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TITLE OF PAPER: Autopoiesis: A theoretical framework for a design management model suitable for the textile print business.

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ABSTRACT:

This research will provide a design management model for the textile print business in their efforts to rationalise the move forward to embrace direct digital textile printing.

Autopoiesis, as defined by Maturana and Varela (1987) is a ‘self-generating, self-bounding and a self-renewing’ process.

Luhmann (1995) and Coleman Jr. (2000) researched its validity as a model for the social sciences and in turn the management sector; Luhmann’s theory being refuted by Viskovatoff (1999, 481-516) and Hernes and Bakken (2003, 1511-1535).

Creativity is considered an essential element in the pursuit of design. (Florida, 2002) The space that creativity demands is necessary to integrate into any appropriate design management model for effective application in a business situation. In business, change is driven by the consumer, technology and economics. To qualify this investigation it is worthy to consider current economic theories that have a resonance with this type of management theory. These are important consideration in the search for a model for design management that is closely aligned to the current situation within the textile print industry.

A self organising management system offers benefits for the businesses and organisations involved. The researcher aims to extend/augment a model based on ‘autopoiesis’ applicable for the design management of digital textile print.

The researcher will conduct this research by use of a literature review outlining current arguments as to the value of autopoiesis in design management theory.

The outcomes from development of this model will provide the researcher with a valid basis from which the researcher can question a number of case study sites for further validation.

INTRODUCTION

Design Management is a field of research that is fairly young. The textile print industry is an ancient industry; one that is currently presented with many advances in technology. These technological advancements offer a wide variety of potential changes within this industry. Considering the changes that face this industry, not only with regards to these technological changes but also shifts that are simultaneously occurring in society, consumerism and economics, Design Management offers methods of managing these changes effectively for the survival and sustainability of a vulnerable industry.

Today businesses struggle to align their resources to the desired areas in order to assure future success. An area that an increasingly significant number of businesses are turning to is innovation (von Stamm, 2004). A sound framework is necessary for any organization to move from discovery to delivery. Design Management is the agency for the integration of aesthetics, applied technology, communications, creativity, economics, strategic planning, etc. In other words, “Design Management is the planning and coordinating activity necessary to create, manufacture, and launch a new product to the market” (von Stamm 2004).

Design Management is like any other type of Management; a multi disciplinary activity. Business today is a complex operation which requires management personnel to possess a wide and varied portfolio of skills and knowledge who can circumnavigate their way around the working operations of any given business activity. The creative arena of the design studio is no longer the isolated domain of the creative spirits of free expression. Design is a, “potent strategic tool that companies can use to gain a sustainable competitive advantage” (Kotler and Rath, 1984, p16).

This multi faceted management activity, Design Management, is the domain of a synchronization of disciplines that facilitate in presenting the design case to Management and likewise facilitate in presenting the designers in their charge with the scope of their undertakings in creating sustainable products for long term financial gains for the

shareholders of the company. Having responsibility to manage design through to success is a critical part of the role of Design Managers. Being responsible and purposeful in creating conditions for creativity in the process of innovation and ideas, disciplined and knowledgeable about technology and with clear understanding about the business goals, (economics) design managers are the leverage fulcrum for design in the corporate and business sector.

BACKGROUND

In presenting the above information I am reminded of the care and attention that is required in managing any living thing. For the nascent fields of digital textile printing and design management, viewing these as living systems is an appropriate analogy. It is from this standpoint that my attention was drawn to ‘autopoiesis’, the theory developed by Maturana and Varela, during their research into the nature of life and cognition. Their research started in the 1970’s and initially was contained to the field of seeing and cognition. They began to focus on providing a model to define life. The question that Maturana asked himself was, “What kind of systems are living systems that they may die, and how come that they cognize?” (Maturana, 1979)

AIMS:

The aim of this study is to determine the validity of using Maturana’s model of the living for application to the textile print industry. On determining its validity I will then prepare a questionnaire for a pilot study followed by two case study sites. I will triangulate the data in a qualitative manner to then determine the strength of this Design Management Model for the Digital Textile Print Industry.

RESEARCH METHODS:

The concept and validity of “case studies as a biological research process” has been presented by John Langrish in a paper by this title in 1993. He argues that case studies can be used as a substitute for real life experience in training. He goes on to state, “In the same way that aircraft pilots experience all known mistakes on a flight simulator, case studies are a well known training aid enabling students to take simulated decisions and learn by mistakes in an environment that is far less expensive than that of making real mistakes.” Langrish states, “‘Case study’ in its second sense is a research method, a way of finding out more about some aspect of reality through a very detailed analysis” (Langrish, 1993). This is my proposed methodology modified to include the ability to act as an agent of change, within these case study sites.

Action research is often associated with clinical research methods that are concerned with change processes. Lisbeth Svengren, in her paper, “Case study methods in design management research” (1993) presents a model for the researcher involved in case study to be actively involved with the case study under scrutiny. This may mean the researcher taking on the position of consultant for the case study in question. This is an activity that I am currently involved in negotiating with my proposed case study sites. Svengren’s defence of this methodology is in the researcher (observer) being actively involved in the process of change, one that my research informs me is necessary to assist in the maturity of the digital textile print business sector and aiding a sustainable future for this business. For my study, I will investigate through a literature review and a pilot case study the validity of viewing the current situation in the printed textile industry as a living system set out by Maturana and Varela in their seminal works, *Autopoiesis and Cognition*, 1973, and *The Tree of Knowledge*, 1987. This view of the textile print industry will inform a questionnaire that will further explore this theme through case study investigation to ascertain in a qualitative analysis the extent to which this view point can be taken and the amplification of the theory required for this particular case; thus developing a Design Management Model suitable for the Digital Textile Print Industry.

The significance of this study is informed by my own previous research along with research undertaken by both academics and practitioners in the field. To date my findings indicate that a suitable design management model has not been located that has both academic rigor and application to this industry.

On completion of this research I will be in a position to further my research in developing a suitable design management model that will fulfil these requirements.

Autopoiesis and the digital textile print industry

Based on a preliminary literature review of autopoiesis and design management in digital textile printing, several related observations can be drawn. To quote from Maturana, “Living systems are units of interactions: they exist in an ambience...they are characterised by exergonic (of or relating to a reaction that releases energy to its surroundings) metabolism, growth and internal molecular replication, all organised in a closed causal circular process that allows evolutionary change in the way the circularity is maintained...” (Maturana, 1972: 9)

Units of interactions

The digital textile print industry is a unit or industry of interactions. It has interactions with clients, suppliers, its internal work force, design parameters, production and output. This system of operations within these organisations can be said to operate in a circular process, a model used extensively to describe the design cycle, allowing evolutionary change. These activities exist within the ambience, or domain of the digital textile print business. These interactions if sustainable will create a form of replication or production throughput that is essential to its maintenance. The input from all of these external sources requires circularity, in other words, ongoing relations for this system, the digital textile print industry, to be sustained.

Circular organisation

Furthermore, “The circular organisation, in which the components that specify it are those whose synthesis or maintenance it secures in a manner such that the product of their functioning is the same functioning organisation that produces them, is the living organisation.”(Maturana, 1972) Applying the concept within the digital textile print industry; a synthesis or maintenance is secured by a strongly creative and innovative outlook and it is this innovative organisation, through its functioning in this innovative manner, that is in essence the same functioning organisation that produces innovation in the textile print industry and according to Maturana, is one of the assets of a living system.

“It is the circularity of its organisation that makes a living system a unit of interactions, and it is this circularity that it must maintain in order to remain a living system and to retain its identity through different interactions” (Maturana, 1972).

In order to remain alive, the digital print industry, must maintain its circularity and its interactions. This can be interpreted as the industry’s need to sustain its strategic alliances with the bodies it interacts with both internally and externally in order to maintain its identity. This requires a degree of ongoing or circular reflexion for retention of its identity through the different interactions that may present themselves. This can be interpreted by the notion of a new client presenting itself for interaction with the digital textile print business; presenting a scenario outside the business’s regular scope of activity. The digital textile print business in question requires reflexion around the criterion of its operations and the scope of this prospective client’s requirement. If there is not a suitable match or fit, in other words if the client is proposing something out of the scope of digital textile printing and the business wants to retain its identity in this field or ambience, then the client or interaction needs to be rejected. If however the fit is appropriate in terms of maintaining its identity as a digital textile print business, then this new or different interaction is no threat to the identity or maintenance of the living system.

“Due to the circular nature of its organisation a living system has a self-referring domain of interactions (it is a self-referring system), and its condition of being a unit of interactions is maintained because its organisation has functional significance only in relation to the maintenance of its circularity and defines its domain of interactions accordingly” (Maturana, 1972). As previously stated this is to do with internal reflection mechanisms being in place within the business unit that has a particular domain. In this case within the field, or domain of digital textiles printing. If something presents itself outside of this field of activity the internal referring mechanism needs to be brought into action for the business to retain its identity, clearly a Design Management function within this business.

“Living systems as units of interactions specified by their condition of being living systems cannot enter into interactions that are not specified by their organisation. The circularity of their organisation continuously brings them back to the same internal state” (Maturana, 1972). Thus the circularity of self-referring is a mechanism by which the business unit is continually accountable for its activities being within the appropriate domain; thus retaining its identity as a living system.

Classes of interactions

“The niche is defined by the classes of interactions into which an organism can enter.” (Maturana, 1972) This is an important consideration when looking at the activities surrounding the evolving field of digital textile printing. Maturana specifically includes in his writings here the classes of interactions into which the observer can enter and which he treats as a context for his interactions with the observed organism. He goes on to state that, “The observer beholds organism and environment simultaneously and he considers as the niche of the organism that part of the environment which he observes to lie in its domain of interactions. Accordingly, as for the observer the niche appears as part of the environment, for the organism the niche constitutes its entire domain of interactions, and as such it cannot be part of the environment that lies exclusively in the cognitive domain of the observer” (Maturana, 1972).

Case studies

Here we can see the potential advantages for the digital textile print business to call upon the use of an active case study researcher, or consultant. In this situation, I as the observer have within my disposition an ability to view this organism, (case study site, of a digital textile print business) and the niche of its domain of interactions, often a very limited field of operations, mainly that of the singular activity of bureau for digital textile printing. As an observer the scope of the environment which presents opportunities for the digital textile print field is far greater than this limited capacity. The field of engineered opportunities for the design of composite textile and object, a garment, has only been marginally explored. The creative scope for design management activity in this field has not been rigorously researched. The areas of the potential development within the field of design management include some of the following: on-demand production, the benefits to the green environment, mass customisation, agile manufacturing, new markets and new marketing opportunities and many more. This presents itself as an area for further research activity in determining potential new opportunities and scope for this nascent business.

Maturana goes on to state, “Every unit of interactions can participate in interactions relevant to other, more encompassing units of interactions. If in doing this a living system does not lose its identity, its niche may evolve to be contained by the larger unit of interactions and thus be subservient to it. If the larger unit of interactions is (or becomes) in turn also a self-referring system in which its components (themselves self-referring systems) are subservient to its maintenance as a unit of interactions, then it must itself be (or becomes) subservient to the maintenance of the circular organisation of its components” (Maturana, 1972). This Maturana describes as a third order self-referring system.

A situation that may currently present itself within the business of digital print where digital textile print becomes subservient to the broader field of digital print, thus losing its own identity to this larger field.

The field of digital textile print is in a vulnerable situation in the current climate of business. The field however of digital textile printing, if strategic in its innovative alignments, where the expertise and knowledge of the breadth of design surrounding textile print and its next phase of manufacturing processes in a situation of preparing itself for some extraordinary growth as a living system.

EVOLUTION OF THE TEXTILE PRINT INDUSTRY

“Evolutionary change in living systems is the result of that aspect of their circular organisation which secures the maintenance of their basic circularity, allowing in each reproductive step for changes in the way this circularity is maintained. Reproduction and evolution are not essential for the living organisation, but they have been essential for the historical transformation of the cognitive domains of the living systems on earth” (Maturana, 1972).

Considering this condition within Maturana’s theory in relation to the textile print industry as it stands; the current practice of the textile print industry with its models of mass production, adverse effects on the green environment, economies of scale related to mass production and slow turn around of finished art to finished product, the industry is faced with a situation where digital textile print is currently ill formed in its system. There is a situation where changes to the self-referring circularity for the historical transformation of the cognitive domains of this living system can occur in a positive way for the textile print industry and retain its identity.

Maturana goes on, ‘For a change to occur in the domain of interactions of a unit of interactions without its losing its identity with respect to the observer it must suffer an

internal change, Conversely, if an internal change occurs in a unit of interactions, without its losing its identity, its domain of interactions changes.”

The inclusion of the active researcher

Either of these situations is currently a possibility. It is to some extent in the domain of the participating systems that constitute the domain or field of textile print businesses. It is here that the benefits of active research as described by Svengren present a strategic situation for this research.

“After reproduction the new unit of interactions has the same domain of interactions as the parental one only if it has the same organisation. Conversely, the new unit of interactions has a different domain of interactions only if its organisation is different, and hence, implies different predictions about its niche” (Maturana 1972). Here the possibilities presented above for new and innovative interactions by way of engineered print designs, new models of lean and just in time manufacturing etc present the new domain of interaction possibilities. Alternately the same interactions can continue with differences occurring in the organisation itself. This may mean new definitions of its client base its supply base etc. meaning a change in the niche that the business operates within.

“What changes from generation to generation in the evolution of living systems are those aspects of their organisation which are subservient to the maintenance of their basic circularity but do not determine it, and which allow them to retain their identity through interactions; that is, what changes is the way in which the basic circularity is maintained, and not this basic circularity itself” (Maturana, 1972).

The generational changes in the industry

Here we can look at the generational changes that have occurred in the textile print industry, from craft, hand production of block printing and screen printing, the agency of the arbitrageur, importing printed textile product for profit from unequal prices in a new international economy as travel between cultures increases, the introduction of the rotary screen in the 1960's and its convergence with an upsurge in mass production taking hold within society, the resurgence of the arbitrageur again in the 1980's as economies between countries and societies diverge in wealth, resources and labour prices, the birth of more expedient communication systems and globalisation of opportunities for businesses present themselves in the 1990's. Throughout this array of changes that have affected the textile print industry head on, although, subservient to the industry itself and thus retention of its identity. It remains firmly within the field of textile print production. Jonas (2004) goes on to expand on a Darwinian mechanism of (1) mutation – (2) selection – (3) re-stabilization – what Jonas adds here is an introduction to a new concept, which might be called mutation, creative act, intentional provocation. This I regard from an autopoietic standpoint as the evolution of the system, or the evolution of the business of textile printing. The changes that have occurred in the environment of its operations yet the unity retains its identity as we might know it, the textile print business.

Reciprocal Structural Coupling

Second order couplings as presented in, *The Tree of Knowledge*, (Maturana, Varela, 1987: 74) describes that, "...two (or more) autopoietic unities can undergo coupled ontogenies when their interactions take on a recurrent or more stable nature... Every ontogeny occurs within an environment,..." they go onto state, "...the interactions (as long as they are recurrent) between unity and environment will consist of reciprocal perturbations. In these interactions, the structure of the environment only triggers structural changes in the autopoietic unities (it does specify or direct them), and vice

versa for the environment. The result will be a history of mutual congruent structural changes as the autopoietic unity and its containing environment do not disintegrate: there will be a structural coupling.”

Regarding structural coupling, interpreting the total available field, current and future, of strategic alignments between businesses that share some commonality within the field of application of digital textile print presents an area for further researched. That is, a wider environment than that of digital textile printing ambience itself. I am referring to the more inclusive environment of the application of this transitional product, printed textiles. Printed textiles are rarely an end result within the design process. Printed textiles tend to be taken up by other design activities and are consumed by this next stage design activity; allowing the printed textiles to be relegated to a situation of being dominated by this next phase design activity. Given the opportunity to reconsider the situation with the nascent field of digital textile printing, opportunities exist for this business (unity) to form, structural couplings, within the broader field of textile applications that situate textile print in a more equal or possible dominant position.

The case study situation

Take for example the situation with some of the fashion design businesses that have embraced aspects of the field of digital textile print; on demand production, low stock inventory, costs determined by scales of production, infinite colour use and engineered print design solutions. This situation of strategic alignment of digital print and the fashion industry, i.e. Paul Smith, has created a situation of incentive for ongoing structural coupling between these businesses due to the success of this venture in the market.

Alternately, had the digital textile print business taken another tack such as that of my pilot case study, Longina Phillips Designs, by setting up her own digital print business and adding to this a fashion design business, creating a range of fashion garments for the resort segment, creating a situation where the strategic or structural coupling was achieved by buying in design skills outside the scope of her existing design business

operations, such as pattern making, a situation of strengthening and growing her own business. These types of entrepreneurial activities are creating a situation for Longina Phillips Designs of both structural coupling and increasing the niche or sector of the environment in which the unity or business activity takes place; attaining an ongoing, at least for the present, status of a living system: One that is also situated in evolutionary change.

Creativity and entrepreneurial activity

In her paper, *A Systems View Of Creativity, for the Printed Textile design Industry*, (1999) Moxley examines what creativity means within the field. She identifies through her research that theorists of creativity identify the nature of creativity in three areas:

- In people (behavioural and mental characteristics)
- As displayed in products (including ideas, theories and artefacts)
- As a process (cognitive processes and practical techniques)

Moxley, goes onto state, “A definition supplied by Gardner (1994) encompasses the disparate perspectives of many theorists; that creativity is ‘solving of problems, products fashioned, or new questions defined in a domain by individuals in a way which is initially considered novel but ultimately becomes accepted in a particular cultural setting’” (Gardner, 1994: 35).

Within the field, or environment of textile print design, Moxley indicates that this community whose members are, “...designers, stylists, design managers, agents, clients, screen engravers, academics, art critics, fabric buyers and customers.” These are the keepers or auditors of creative values and the structural integrity of the domain, or environment, by directly or indirectly ‘accepting’ methods of working.

Proposal

The proposal on the analysis from this study is that this domain may need to be altered and extended in terms of the maintenance of the domain. The blurring of the boundaries of distinct design disciplines is significant in redefining the field of acceptability and retention of the textile print domain.

There is considered to be a lack of agreement on the definition of entrepreneurship, opportunity, human action, creativity, innovation and exchange have emerged as central constructs (Styles and Seymour, 2005: 5). It is these activities that are considered central to the proposal of autopoiesis as a model for consideration in design management in the field of digital textile print business. Each can be said to be situated centrally around this proposed construct. As indicated above, opportunities currently present themselves for this nascent industry, these require human action, through effective Design Management, to leverage them into creative and innovative strategies for the digital textile print industry. The element of exchange involving a transfer of value (tangible or intangible, actual or symbolic) between two or more parties, with the implication that all parties to the exchange give and receive value (Houston and Gassenheimer, 1987). This exchange can be viewed for Maturana's perspective as one where this occurs without loss of identity, as expressed above.

Autopoiesis and Economic Theory

When considering the appropriateness of autopoiesis as the basis of a model for design management for the digital textile print industry an important consideration is one of economics. The industry is situated in a fragile zone in that it is still in its formative stages of evolution. So far a substantial case has been developed to look from an autopoietic stand point at the industry and with resulting benefits. The industry however will fail to grow and evolve into a mature business activity if there is not a viable

economic model to support the activities of this system, its evolution and its structural coupling.

“An advantage of (managing) economics by adjusting incentives, rather than by the kind of regulation that is often used at present, is that incentives work at a deeper level in the economic system. Regulation often addresses the end result, where it is least effective. Whereas creative management of incentives can address people’s motivation and harness their creativity and these can be allowed to run with little further interface” (Davies, 2004: 446).

Davies presents a case for harnessing people’s creativity and motivation, part of the role of design management, and suggests an economic model that is more focused on as far back in the production process as possible. He advocates that designers are critical to the efficient delivery of goods and services: Providing incentives for their performance in creativity and innovation.

Davies goes on to state, “Experience is revealing how to structure and apply incentives so as to maximise their effectiveness, whether we are dealing with a factory workforce of a whole economy” (Davies, 2004: 420). Davies gives the example of a contract that rewards architects with a share of savings of energy and material costs in developing a design solution for a client. Looking at the digital textile print business similar shared savings could be negotiated with garment buyers of finished printed garments who chose to work with digital printers to establish a model of manufacture that minimise dye wastage and over supply of full retail price stock, through on-demand production models. This type of economic incentive system or model could be adapted to include aspects of all of the attributes of digital textile print production over that of conventional mass production print models.

Conclusions:

It has become apparent through the process of research around the construct of autopoiesis and its suitability for the digital textile print industry that there is ample scope to support the further investigations of the case study work that I have proposed.

Autopoiesis as a construct within the field of the social sciences had come under criticism from other researchers, however support of the use of this conceptual tool for understanding the scope of possibilities for effective design management are also to be found. Jonas in his paper *Mind the gap! – on knowing and not-knowing in design* Or: there is nothing more theoretical than good practice, uses social systems theory (Luhmann) with the concerns of autopoiesis. To take up some of Jonas's theme for his paper he states that, "Progress in research and in practice depends on prior art. This is another way of stating that progress requires foundations. If there is progress – and there is – there must be foundation(s). There is progress in design > QED: design has foundations" (Jonas, 2004). He argues design is the agency of bridging the gap, the interface. Taking an autopoietic viewpoint of the full breadth of the textile print industry, the niche of digital textile printing can be seen as some way to bridge the gap. The gap in this case is the gap in economic, cultural and social needs not currently met by the textile print industry in its mass manufacturing model. The digital textile print business with creative and innovative drivers can situate this business in a position to bridge this gap. It is not being suggested as a replacement in its current technological situation for conventional or analogue textile printing. It is different and offers different opportunities to fill gaps in society's requirements, needs, wants and desires.

My proposal is that the domain or field of applicability for the digital textile print business may need to be altered, redefined or extended in terms of the maintenance of the identity of the textile print business. This situates the industry well within an autopoietic framework for developing a suitable design management model suitable for its growth.

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