop systems that can only be understood using computer simulation, although later adherents have also put an equal emphasis on causal maps (Senge, 1990). Absent an understanding of system dynamics, policy makers tend to focus on fixing symptoms rather than their underlying causes (Ford, 1999). System dynamics often involves the use of computer simulation models that "give people a more effective understanding about an important system that has previously exhibited puzzling or controversial behavior" (Forrester, 1987, p. 136) or systems diagrams that depict interrelationship and feedback loops (Senge, 1990). Both family systems and family business system involve interrelated factors and feedback effects, which suggests that a system dynamics approach may be a useful way to better understanding their behavior.

In general, a systems approach attempts to look at factors as interconnected, and often affected by external environmental events. Thus, they are open, at least to a certain degree, and also subject to feedback effects from other factors in the system. Changes in one factor that can impact other factors and feedback from the impacted factor can then have either a positive or negative impact on the original factor (Miller, 1978). These system type effects can occur in living systems, individuals, organizations, groups or even industries. In fact, some of Forrester's (1971) early research modeled the entire world to identify the global impact of current rate of extraction of natural resources and the sustainability issues associated with their current rate of use.

A systems approach is helpful because there is a tendency to look at things in a linear fashion. Senge (1990, pp. 74-75) points out that even filling a glass with water can be viewed as a system where the position of the faucet determines the water flow, the current water level in the glass determines the gap between the water-level and the top of the glass, and as the "water approaches the desired level, we adjust the faucet position to slow the flow of water." It is the recognition of feedback loops in systems, such as goal-seeking behavior, and adjustments made to reduce gaps between the current state of the family or family business and the goals associated with each entity that makes examining problems at the system level so useful in terms of enhancing our understanding of complex problems (Weick, 1979; Richardson, 1991). An easy to understand feedback system is a thermostat that adjusts a home's temperature higher or lower depending on the information it receives about the home's current temperature. Another example is rockets that are able to engage in self-correcting adjustments from information about their current trajectory (von Bertalanffy, 1968). Many other systems react in the exact same fashion, although the delays are usually longer and harder to detect, which often results in inappropriate solutions and in family settings there is some deliberate decisions being made that affect the family and family business outcomes. These feedback loops form the basis for system dynamics research (Forrester, 1961) and together with reciprocal influences were elements that Pieper and Klein (2007) identified as missing from family business research. In many cases it is impossible to visualize these feedback effects because they are too complex, especially when systems involve third, fourth or even higher order effects, without the assistance of a tool such as computer simulation or causal maps (Miller, 2006).

Family System Theory

Some of the earliest research on families also places them as part of larger systems such as Le Play's 1855 research on the interplay of families and work as a means to improve their status (Le Play, 1982) and Thomas and Znaniecki's (1918-1920) five volume work that showed how community disintegration led to high levels of family breakdown among Polish emigrants. More recent clinical research had a different focus and although viewing the family as a system, saw it as one that caused individual family members to become dysfunctional (e.g., Bateson, Jackson, Haley & Weakland, 1956; Wynne, Ryckof, Day & Hirsch, 1958; Vogel & Bell, 1960). These early clinical research efforts were designed to help therapists better understand how certain behavior by family members resulted in other members developing serious mental problems. For example, Gregory Bateson and his colleagues (Bateson et al., 1956) developed a double-bind theory where "the 'victim'—the person who becomes unwell – finds him or herself in a communicational matrix, in which messages contradict each other" (Gibney, 2006, p. 50). This represents a situation where a person feels "dammed if I do and dammed if I don't," which they theorized caused schizophrenia (Batson et al., 1956).

There is also a strong tradition of family systems research that focuses on the nature and impact of communication with the impact of family member communication on each

other as their main focus of inquiry. For instance, Noller and Fitzpatrick (1993) developed a model of family communication, the intimacy-conflict-parenting style family functioning model. Ineffective communication is seen as a cause of family conflict. However, the reverse does not appear to be true and Vuchinich (1987) found that there are three episodes of conflict at a typical family meal but that these are actually helpful in terms of promoting communication, although they seldom lead to compromise. It is only when these conflict situations reach some kind of chaotic stage that they are likely to spill over to other areas such as the family business (Noller & Callan, 1991). It should be noted that in their extensive review Noller and Fitzpatrick (1993) show that most research involves examination of only a single family and not the multiple families often involved in the operation of a family business.

In describing the existing family systems research, Broderick (1993, p. 37) points out that extant research has “led to the general conclusion that the family is an example of an open, ongoing, goal-seeking, self-regulating, social system.” Conflict and discord in one family can spill over to other families, and this is especially true in family businesses because family members’ task roles are overlapping. Although the relationships between the family business and the family are not often discussed by family system researchers, the fact that they view the family as an open system recognizes that the family would likely be affected both positively and negatively by events in the family business, even if not actively involved in the management of that business.

Family system and process theories make their contribution by linking family research to family business, not because they directly link the two in any systematic fashion but because they focus more on the entire family system and their frameworks included the family at the individual, sub-group and extended family level (e.g., Kanton & Lehr, 1975; Rosenblatt, 1994; Broderick, 1993; Broderick & Smith 1979). Family process system research recognizes that families are open to external influences implies, although not explicitly that the two could influence each other.

In terms of operationalizing a family system, Broderick and Smith (1979) provide a comprehensive discussion of the features of such a system. In general, they follow the general concepts of system construction by including inputs, rules for transformation and outputs. The transformation rules are what account for feedback effects, which can either be self-reinforcing or correcting. For example, a family member “A” may engage in hostile behavior toward family member “B.” Depending on how family member “B” processes the behavior and what transformation rule they use, the conflict will either escalate or dissipate. They also reveal how intractable it can be to express these relationships with their illustration of rates of system level hostility that just involves the husband and wife (Broderick & Smith, 1979, p.118). They adapt Rapoport’s (1960, p. 20) mathematical equations that he used to model an arms race. The two equations are:

$$(1) \frac{dx}{dt} = ay - mx \pm g$$

$$(2) \frac{dy}{dt} = bx - ny \pm h$$

“The terms x and y represent the amount of hostility the husband and wife, respectively feel toward each other....The terms a and b stand for the degree to which each partner’s hostility is dependent upon his spouse’s level of hostility.... m and n are the costs to each of his or her own hostile feelings.” Finally, g and h , if positive are measures of a history of hostility but if negative represent a history of rewarding experiences. While this approach is precise, it would become intractable mathematically with the addition of terms for more family members and the family business. A complicated set of equations would also lack the visual clarity that facilitates theory building using systems diagrams.

Those involved in the development of family process or system models have made great strides when contrasted with their earlier focus on fairly narrow functional items.

However, their approaches still are mostly linear and family business issues are lumped in with the vast array of environmental forces that can affect any open system. In addition, while many family researchers use psychological and sociological approaches they tend to view business as an applied discipline and one that is not one of central interest to their field, especially those researchers involved with clinical research and practice. It has been suggested that family business researchers link with those in other fields to enhance our theoretical contributions (Stewart, 2008) but it may be necessary to start that linkage on the family business side of the research table, especially with respect to interactive system research, which is the main focus of this research effort. Thus, while this effort is focused on family business outcome it includes family dynamics as an input and in this way hopes to make a contribution to both fields.

Family Business System Theory Perspective

The evolution towards including the family business as linked to the family system was a predictable one. Even in fiction, Thomas Mann's (1924) novel traces the rise and decline of a German mercantile family, the Buddenbrooks, in which the interrelationship between the family and the family business is fairly explicit. In the end the family declines and the business is sold off for lack of a competent successor. Issues related to governance, bringing family members into the business, family conflict, bad marriages and a host of other family and business issues impact on both the family and the business, with the reader first seeing the subtle factors that lead to success and then the one's that lead to family decline and business failure.

On the academic side, one of the earliest works that connects the two in a systematic way is that of Miller and Rice (1967, p. 107), who were really studying organizational structure but had two chapters that examined the "problems created for family businesses by the modern structure of the family and prevailing social values," as well as the impacts of economic and technological change. They viewed these factors as so difficult to cope with in a family context that they concluded "that a modern industrial enterprise can survive as a family business only with the most exceptional of families" (Miller & Rice, 1967, p. 125-126). Miller and Rice's (1967) introduction of a multi-task system model, where the members of a sentient group had to cope with both business and family tasks, highlighted the reasons for the frequency of conflict in both systems. Other early efforts, such as examining the degree of intentionality and capability, showed how family characteristics could affect business performance (Davis, 1983) and how the degree of overlap between family, ownership and management help explain the attributes associated with the family business (Davis & Tagiuri, 1989).

Lansberg (1983) developed a two-circle model that included both family and business norms, with the area where they overlapped as the area where founders faced the most difficult issues. This is interesting because Lansberg was the co-author of a book that expanded his model and introduced a three-circle model that included business ownership, family and family business management (Gersick, Lansberg, Davis & McCollum, 1997). This three-circle system model results in seven separate areas of concern and helps explain the complexity of management of a family business and why it is logical for people occupying different sectors to exhibit different responses. Where people sit in the system will affect their perspective with those who have family-ownership-management positions being different from those who are just occupying one position, such as just being a family member. Gersick et al. (1997) point out that we need to understand the entire system, although understanding it does not mean that we will not end up with family-first, owners-first, management-first and numerous boundary condition family firms.

There has been ongoing interest in these system approaches with Sundaramurthy and Kreiner (2008) proposing a two circle system model where the degree of overlap is related to family members ability to segment their family roles from their business roles. The family embeddedness model developed by Aldrich and Cliff (1993, p. 590) includes a series of transition factors such as marriage, childbirth and employment that impact on the business, at least with respect to opportunity emergence and recognition. They link these events to measures of objective performance and subjective success, which provides a system link between the family and the family business. Habbershorn, Williams and McMillian (2006) also link the family to the business in a systematic way that relates to the ability to formulate effective strategy by pointing out that some of the factors that build a sense of “familiness” can also help the family firm develop competitive advantage, which they viewed “as the summation of idiosyncratic...bundle of resources and capabilities (Habbershorn, Williams & McMillian, 2003, p. 460). Because of the nature of families and family businesses it is extremely difficult to demonstrate these systems empirically, although the Habbershorn et al. (2006) model has many characteristics of a system model.

The systems model most directly related to this research is the sustainable family business model developed by Stafford, Duncan, Dane and Winter (1999, p. 204), which shows constraints and resources at both the family and the business as important in handling disruptions and important to the level of achievements in both the family and business in both times of stability and change. Although, there model does not depict feedback loops, it links sustainability to the level of both objective and subjective success in both units. Thus, one could assume that lack of achievement would cut into the resources of both the firm and family and have the opposite result, although the sustainability model is clearly focused on identifying factors and a process that leads to sustainability of both family and family business. Their model’s inclusion of both family and business sectors with equal levels of detail is also a feature on which this research builds its model.

SYSTEM CONCEPTS

It is useful to briefly discuss some system concepts before proceeding to the research model. In taking a system approach it is important to note that the system is the unit of analysis, although it is affected by individual, family and firm level factors. It is also necessary to draw a boundary, even if the family and family business are affected by numerous exogenous factors. For modeling purposes even open systems need boundaries. The adequacy of the boundary can be assessed by trying to determine if the behavior of the modeled system would be dramatically affected if the boundary assumption was relaxed (Barlas, 1996). Thus, of necessity the model is not intended to fully include every factor that might have some impact but rather to ensure it contains those factors that help us understand the system dynamics of interest.

In this research four concepts from systems theory are going to be used to try to better understand the interactions between the family system and the family business system. These are path dependence, carry capacity, goal adjustment behavior and the tipping point concept and the feedback loops impact associated with these impacts. In this senses, although the model here builds on the sustainable family business model’s approach (Stafford et al., 1999), it is more focused on the reasons why most family firms are not sustainable in the longer term.

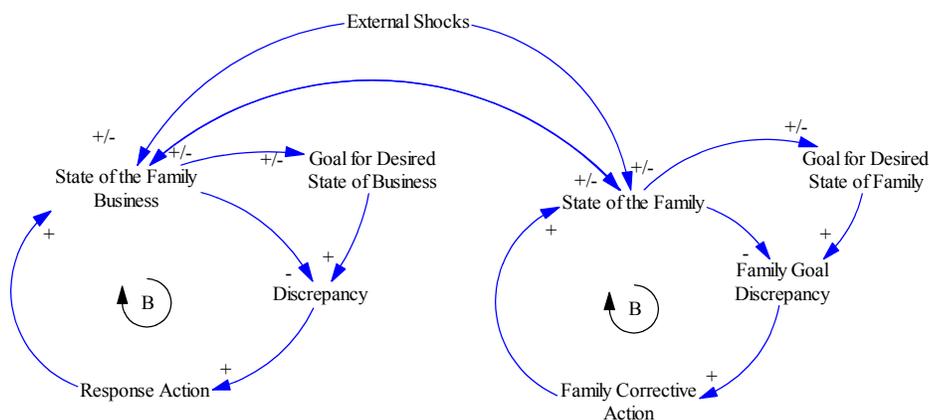
Goal Adjusting Behavior

Goal adjusting behavior will be discussed first because other system effects are usually seen when they impact the goal setting or adjusting behavior of the family and the family business. It is also useful because it provides an opportunity to introduce the entire

model. In a system context goal seeking involves negative feedback in the sense that some percent of the performance gap is targeted for reduction during each time period. There is a desired state (goal) in all systems and there is a current state of performance. When the current state is less than the desired state this triggers a negative feedback process that acts to close the gap between the current and desired state (Sterman, 2004). In a business context the adjustment can involve objective indicators such as sales, productivity, project completion, hiring and various financial indicators as well as subjective factors such as worker satisfaction or a desired corporate culture. The same is true in the family where both quantifiable issues such as resources and subjective factors related to the level or harmony or support can be important goals for members.

The family business model depicted in Figure 1 links the goal setting systems for both the family and the family business. The arrows show the direction of the influence with the sign at the end of each arrow indicating its polarity. A positive sign indicates that a change in the factor at the base of the line, in either direction, will have the identical directional influence on the factor at the tip of the arrow. The relationship is somewhat different than a correlation and could be interpreted, for example as an increase (decrease) in the “state of the family business” will result in a decrease (increase) in the “discrepancy” larger than it would have been without the increase in “state of the family business.” There are other reasons the “discrepancy could decrease such as a reduction in “goal for desired state of business.” The “B” in the center of each of the two systems indicates that these loops are balanced, in the sense that they are self-correcting and should not explode or implode. For a system to be stable it must be balanced so that it neither increases nor decreases forever.

FIGURE 1
System Dynamics Model of Family and Family Business Systems



Kantor and Lehr (1975, p. 12) suggest that family systems are “purposive and goal-seeking” and that feedback is an essential feature in this process. They introduced the concept of a member of the family who serves as their comprador, by monitoring the family system. The comprador determines when an error message should be sent to the members in an attempt to reduce some deficiency. Obviously, the “state of the family” involves more complex and subjective measuring tasks than some related to the family business but the systematic effects are similar. In addition, it must be recognized that there is no one single family goal and that different members of the family may have conflicting goals. Thus, it would be normal to expect that the sum of all these goals would be extremely difficult to meet and that it would be normal for there to be a goal discrepancy. It would also be normal

for individuals to adjust their goals upward or downward in response to current conditions. Thus, the state of the family is a complex measure of the goals of individuals in the family and as Broderick (1993, p. 42) points out “identifying the prime directives of a family system is not easy” because they also change over time as the family’s conditions and features change.

The same goal setting behavior exists in most business systems and in many organizations this has been formally incorporated into the annual strategic planning process. While the planning and goal setting process tends to focus on objective performance or cost indicators, organizations also have subjective factors to consider such as employee relations, customer satisfaction, and maintaining a good public image. In terms of achieving these goals the family member manager may have to give priority to enhancing the state of the business at the cost of doing so for the family or vice versa. The notion that all the family and business goals can always be achieved is not realistic and tradeoffs have to be made. As long as the tradeoffs are not too excessive in favor of either unit both the business and the family should remain functional.

Many of the factors in the family system and family business system have the potential to exhibit both positive and negative polarity, in response to both external and system shocks. If the state of the family or the business becomes dysfunctional, in terms of maintaining some level of goal achievement, this will also affect other parts of the system. The same thing happens if either unit is unable to deal with external shock that draw on the resources and capabilities of either the family or the business, which means that it is important to try to keep both systems balanced. When either gets too distorted both systems can undergo ruinous effects as occurred with both the Bingham (Jones & Tiffit, 1991) and Mondavi (Siler, 2007) families where the spillover between family and business affairs affected both units in a negative fashion. Thus, in terms of the research model depicted in Figure 1 we can expect that the goal setting systems, if functioning properly, should keep both systems operating effectively.

Proposition 1: The goal setting systems of both the family system and the family business system should exhibit balanced behavior in their equilibrium position if business and family functionality is to be maintained.

Path Dependence

Path dependence is a concept from system theory that helps enhance our understanding of family businesses and families as interrelated systems. Path dependence helps explain why we drive our cars on the right side of the road in some countries and on the left hand side in others, why we maintain an inefficiently configured typing keyboard and why we have the railroad gauge that we have. At some point, early in a process a random choice is made that provides strong positive feedback that causes some factor associated with that process to dominate the system (Sterman, 2004). George Pólya (1931) developed an experiment involving black and white stones in an urn to show how a random early choice would come to dominate the color of the stones in a particular urn. The color of the early stones determines which color will come to dominate the population of stones in the urn.

In families and family businesses, history also matters. Random decisions or actions taken early in the family’s or business’ history can influence the number and nature of future options and the final configuration of the family and the firm (Habbershorn, Williams & MacMillan, 2006), which can have an impact on the sustainability of both units. Schulze, Lubatkin and Dino (2003, p. 477) suggested that current and past child-parent relationships “influence the nature of agency relationships in family firms.” Broderick (1993) includes a family archival function in his schema of the family self-regulation function, which contains information that influences family goals policies and priorities. When these regulations get

firmly established that act to limit options, which can be non-beneficial when disruptions occur.

Path dependence become especially relevant at the point of succession, where children are likely to engage in a wholesale adoption or rejection of the organization's history and both approaches are normally less than optimal (Miller, Steier & Le Breton-Miller, 2006). The use of genograms as a clinical tool by family business consults also indicates that they tend to see past history as important in explaining current behavior (McGoldrick, Gerson & Shellenberger, 1999) and help families understand that certain process that they accept are the result of decisions made by earlier generations.. In placid environments path dependence keep both the family and the family business systems on course and that can be good if staying on course is the appropriate thing to do. However, in case of environmental turbulence at either the family or business level path dependence may lead to inaction and then to business failure or a dysfunctional family.

Most organizations are also path dependent in the sense that "firms must follow a certain trajectory or path of competence development" (Teece, Pisano & Shuen, 1997, p. 515). The same thing occurs in computer simulation exercises that are often part of business courses. The student team's first set of decisions and the initial outcome of the simulation program makes all the participating groups' path dependent on their first set of results. That is not to say that an organization is trapped because it is possible that they can learn and change their path (Cyert & March, 1963). In family businesses changing paths is complicated by family relationships. For instance, in the case of the Bingham family the family patriarch could not bring himself to tell his son he was just not up to running the newspapers, so he sold the firm (Tiffit & Jones, 1991). He only revealed his reasoning after the fact. In this case it may have been possible to have inserted professional management if the lines of communication, with respect to performance appraisal, could have taken a more professional business approach.

Path dependence occurs within families that establish routines that become the established way to doing things and of interacting. Using the metaphor of a river to represent a family, Rosenblatt (1994) showed how families become path dependent or a product of their history. He pointed out that as a river flows it "cuts its path, and that path constrains it" (Rosenblatt, 1994, p. 45). Families also cut a path in terms of making commitments to various things such as religion, location, education and friendships, which then also act as constraints on family behavior. He point out that unlike a business, a break at the family level does not just involve an individual break but also a break from family members and even ancestors. Sundaramurthy and Kreiner (2008, p. 425) in exploring the degree to which family members were able to separate their business and family identities suggested that "comingling of family and business identity" would likely lead to a condition where both family and business are likely to be more path dependent. In terms of system behavior this means that starting positions and early decisions are extremely important and the introduction of exogenous shocks can actually enhance the functioning of both systems because they are needed to induce change but it is necessary to recognize that path dependence at both the family and business level make radical change more difficult.

In terms of the model in Figure 1, the external shock factor is what would normally lead to a family or family business to make adjustments. However, even external shocks are less likely to nudge either system from its path dependent trajectory in areas still guided by earlier choices about how things should be done that are no longer optimal. Absent an external shock, families and family businesses would normally view continuing with the present behavior as the norm, even if an objective outsider would prescribe changes at both the family and family business level. This is why the below proposition suggests a high

degree of ossification when respect to changing from well-established path dependent behavior.

Proposition 2: Family business and family systems will continue with path dependent behavior even in the case of external shocks to either system.

Carrying Capacity

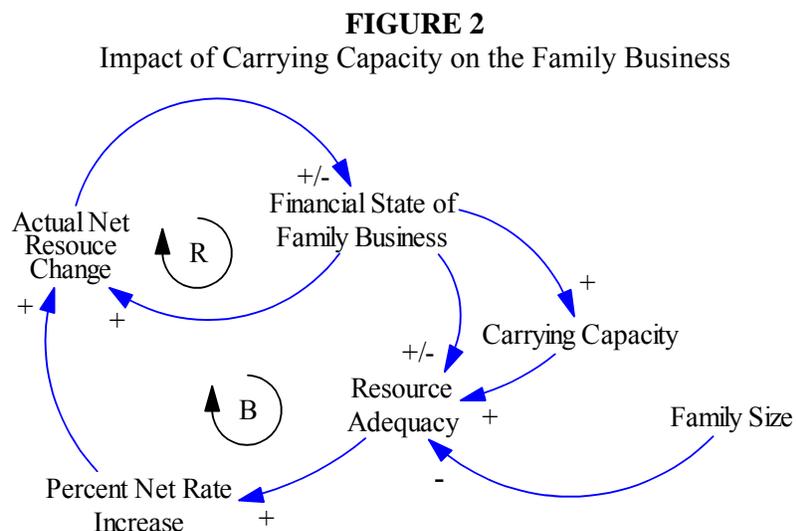
Carry capacity, a term often used by freight companies to describe the maximum tonnage a ship or truck can carry, is also used to describe the carrying capacity of systems and the assumption is most systems do not have infinite carry capacity. Eventually, there is some constraint to growth but there are likely to be negative consequences to the system before the constraint is met in many cases. Much of the research in this area relates to the ability of the environment to absorb something such as population or pollution growth (Ehrlich & Holdren, 1971). For example, the inability of Easter Island to supply sufficient wood for boats needed for fishing by an increasing human population (Sterman, 2004) or of the Kaibad plateau in Arizona to provide sufficient food for a growing deer population (Ford, 1999) has been theorized to account for the collapse of these systems. Families may have similar problems with carrying capacity when viewed in terms of the resource constraints of a family business. The likelihood of the family business having sufficient carrying capacity for all members is likely to diminish in most family businesses as the number of family members increases, and especially if it increases in a dramatic fashion. Although there is little research that examines the carrying capacity of family businesses, some attention has been given to the relationship between number of children and quality of children in terms of their educational achievement (Blake, 1981). This research showed that the college plans of later born children were affected by birth order, but not for the last born, which suggests the “baby of the family” may receive increased attention from parents and older siblings. It seems reasonable that the same deteriorating effect could occur within a family when if the resources of the business do not increase at the same rate as the family, which would also include spouses marrying into the family, children from multiple marriages, stepchildren, and the growth dynamics would then be repeated with grandchildren.

Lambrecht and Lievens (2008, p. 310) suggest attention should be given to pruning the family tree and that “not pruning in time can generate a high opportunity cost and impose a burden on business performance.” Decisions about who is included as either a manager or owner can be conditioned on certain qualifying factors so as to ensure that the demands made by family members do not exceed the firm’s carry capacity. Thus, as family size increases, through both births and marriages, its carrying capacity is a function of the firm’s resources and the growing appetite of family members to draw down firm resources. There may need to be sufficient opportunity for employment for those wishing to join the firm while others will be more interested in the level of current dividends that they receive or what they will eventually receive if the firm is sold. In a way this relates back to the earlier section that suggests fully satisfying the goals of all the family members with respect to either the business or the family can be dysfunctional at the family business level. If family business resources are not adequate the carrying capacity of the firm will be exceeded and this is likely to increase the level of dissatisfaction in some family members. Discord in the family will normally begin to impact on the family business and may do so in ways that lead to its end as a family business. This would lead to dysfunctional system behavior that could escalate into producing a reinforcing system impacts that have negative effects on both the state of the family and the state of the family business. Once this escalation begins it is difficult to stop as is discussed in the next section dealing with the tipping point concept and its role in determining why, beyond some point, system failure is inevitable.

Figure 2 shows how these dynamics work from a system perspective. The top loop is fairly straight forward. When there are increases or decreases in the resources of the family business during a period this produces a corresponding effect on the financial state of the business. If the firm has more resources it has the potential to earn more profit and the opposite is true when the firm is losing money. Obviously a virtuous cycle of increased net profits and increased resources cannot continue indefinitely, and the reverse is even more obvious because it leads to bankruptcy. The factors included in the upper loop have the potential to produce good and bad results but the factors included in the bottom loop depict how the carrying capacity of the firm determine the degree to which the family business is likely to survive.

The dynamics depicted in the bottom loop allow it to act to balance the system that keeps the family business system operating effectively or, in unfortunates cases help explain why the business fails. As the family resources increase both carrying capacity and the actual size of the firm's resources will increase. However, as family size increases the resources per family member will decrease and could lead to a decrease in resource adequacy as funds are often drawn off for family rather than business purposes. As the financial state of the business improves, resource adequacy would normally not be a problem but if there is a reduced need for resources because the number of relevant family members is increasing, then the increase in resources may not be sufficient to satisfy the aspirations of all family members. Unless checked, at some point the size of the family will tend to overdraw on the resources of most family businesses, even those that are extremely successful. Figure 1 visually depicts shows how the two systems impact each other.

Proposition 3: When carrying capacity of the firm does not increase at a rate sufficient to maintain resource adequacy it will begin to have a negative impact on resources that can be devoted to the firm and have a delayed negative impact on the Financial State of the Family Business.



Tipping Point

There has been some recent attention, in the popular press, given to tipping points as they relate to smoking by teenagers, crime in metropolitan areas and contagious disease (Gladwell, 2000). This is one of the reasons why the number of cases of the H1N1 influenza (swine flu) has been monitored so carefully. Taylor and Ford's, (2006, p. 83) define a tipping point as "a threshold condition that, when crossed, shifts the dominance of the feedback loops that control the process." In an epidemic this would occur if the number of people being

infected is larger than the number recovering and the susceptible population remains large. Infected persons pass on the disease to more than one person and at some point this positive loop pushes the disease to the point that it cannot be stopped, even with heroic efforts. This is because it crosses the tipping point (Sterman, 2004) and the epidemic ends when the susceptible population becomes so small that it is had to transmit the disease to a non-immune person. This same type of thing can occur in a family system when a problem or situation has escalated to a point where the family system has become unstable and the situation continues to deteriorate because the positive loop of discord is dominating the negative loop that is attempting to restore stability to the situation.

FIGURE 3
Graphical Depiction of Tipping Point in Family and Family Business

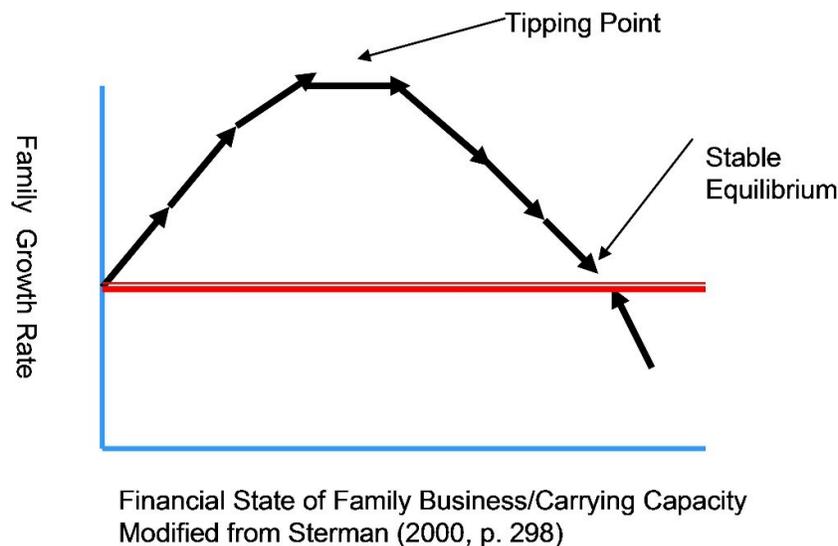


Figure 3 depicts what would happen with the growth of a family. Initially, increased numbers of family members may be beneficial to the family business because they provide additional expertise or are more productive at a lower wage cost than non-family member employees. However, as the children become adults, marry and have children the number of living family members will exhibit growth similar to an s-shaped curve. The gap between resources desired and resources supplied would continue to widen unless the family firm was able to produce a dramatic increase in its resources. As the grandchildren of the original founders began to marry and have their own children the resource gap would continue to grow while the bonds between second cousins would normally be less intimate. As the figure indicates at some point the system begins a downward spiral, which is almost impossible to stop.

The growth in family size pushes the firm to produce more resources in the initial stages of family growth, perhaps because the founders want to provide for their children's needs. However, as growth and its accompanying interpersonal distance increases a tipping point would be reached and then both systems would move into a deteriorating spiral. It would be almost impossible to provide sufficient resources to meet the goal aspirations of all family members. Conditions in the family and the business would then continue to deteriorate until a new equilibrium point is reached, which is likely to leave some family members out in the cold or a failed family business.

Proposition 4: Family size increase that occur at a rather faster than resources are generated will eventually lead to a tipping point beyond which salvaging family and/or family business systems is not possible.

DISCUSSION AND CONCLUSIONS

Understanding how well established system effects can impact the family and the family business and how these impacts can be difficult to detect is extremely important. This is because these effects often come with a delay. However, in some cases they are fairly easy to predict, such as the limits of the family business in terms of carrying capacity. This paper theorized that normal family events such as marriage, birth, aspirations, and ordinary decisions can often have as strong an impact on the functioning of the family and family business as serious and visible external events. These system effects cannot explain away the impact that the presence of a child with schizophrenia can have on a family or not having a succession plan for the business can have on the business' survival. However, it does suggest that we can make an effort to incorporate established principles that have been found to be useful in examining other systems into family business research.

In addition, causal maps provide a useful tool for the practicing managers and family members can use in examining their own family and family business dynamics. We already have a great deal of valuable family business and family research and by thinking about how these are systematically linked we can develop more interrelated theories as well as useful tools for the practicing managers who run family firms as well as for family members involved in these firms at any level, including that of just being an interested family member.

This research represents an initial step in explaining why family business failure is a system based occurrence, which helps us to better understand why so few family businesses survive beyond the first generation. The general models, presented here, may need to be modified to correspond with specific problem situations in a particular family or particular class of family. One way to do this is to transform the causal loop models used in this paper into something that distinguishes more than information links. Thus, items such as the state of the family business and state of the family are really "level" variables, which increase and decrease, much as water enters and leaves a tub. Rate variables, which act much like the spigot on a sink, are needed to regulate the flow on these levels. Delays also need to be specified and depicted, since the impact of feedback effects is usually delayed, which is one of the reasons why solutions are so often misdirected.

Once the causal loop diagram is reconfigured as a model that includes rates, levels, information, and delays it can be operationalized as a computer simulation model upon which experiments can be conducted. A well-functioning simulation model would be helpful in testing to see if theorized causes of problems or proposed solution are feasible in specific firm circumstances. It would also allow the user to see higher order effects than cannot be detected using linear techniques. Thus, in terms of future research the next step should be to build a working simulation model to determine the exact impact that carry capacity, path dependence, goal setting behavior, and the tipping point effect have on family and family business functioning from a system perspective. This would be done in terms of the tangible issues that have been identified as relevant to a specific family and family business' success.

The models here also add to the work of Stafford et al. (1999) in that they include both family and business systems, what they referred to as two sector models. The suggestions here is that we need to pay more attention to delayed effects as well as feedback processes and existing theories could also be revised to include these dynamics as extensions to their models. In this respect the agenda for future research includes examining existing theoretical family business research for ways to make theoretical extensions using system concepts.

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