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DEM	2.2873
CRD	0.7126



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ISSN 2150-4059 (Print) ISSN 2150-4067 (Online)

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February 2010

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Technology and Investment (TI)

Journal Information

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The Technology and Investment (Online at Scientific Research Publishing, www.SciRP.org) is published quarterly by Scientific Research Publishing, Inc., USA.

E-mail: ti@scirp.org

Subscription rates: Volume 1 2010

Print: \$50 per copy.

Electronic: free, available on www.SciRP.org.

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The Cubrix, an Integral Framework for Managing Performance Improvement and Organisational Development

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Received October 26, 2009; revised November 23, 2009; accepted December 25, 2009

Abstract

Marcel van Marrewijk, academic director of Research to Improve, has developed an integral, multi-level, multi-disciplinary and multi-stakeholder management framework, based on a phase-wise development approach as described by Clare Graves' Levels of Existence Theory, Ken Wilber's Four Quadrant Theory and the author's Global Excellence Model. This conceptual framework is coined, the Cubrix.

This paper shortly introduces the three original concepts and shows how these models have been merged into the Cubrix. In part two the author demonstrates how Research to Improve designed various surveys, scans, monitors and assessments, all based on this framework. Furthermore, the Cubrix has also been supportive in designing the Performance Improvement Cycle and offer input for developing roadmaps for transitions in organization development.

Keywords: Value Systems, Spiral Dynamics, GEM, Cubrix, Transition Matrix, Research Framework, Sustainable Performance, Organisation Development, Transformations, High Performance Organisations

1. Introduction

2001, Van Marrewijk, in collaboration with Erasmus University Rotterdam, launched an international research project in response to an EC-assignment to develop an integral model for Corporate Social Responsibility, CSR. More than two years later, a consortium of experts delivered the European Corporate Sustainability Framework (ECSF) to the European Commission. It was a new generation management framework, demonstrating company responsible ways of doing business while achieving higher performance levels as sustainable operating organizations, carefully aligning their particular development level(s) with their major challenges [1-3].

The ECSF-research project succeeded in identifying various ways of interpreting Corporate Sustainability and Responsibility (CS-R) and aligning specific ambitions with respect to CS-R and with adequate ways of implementing it. The generic definition of CS-R is the corporate inclusion of social and environmental concerns into business operations and in interactions with stakeholders. Van Marrewijk [4] concluded that corporate responsibility (CR) expresses the corporation's willingness to be accountable for the impact of their doing to stakeholders

(Communion) and relates to phenomena such as transparency, stakeholder dialogue and sustainability reporting. On the other hand, corporate sustainability (CS) is manifested as the organization's capacity (Agency) to improve value creation with respect to the triple bottom line (people, planet & profit), due to for instance environmental friendly production systems, waste reduction policies, recycling, human potential development programs, fair trade, green energy and many more ways to improve multiple performances.

The ECSF framework hosts traditional ways of doing business, such as compliance-driven and profit-driven approaches. It also includes business approaches that have emerged only recently, such as more care-driven and synergy-driven ways of organizational behaviour [5]. Each respective approach characterizes a specific development level, transcending and including the former ones and each supported by particular value systems and management paradigms, demonstrated in coherent sets of institutional structures [6]. Business phenomena such as CS-R can thus be interpreted by each of these systems, taking different manifestations per development level [4,5]:

1) Compliance-driven: CS-R at this level consists of

providing welfare to society, within the limits of regulations from the rightful authorities. In addition, organizations might respond to charity and stewardship considerations. The motivation for CS-R is that CS-R is perceived as a duty and obligation, or correct behavior.

2) Profit-driven: CS-R at this level consists of the integration of social, ethical and ecological aspects into business operations and decision-making, provided it contributes to the financial bottom line. The motivation for CS-R is a business case: CS-R is promoted if profitable, for example because of an improved reputation in various markets (customers/employees/shareholders).

3) Care-driven: CS-R consists of balancing economic, social and ecological concerns, which are all three important in themselves. CS-R initiatives go beyond legal compliance and beyond profit considerations. The motivation for CS is that human potential, social responsibility and care for the planet are as such important.

4) Synergy-driven: CS-R consists of a search for well-balanced, functional solutions creating value in the economic, social and ecological realms of corporate performance, in a synergistic, win-together approach with all relevant stakeholders. The motivation for CS is that sustainability is crucial as it is recognized as being the inevitable direction progress takes.

5) Holistic-driven: CS-R is fully integrated and embedded in every aspect of the organization, aimed at contributing to the quality and continuation of life of every being and entity, now and in the future. The motivation for CS is that sustainability is the only alternative since all beings and phenomena are mutually interdependent. Each person or organization therefore has a universal responsibility towards all other beings.

Too often confronted with pretentious and manipulative CS-R communication (green washing), Van Marrewijk concluded that building cultures of trust within organisations was the first practical and effective step in achieving authentic corporate sustainability and responsibility. He became director Great Place to Work® Institute Netherlands, engaged primarily with transforming workplaces through research, and ‘naming and faming’ best practices in various award activities [2].

In 2005 he was member of an EC-research project, coordinated by Esade Business School, analysing Great Place to Work® data gathered from over 1,000 European companies. The data showed a pattern in which the best Scandinavian workplaces outperformed the ones in the Mediterranean countries. The GPTW® model is not able to explain such patterns. Once more, Van Marrewijk turned to Spiral Dynamics and Wilber’s Four Quadrant (SDI) to develop a sequence of macro-economic systems, running from self sufficiency, pre-capitalist and various classical economies, capitalist (Anglo-Saxon) and socialist market (Rhineland) economies and the emerging interdependent economy [7]. Again, each economic sys-

tem transcends and includes the less complex ones. Therefore the socialist market economy, predominantly present in northern continental Europe, show plenty reminiscents of former systems, such as excessive rewarding practices for CEO’s.

From 2000 on, Van Marrewijk remained board member of the Dutch branch of the European Federation for Quality Management, the EFQM. The ECSF consortium of international researchers² was mainly drawn from an international network of quality experts. Its outcome, the ECSF framework was placed within the quality management tradition, as it regarded complex interpretations of CS-R as integral part of business improvement and organizational excellence.

Despite its elegance in framing management attention areas, the EFQM model, officially named the European Model for Business Excellence, is ‘as flat as a pancake’, in other words, it lacks depth to generate adequate understanding of complex organisations. In order to align the EFQM model within the ECSF framework, Van [8] adapted the EFQM model, by introducing depth and providing various contexts to business excellence, thus creating a multi-level, a multi-disciplinary and multi-stakeholder Global Excellence Model (GEM). In this paper, while discussing the GEM, the author will further elaborate on this topic.

Van Marrewijk remained enthusiastic with his multi-level approach applied to corporate sustainability and business excellence. He developed it into an even more sophisticated framework, which he coined the ‘Cubrix’, a cubical framework based on three dimensions: development levels (Spiral Dynamics Integral), management attention areas or disciplines, and stakeholders (both Global Excellence Model), the topic of this paper.

In practice, van Marrewijk remained preoccupied with the introduction of the rather one-dimensional Great Place to Work Concept in the Netherlands. In providing feedback to companies on the quality of their workplaces, van Marrewijk noticed that the human resource management approach is often dominant, jeopardizing the transformation towards more promising approaches. Again, the ‘flat pancake’ syndrome was bothering corporate development as many people managers seemed to be ‘arrested’ in their constrained and limited set of policies and practices. He felt the time was ready to apply new concepts to corporate research, aligning it with learning and performance improvement. He left Great Place to Work Institute Nederland to his successors and founded a new research institute, Research to Improve and started anew.

This paper elaborates on the content and structure of the Cubrix and demonstrates its use in the development of new research tools. It also deals with some derivatives from the Cubrix such as the Performance Improvement Cycle and the way to design roadmaps for organisation development and performance improvement.

1.1. Structure of This Paper

Paragraph two starts with a short introduction of Spiral Dynamics Integral, as developed by Clare W. Graves, his successors Don Beck and Chris Cowan [9], and Ken Wilber [9]. Also the second fundament underlying the Cubrix, the Global Excellence Model, will be introduced. Paragraph three describes the Cubrix. Paragraph four deals with research tools based on the Cubrix and paragraph five introduces derivatives from the Cubrix, with impact on change management and the design of a roadmap for organization development and performance improvement.

2. Supportive Structures of the Cubrix: Contexts

2.1. The Gravesian Approach to Development

Clare W. Graves, professor psychology at Union College, New York, teaching sections on psychological approaches of Freud and Jung, Watson and Skinner, Maslow and others, was confronted by his students: “OK, Dr. Graves, which one is right?” Graves recognized that all the theories had elements of truth, as well as holes. It led him on a thirty-year quest to better understand the emerging nature of psychologically healthy human beings. It placed him among scientists that try to structure evolutionary aspects of development. See Table 1.

In the 1950s throughout the early 1970s, professor Graves performed extensive empirical research on value systems. He coined his model: the Emergent, Cyclical, Double-Helix Model of Adult BioPsychoSocial Systems Development or, for short, Emerging Cyclical Level of Existence Theory (ECLET). As an introduction to his framework each qualification will be briefly summarized.

2.1.1. Emergent

With respect to ‘emergent’, Graves concluded that mankind has gradually developed eight levels of existence or core value systems, so far. A value system is a way of conceptualizing reality and encompasses a consistent set of values, beliefs and corresponding behaviour and can be found in individual persons, as well as in companies and societies [9]. With these statements, Graves confronted Maslow’s ‘Hierarchy of Needs’. He agreed to the ranking of the needs, but the image of a pyramid cannot express the emerging capacities of human beings in meeting higher levels of complexity, thus creating different manifestations of personal and collective self-actualisation. Graves’ successors, Beck & Cowan, created the image of a spiral, emphasising the open ended and ever expanding nature of their approach.

Human development is an emergent, oscillating proc-

Table 1. Evolutionary aspects.

Line	Life’s question	Typical researcher
Aesthetic	What is attractive to me?	Housen
Cognitive	What am I aware of?	Piaget, Kean
Emotional	How do I feel about this?	Goleman
Interpersonal	How should we interact?	Selman, Perry
Kinesthetic	How should I physically do this?	Gardner
Moral	What should I do?	Kohlberg
Needs	What do I need?	Maslow
Self	Who am I?	Loevinger
Spiritual	What is of ultimate concern?	Fowler
Values	What is significant to me?	Graves, Spiral Dynamics

ess that subordinates older, less complex ways of thinking/being to newer, more expansive, more complex ones. Older systems do not disappear, but are subsumed within the more elaborate ones and can be reactivated when older problems resurface. Each new emerging system ‘transcends and includes’ the previous ones [10].

A second notion regarding emergence lies in the intangible aspects ‘below the surface’ that influence human behaviour. The core question according to Beck and Cowan is “how does the mind process reality”. The framework structures thinking systems within people, not types of people. Each value system is associated with a specific ‘world view’, thus generating multiple ‘truths’.

2.1.2. Cyclical

The development of value systems occurs in a fixed order. The value systems can be tagged as follows: Survival; Security; Energy & Power; Order; Success; Community, Synergy and Holistic Life System. These systems brighten or dim along with changing life conditions and one’s capacities. Each new value system includes and transcends the previous ones, thus forming a natural hierarchy (or holarchy).

The value systems alternate between I-oriented and we-oriented systems, with a respective focus to changing the world outside and coming to peace with the world inside.

2.1.3. Double Helix

Value systems develop in reaction to specific environmental challenges and threats: the systems brighten or dim when life conditions change. These Life Conditions (LC) consists of historic Times, geographic Place, existential Problems and societal Circumstances. As with the double helix in a DNA-string, Graves’ model distinguishes LC as one of the two determining factors that cause the existence of prevailing and emerging contexts. The other one is Mind Capacities [MC’s]. Their interactions produce the thinking systems, mentioned above.

Transformations to more complex contexts actually occur when life conditions have build up a sufficient level of urgency among entities to leave behind their proven pa-

Table 2. A developmental approach to values.

Development Label	Compliance-driven Order (Blue)	Profit-driven Success (Orange)	Care-driven Community (Green)	Systemic-driven Synergy (Yellow)
Environment LC	Ordered relationships requiring legitimization in order to ensure stability and security for the future	Many viable alternatives for progress, prosperity and material gain since change is the nature of things	The gap between people and their (material) possibilities has become disproportionately large	Complex problems that cannot be solved within the current systems as awareness of broad interconnections grows.
Values examples	Duty, obedience, loyalty, guilt, discipline, stability, clarity, justice, one truth	Productivity, personal esteem, image, reward, satisfaction, competition	Harmony, equality, consensus, honesty, openness, trust	Insights, tolerance, long term orientation, systems-thinking

terns of behaviour and challenge their world view. They have to experience that current solutions are no longer adequate. In order to cope with the new life conditions, entities must have a supportive mind capacity to be able to match the new challenges life conditions offer and generate new adequate behavior and subsequent institutional arrangements.

Entities such as people and organizations will eventually have to meet the challenges their context provides or risk the danger of oblivion or even extinction. If for instance societal circumstances change, inviting corporations to respond and consequently reconsider their role within society, it implies that corporations have to re-align their value systems and all their business institutions (such as mission, vision, policy deployment, decision-making, reporting, corporate affairs, etcetera) to these new circumstances.

2.1.4. Adult

Graves restricted the outcomes of his theory to 'healthy adults' only. In practice one can observe that Spiral Dynamic thinking can also be applied to the development of children, all be it with some adjustments. As a third generation researcher, with Graves being the first and Beck and Cowan the second generation, van Marrewijk applies the theory also to groups, organisations and even societies and economic systems, as this paper will demonstrate.

2.1.5. Biopsychologicalsocial

People tend to change their biopsychologicalsocial beings as their Conditions of Existence change. With respect to the biological appearances, it obviously applies to the pre-historic Cro Magnon, the Pygmies, Inuits and Bedouins, as well as contemporary Salarymen. Over time mankind was able to alter his DNA information to adjust to changing circumstances and support new generations with a better constitution to cope with prevailing circumstances. Also psychologically and socially people change along with their life conditions, creating new cultural patterns and institutional arrangements that facilitate adequate behaviour.

Psychologically, people alternate between an inner locus of control with a focus on changing and controlling the world outside (the I-systems) and an outer locus of control with a focus on coming to peace with the world

inside (we-systems).

Due to the ability to match MC with LC, people centralized in a value system are psychosocially congruent with components of that system. On the other hand, a person may not be equipped to move to a more complex system, even if the Conditions of Existence demand it. Psychologically, these people remain 'arrested' towards future needs or even 'closed' to less complex value systems that, naturally, should have been included in their repertoire.

Individuals and groups develop and apply values and supporting institutional structures, in order to cope with the prevailing challenges. A person may stabilize at one or at a combination of value systems if the Conditions of Existence are stable. When LC warrants, a person or group may regress to a previous value system. As with an uphill ride, people back shift to a lower gear to get more power.

2.1.6. Systems Development

Each value system includes a range of positive and negative characteristics and behaviours, adaptive and maladaptive elements. A system can become healthy and unhealthy, supportive and destructive, energizing and frustrating, sowing the seeds of change. It offers linkages to change management, what to do in order to improve performance.

It is important to understand that NO value system is inherently "better" or "worse" than another. It is all about adequateness or appropriateness to the milieu and conditions of existence. As higher value systems normally include the previous contexts, a higher system is not simply better; it offers more grades of freedom to match particular challenges. If a response can be made adequately in a basic context, there is no need to do it more sophisticatedly and waste time and efforts. Moreover, complex value systems are much more vulnerable, or more difficult to sustain.

The actual introduction to the various levels of existence will be dealt with in the next paragraph.

2.2. Wilberian Approach to Development

In *Sex, Ecology and Spirituality*, Ken Wilber [10] made a large contribution to evolutionary developments. He

supports Graves when stating: “Evolution proceeds irreversibly in the direction of increasing differentiation/integration, increasing organization and increasing complexity”¹. This “growth occurs in stages, and stages are ranked in both a logical and chronological order. The more holistic patterns appear later in development because they have to wait the emergence of the parts that they will then integrate or unify”². This ranking refers to normal hierarchies (or holarchies) converting “heaps into wholes, disjointed fragments into networks of mutual interconnection”³.

As the natural orientations emerged, they clearly show an increase of integratedness and complexity, each stage including and transcending the previous ones.

From evolutionary literature, Wilber concludes twenty “patterns of existence” or “tendencies of evolution” which are summarized below: reality is not composed of things or processes; it is not composed of wholes nor does it have any parts. Rather it is composed of whole/parts, or holons⁴. This is true of the physical sphere (atoms), as well as of the biological (cells) and psychological (concepts and ideas) sphere, or simply said, apply to matter, body, mind and spirit. Atoms or processes are first and foremost holons, long before any ‘particular characteristics’ are singled out by us.

Holons display four fundamental capacities: self-preservation, self-adaptation, self-transcendence and self-dissolution. Its agency—its self-asserting, self-preserving tendencies—expresses its wholeness, its relative autonomy; whereas its communion—its participatory, bonding, joining tendencies—expresses its partness, its relationship to something larger. Both capacities are crucial: any slight imbalance will either destroy the holon or make it turn into a pathological agency (alienation and repression) or a pathological communion (fusion and dissociation). Self-transcendence (or self-transformation) is the system’s capacity to reach beyond the given, pushing evolution further, creating new forms of agency and communion. Holons can also break down and do so along the same vertical sequence in which they were built up.

These four capacities or ‘forces’ are in constant tension: the more intensely a holon preserves its own individuality, preserves its wholeness, the less it serves its communions or its partness in larger and wider wholes and vice versa. This tension can be manifested, for instance in the conflict between rights (agency) and responsibilities (communions), individuality and membership and autonomy and heteronomy.

If holons stop functioning, all the higher holons in the

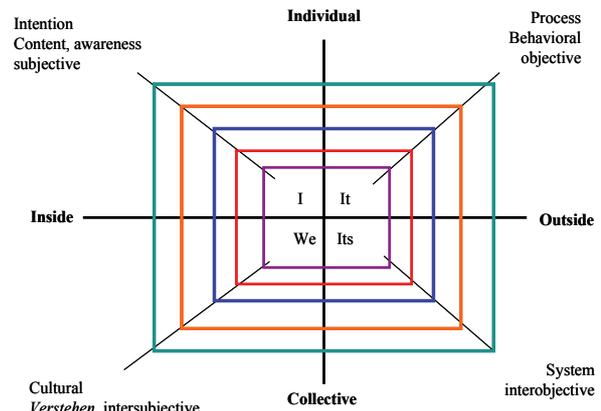


Figure 1. Wilber’s all quadrant model, slightly adapted.

sequence are also destroyed, because those higher wholes depend upon the lower as constituent parts. We might say that Wilber as well as Graves, Beck & Cowan have created an almost identical phase wise orientation to reality however based on different lines of reasoning.

Wilber’s rich analysis of science and (eastern) religion has culminated in a four-quadrant perspective towards Reality. The upper quadrants represent individual holons, the lower half of the diagram, social or communal holons. The left side is the interior and the right side the exterior form or structure of holons.

The upper-right quadrant represents the objective, empirical observations of holon behaviour, such as atoms, gases, fish or humans. The upper-left quadrant stands for the I-world: the interior form of an individual holon: subjective intentions and awareness. Characteristic sciences focused on this quadrant are psychoanalysis, phenomenology and mathematics. The lower-right quadrant represents the ‘its-world’. With reference to humans, it shows the exterior forms of social systems such as the development from kinships to nations-states, but also tools and technology, architectural styles, forces of production, concrete institutions and even written material. The lower-left quadrant corresponds with the we-perspective of Reality, the Cultural dimension. Weber introduced an intersubjective sociologist approach, *Verstehen*, that characterizes this quadrant. It is the realm of relational exchange creating collective values, consciousness, worldviews and common meaning and interpretations.

The upper quadrants coincide with Graves’ Biopsychosocial features of the Mind Capacity and the lower ones with Life Conditions. In both concepts, the quadrants are aligned: Each point in any of these quadrants correlate with a specific set of points in the other quadrants, such as Figure 1 above demonstrates. The Four Quadrant Model includes Graves’ Levels of Existence as Table 3 shows.

Woodsmall has labeled the right quadrants as Process and System. It aligns better with the intention to apply the Quadrants Model to corporate dynamics.

¹Wilber, K., *Sex, Ecology and Spirituality*, Shambhala, second edition. 2000, 1995 (page 19, 74).

²Wilber, K. *SES* (page 28) italics by Wilber.

³Wilber, K. *SES* (page 26).

⁴Koestler: “a holon is a whole in one context and simultaneously a part in an other”.

1 - Self and Consciousness	We - Culture	Its-Social/Governing Systems	Spiral Dynamics
Holistic Self	Holonic	Holistic	Holistic
Integral Self	Integral	Integral Commons	Energy
Sensitive Self	Pluralistic	Value Communities	Community
Achiever Self	Scientif-Rational	Corporate States	Success
Mythic Self	Mythic Order	Nation States	Order
Ego-centric Self	Power Gods	Feuda Empires	Power/Energy
Magic Self	Animistic/Magical	Ethnic Tribes	Security
Instinctual Self	Archaic	Survival Clans	Survival

Table 3. Quadrants as process and system.

2.3. Application to Corporate Dynamics

Organizations and employees can be recognized easily as holons, as they are mutually dependent, as strikes and absenteeism clearly show. In terms of Wilber, organizations tend to support their employees (vertical relationship), creating value as an (horizontal) agency, in constant exchange with its stakeholders (horizontal communion).

Challenged by changing circumstances and provoked by new opportunities, individuals, organizations and societies develop adequate solutions that might be new sublimations, creating synergy and adding value at a higher level of complexity. Since instability increases at higher complexity levels, entities can shift to lower levels should circumstances turn unfavorable or should competences fail to meet the required specifications.

Figure 2 represents a phase-wise development of corporations, as complexity increases thus requiring additional degrees of freedom to find more adequate solutions to prevailing circumstances. Along with the evolutionary development of corporations their awareness, their culture, their behavior and their structures/systems change.

Clusters of values facilitate these institutional changes and manifestations. Evolutionary development has reveal-

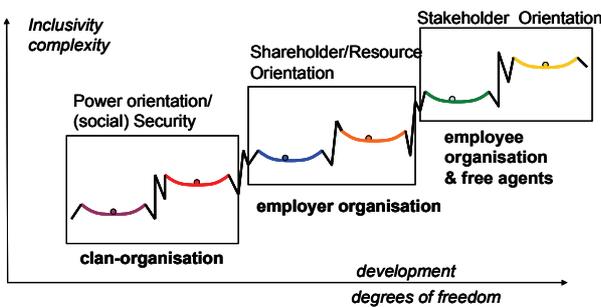


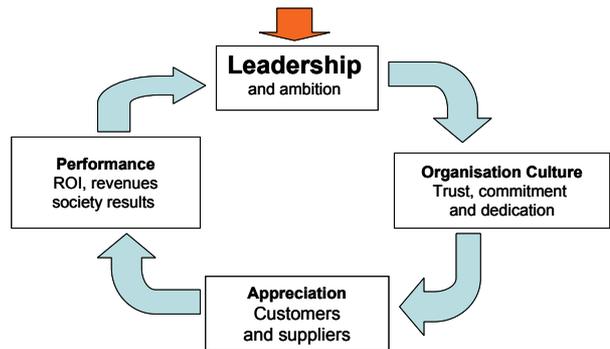
Figure 2. Phase wise orientation to business development.

ed a sequence of multiple levels or development stages. From now on we will refer to these as the contexts of organizations. In order to be able to draft ideal type organizations, aligned with specific contexts, we need to go deeper and explore the disciplines that are active within organizations. We need to elaborate on the various manifestations disciplines can take in various contexts. We therefore introduce the Global Excellence Model.

3. Supportive Structures of the Cubrix: Disciplines

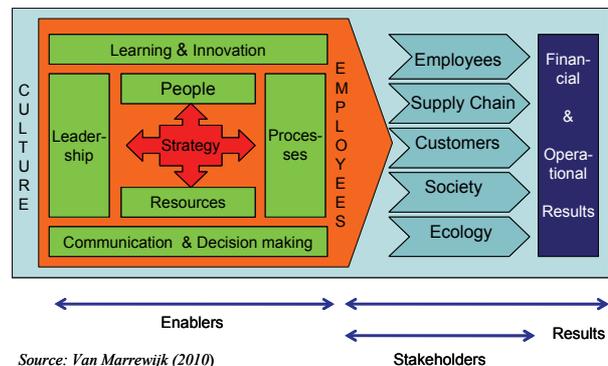
3.1 Global Excellence Model

The European Model for Business Excellence (EFQM model) [11], developed in 1991, was a breakthrough in management and quality improvement, and has been applied successfully among thousands of companies, mainly all over Europe. Over time such initiatives become rigid, as they appear to be unable to include new developments in their conceptual thinking and business appliances. Their failure to include a phase-wise approach caused us to develop the Global Excellence Model (GEM). However, the resemblances are much more important, than the differences. See www.efqm.org for further information.



Source: Brooks & Whitley '96

Figure 3. Linkage research by Brooks & Whitley '96.



Source: Van Marrewijk (2010)

Figure 4. Global excellence model (GEM).

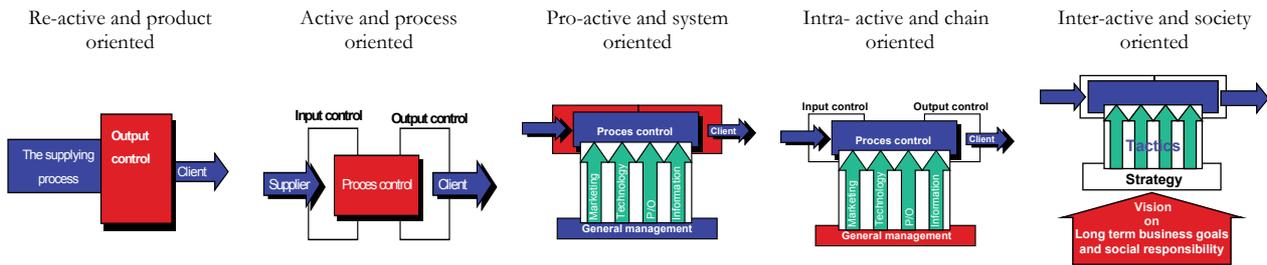


Figure 5. INK quality orientations.

The GEM as well as the EFQM model is non-prescriptive frameworks that recognizes that there are many approaches to achieving sustainable excellence. Due to their focus on excellence, the EFQM model is centred on process management. We prefer to align the GEM with Brooks and Whiley’s conclusions based on Linkage Research (1996) and to focus on the impact of leadership and culture. It is people who bring passion, loyalty, entrepreneurship, trust and dedication to the work floor. Without these, processes would never achieve the expected levels of output. As Wilber taught us, it is all about balancing and consistency in order to deliver adequate solutions to prevailing circumstances.

A group of people create, plan, deploy, lead, implement, improve, execute, learn, enjoy, what ever that needs to be done, in order to achieve the desired results. These results can only come about when stakeholders appreciate the fruits of their doing. Thus, the enabler criteria cover what an organization does, while the results criteria cover what an organization achieves. See Figure 4.

The major distinction between the GEM and the EFQM model is the GEM’s ability to generate multiple levels of quality development, both with respect to contexts as well as situations.

This issue of multi-levelledness was firstly challenged by the Netherlands Quality Institute (INK), already in 1993, when they introduced five quality orientations for assessment purposes: activity (or output), process, organization (or system), chain and society.

Each next quality orientation transcends and includes the previous ones, evidently increasing its complexity. The issue here is “do quality orientations align with the Gravesian development levels or can these value systems (or contexts) support various quality orientations.”

In Table 4, Van Marrewijk presents his conclusions: he INK quality complexity phases do not align necessarily with the Gravesian framework of development levels. An organization functioning in Order is adequate with output control (X), and has abilities with respect to managing processes (x). Organizations that are strong in Success are better able to manage their processes (X) and have abilities to define and apply quality in systemic terms (x). Less complex contexts might have limited abilities or none at

all to produce more complex quality orientations (O).

In order to support an organization wide approach to quality, processes and systems need to be complemented by, firstly, a culture that creates unity, trust and supports co-operation and, secondly, an approach that generates (personal) alignment of the stakeholders involved.

In trying to improve quality it makes quite a difference if a shift to a next quality orientation can be achieved within the same context, or that a transformation to a more complex value system is necessary. We believe that many advisors in quality improvement have failed in making this distinction and taking proper precautions.

Van Marrewijk therefore suggests defining quality orientations as ‘situations’ within a context, at the same time acknowledging the developmental aspects of quality stating that specific orientations can be best implemented more straight-forward than in organizations supported by the value system Success. Managers and advisors alike have often questioned the lack of simplicity in our approach. There is lots of evidence in the failure of numerous quality

Table 4. The quality matrix.

Contexts/Quality Orientations	Order	Success	Community	Synergy
Output	X	x	x	x
Process	x	X	x	x
Organisation	-	x	X	x
Chain	o	-	x	X

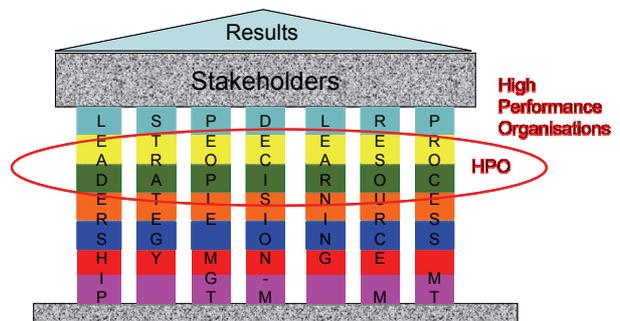


Figure 6. Global excellence model (GEM) and SDI phases.

improvements projects. People have to get used to it that managing complex organizations requires large skills and good theories, better than we ones they used to apply. In elaborating on the performance cycle, we will further deal with this topic.

In developing the GEM, we have assigned the various quality orientations as subsequent manifestations of process management, one of the seven enablers within organizations. We applied the same approach to all seven enablers, thus providing the image of a temple with seven pillars, see Figure 6, each consisting of a set of subsequent paradigms.

In Subsection 4.2 we will demonstrate how these ‘pillars’ support specific research tools and related implementation and learning activities.

3.2 The Cubrix

The Cubrix, as well as its supportive concepts, emphasize the relationship between performance and organization development. With a single focus on management areas, companies do make progression when they succeed in aligning various enablers into an integral business approach, but often they fail in sustaining their performance growth due to rigidity with respect to organizational development. Once organizational development also becomes a variable in improvement activities, sustainable progress is possible. In discussing High Performance Organizations we will further elaborate on this topic.

The Cubrix shows the three dimensions: Organization Development (levels), Disciplines (Management Areas, enablers) and Stakeholder Performances (or Triple Bottom Line: People, Profit, Planet). Each of the cells within the Cubrix can be highlighted and made specific. The result is the so-called Transition Matrix. The appendix shows a summarized version of this matrix.

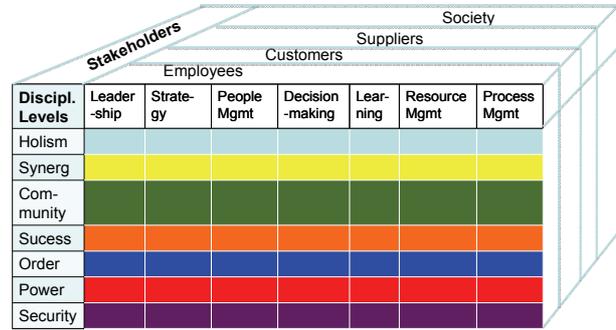
In the next chapter, Van Marrewijk will demonstrate some of the research tools based upon the Cubrix.

4. The Cubrix: Supporting Research

4.1. Research to Improve

Successful organizations have long stopped running on just processes, numbers and systems. Their measurement systems also include organizational culture and employee intentions. Driven by values and ambitions and challenged by competition, organizations look for the right blend of 'hard' and 'soft' measures in order to continuously improve corporate performance and successfully implement a carefully drafted road map for organizational development.

Research to Improve’s surveys, monitors, scans and assessments provide a deep understanding of dynamic and complex topics within organizations. The research tools



Discipl. Levels	Leader-ship	Strate-gy	People Mgmt	Decision -making	Lear-ning	Resource Mgmt	Process Mgmt
Holism							
Synerg							
Com-munity							
Sucess							
Order							
Power							
Security							

Figure 7. The cubrix.

generate results, which give an insight into what people do, how and why they do so and what steps managers and employees can take in order to achieve goals, overcome bottlenecks and enhance performance.

Each development phase has a specific culture and values, ambitions, set of characteristic institutions and related change strategies. Research to Improve has developed research tools for every development phase and within every phase, for each management criteria. By means of generic surveys and dedicated scans, Research to Improve tries to investigate the dominant contexts within an organization. Sophisticated research, strengthened with conceptual and practical expertise, generates a proper diagnosis. This should blend with the internal experiences through dialogues and ‘good conversations’ discussing and interpreting the contemporary contexts and situations, challenges and bottlenecks. This is the input for drafting the best way to move ahead.

The outcomes of generic surveys are presented in feedback reports and graphs based upon Spiral Dynamics, 4 Q model and the GEM. Which policies and business topics are managed best and appreciated most? Are the four quadrants consistently developed?

In the next paragraph we will introduce examples of research tools, such as the RTI Survey, the Leadership Monitor and the People Management Monitor.

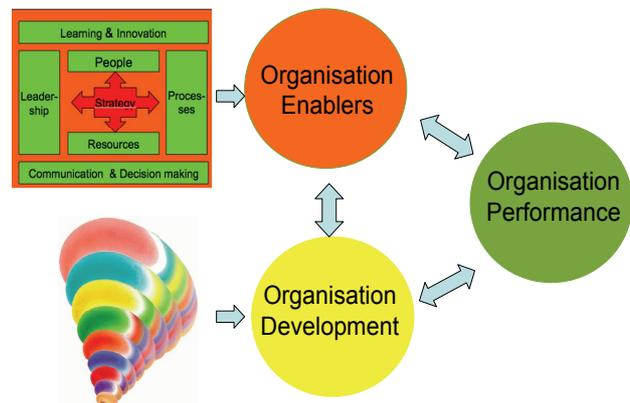


Figure 8. Research to improve model (Cubrix).

4.2. Research to Improve Basic Employee Perception Survey

The RTI Survey identifies the management areas of the GEM, the dominant context, situation and bottlenecks in management and operation. It reports the results on the three most prominent performance criteria: Good Entrepreneurship, Good Employership and Good Neighborhood.

The feedback report generates the opinions and perceptions of stakeholders-mostly employees-with respect to:

- The quality of leadership
- The guidance of the strategy
- The effectiveness of communication and decision-making.
- People management
- The way learning, collaboration and innovation takes place
- The support of resources and opportunities
- The quality of the processes

As well as cultures and the development levels

The RTI Survey emphasizes the importance of trust, as trust includes and transcends employee satisfaction, motivation and commitment.

As custom-made adjustments we can include the core values of the clients' organization and report if the desired behavior not only meet the requirements, but also whether it matches the intrinsic values of the employees, and if it is sufficiently supported by their culture, by leadership behavior, and by the policies and procedures provided by the organization itself.

The RTI survey links to organizational performance to organization development, so that long-term aspirations can be made specific to day-to-day operations. Also the gap between 'what is' (ist) and 'should be' (soll) can be better understood. Combined, one can design a roadmap, by distinguishing a sequence of steps, priorities and interventions. See also Subsection 5.1.

In 2009, Research to Improve developed an innovative research tool for another stakeholder group, hospital patients by once more applying spiral dynamics thinking into the monitoring of vital processes in hospital management: the patient trust survey, we were able, among others, to distinguish levels of patients' wellbeing, their loyalty, quality perceptions from patients' perspective and various ways how medical and nursing professionals behaved towards the patients.

4.3. Leadership and People Management

The Cubrix suggests seven leadership styles, each associated with a specific development level (Figure 9). Per style, experts of the Rotterdam School of Management, Erasmus University, especially dr. Dirk van Dierendonck,

dr. Daan Stam and dr. Inge Nuijten, selected leadership qualities. The statements defining these qualities are validated via scientific methods.

An effective leader, let us say one with a natural gift in servant leadership, should firstly align with the context and challenges the organisation is facing and secondly, include the qualities of the previous leadership profiles. In addition to the congruency of leadership competences, the monitor is able to measure the contextual effectiveness of specific leaders. In the end we do not want to have an entrepreneur responsible for accountancy or a bookkeeper for an R&D department. The situational effectiveness of leaders is determined by the strategic orientation of the organization. See also Subsection 4.4.

The People Management Monitor is developed in order to provide in-depth understanding of the effectiveness of an organisation's people management practices and policies. Based on the Cubrix, Research to Improve distinguished five ambition levels in people management policies:

1) Creating a safe, vitalizing and physically and emotionally healthy community (building the foundation for a culture of trust);

2) A clear and fair salary payment system, employee benefits, and working conditions (Personnel Administration Department);

3) Employee fit in a functional perspective, especially the recruitment, career development and employee turnover, as well as work pressure and absenteeism (Human Resource Management);

4) Investing in employees' professional and personal development (Human Talent Management), by attracting and attaching employees;

Holism	Spiritual leader: vulnerable, leading the mission; inspiring
Synergy	Emergent Leader: visionary, communicative, challenging, long term orientation
Community	Servant Leader: supportive, caring, personal growth, forgiving, coaching, emphatic
Success	Entrepreneur: courage, rewarding, result oriented, accountability
Order	Manager: facilitator, purposeful, monitoring, planning & control
Power-energy	Baas: authoritarian, decisive, competitive, corrective
Security	Founder: role model, mediator, story teller, Pater Familias

Figure 9. Value driven leadership styles and qualities.

Synergy	Human Capital: alignment, balancing intrinsic and eccentric values (trust)
Community	Human Potential: talent development; evaluation & feedback, organization development (motivation, engagement)
Success	Human Resources: recruit; retain, rouse; absenteeism (satisfaction)
Order	Personal Department: administrative, compliance driven; working conditions (loyalty)
Power/Security	Community Building: a healthy and vital, non-discriminatory workplace (cameraderie)

Figure 10. Value driven people management policies.

5) Fine-tuning personal drives and qualities and collective ambitions, for daily operational fit, cultural alignment as well as matching individual and collective learning needs (Human Capital Management). These instruments provide a sense of consistency: “what will be the results when we stick to an authoritarian leadership style, with our business attracting more and more educated and independent employees?” “How can we support employees’ dedication, engagement and motivation, as these are one of the most important success factors for High Performance Organisations?”

With a better understanding of contexts, values, challenges and organization development, companies can select more effective interventions and improvement activities.

4.4. High Performance Organizations—HPO

Jim Collins, co-author of *Build to Last* [12] and author of *Good to Great* [13], has revealed how good, mediocre and even bad companies achieve enduring greatness, and sustain their success over time by ‘engineering’ growth and continuous improvement into the DNA of an enterprise. Measured according the number of copies sold, the books were a huge success, but only a few companies seem to be able to apply the findings in practice.

Dr. André de Waal, a Dutch scientist and business consultant, performed a five-year study to grasp the discriminating factors for High Performance Organisations (2008). He defined five pillars:

- High quality of management
- High quality of professionals
- Long term orientation
- Open and action oriented
- Continuous Improvement

The specific qualities of leadership relate to what we called servant and emergent leadership, the green and yellow realms of organization development (see Figure 6). The same applies to professionals: they flourish in cultures of trust. If fully enabled, respectfully challenged and endowed with opportunities to take responsibility, professionals can become highly resilient, dedicated, and profoundly more productive than employees working in

Table 5. The strategy matrix.

Contexts/Strategic orientations	Order	Success	Community	Synergy
Effectiveness	x	X	x	x
Efficiency	X	x	x	x
Flexibility	x	x	X	x
Creativity	x	x	x	X

X = dominant
x = applicable

organizations offering mediocre conditions.

The GEM adds two additional criteria and combined with its phase-wise orientation, Research to Improve is quite able to measure HPO and identifying the intermediate steps in order to enter a new level of performance and ultimately becoming a HPO.

The next tool, the strategy scan, developed by Marcel van Marrewijk and Prof.dr Teun Hardjono, shows how this can be done.

4.5. The Strategy Matrix

The first step in drafting a roadmap towards sustainable performance improvement and organisation development is finding out one’s position. What are the current constraints, challenges and risks? What are the dominant value systems within the organisation? In short, what (strategic) situation and context are most adequate to face current strengths and weaknesses, opportunities and threads?

In 2003 Van Marrewijk and Hardjono developed the Strategy Scan, based on the Strategy Matrix. This online scan supports the strategic dialogue, the exchange of facts and experts opinions, and gives a direction to strategy development. One can conduct the Strategic Scan in board of directors, management teams, among staff members, and as a vertical dialogue deeper into the organisation as well as outside, even with all stakeholders.

The first part of the scan focuses on strategic situations, which ultimately determine the main direction or strategic orientation of the organisation. Examples of such aspects are the consumer needs and the current bottleneck obstructing organisational performance. The result is a focus and a set of ideal type interventions. See also Van Marrewijk [7].

The second part surveys the nature and complexity of the (external) environment and the disciplinary developments (or paradigms) regarding the management criteria such as leadership, people -, resource - and process management. The Strategy Scan indicates the organisation’s most dominant development phase, its favourite level of existence.

A Strategy Matrix can be drawn with all situations and contexts. In contradiction to the quality situations, all strategy situations are relevant to all contexts, but in each context a situation is manifested differently. The large X indicates the natural combinations. Efficiency can be performed adequately in Order, while Effectiveness aligns best in Success, etcetera.

Each combination provides the researchers and corporate experts a set of specific interventions and key performance indicators, which forms a major input for drafting a roadmap for performance improvement, aligned with the dominant value systems of the organisation.

The Strategic Sustainability Scan is an extended version including sustainability issues. The Sustainability Scan generates an adequate meaning of corporate sustainability and responsibility, an ideal type reference on which an organization can develop its own touch and approach. This way one can link strategy with CS/CR-policies and interventions.

5. The Cubrix Supporting Change Management

From the sheer construction of the Cubrix, in other words, through distinguishing contexts (value systems), aspects (disciplines) and situations (quality or strategic orientations) one has to conclude that all management principles, models and even hypes have their value, but often only in a certain combination of situation, aspect and/or context. Or put differently: each cell within the Cubrix will have a list of do's and don'ts, with effective approaches, tools and policies, and ones that do not apply to this particular context-situation.

Due to changing circumstances both outside as well as inside organizations, in the case of corporate dynamics, models, tools and certainly hypes have limited applicability and tenability over time. The Cubrix is therefore able to function as a framework for structuring tools, policies, models and management literature.

The multi-level approach underlying the Cubrix also revealed a set of distinctive complexity levels in change management. Furthermore, it offers a conceptual basis for the so-called Performance Improvement Cycle from which one can deduct a roadmap for sustainable business improvement and organisation development. It is the topic for our next paragraph.

5.1 The Performance Cycle

The Cubrix helped us in structuring change management into four distinctive hierarchical complexity levels: (1) vitalising, (2) optimising, (3) shifting and (4) transforming. These four dimensions of change management are explained below.

5.1.1. Vitalizing

Often the performance can be improved by enhancing the fundamental skills, structures and procedures of including contexts; these interventions are relatively simple as we have a lot of experience in managing these aspects, but being involved in more complex value systems, we tend to neglect basic competences although they can jeopardize current performance potential.

Vitalization programs ought to touch all four quadrants, or at least restore the balance between them.

5.1.2. Optimizing

Once a sound fundament has been realized, further im-

provement can occur we organizations enhance the effectiveness of the characteristic institutions within the dominant context. Try to find out and apply best practices, work smarter and excel in what needs to be done.

5.1.3. Shifting

If including and current contexts are functioning well, further improvement can be established by fine-tuning the strategic situation. Within a context, organizations must focus their business towards the most adequate situations, aligning their interventions accordingly.

5.1.4. Transforming

When the previous three change management dimensions can no longer sustain corporate performance, organizations should adopt new ways of organizing by transforming to a more complex context, adopting emerging value systems and all institutions aligned with it. Transformations are complex phenomena, especially if managed as an improvement project.

Each value system has a supporting institutional structure that consistently arranges ways of doing. As more value systems appear parallel, or nested, within organizations, these structures are reasonably flexible to comprehend elements from various value systems. Elements of emerging systems can be developed within the current structures. It needs to have a critical mass of people who can support these values and corresponding awareness and behaviour. Once these values are triggered by challenges or intrinsic motives, their full potential can become manifest causing new institutional arrangements, encompassing previous ones. These transformations are far from simple. Changing life conditions boost a sense of urgency, building up a dissonance, a pressure to move, a necessity to change, and requires commitment to change at the top of the organization. These necessary conditions can be concerted into a successful transition to a more complex level of existence. Despite its difficulty, some organisations are very good at it [14].

Having identified the four dimensions of change management, we adapted the Performance Improvement Cycle. See Figure 11. It is structured according to Deming's Plan-Do-Check-Improve sequence.

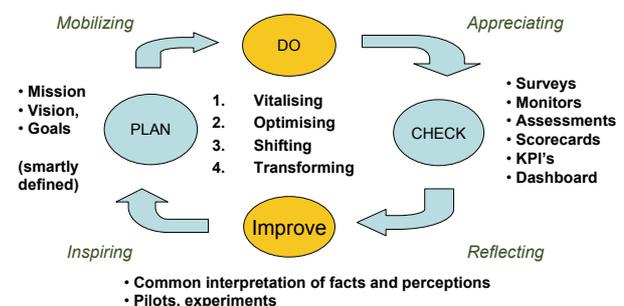


Figure 11. Performance improve cycle, based on Deming's PDCA.

The Performance Improvement Cycle suggests various ways to check the impact of the implementation process. Employee perception tools, such as surveys, monitors and assessments, as well as quality management, business operation and accounting tools generate data which via business intelligence services are provided to the board of directors, to management and professionals. Together they interpret the data and determine the progress made. Easy adaptation and fine-tuning is implemented directly, but larger alterations can be tried as experiments and pilots on a small-scale basis, or postponed until they fit the next strategic orientation.

5.2. A Roadmap towards Sustainable Performance

Deducting a roadmap for performance improvement and organizational development can be difficult as each organisation is unique. Many aspects can play a role and not all of them can be foreseen. Still it makes sense to have an idea about the path of change. What can we expect? What level of complexity? Do we have the necessary competences? Do we have the right people on the bus?

Each organisation must provide its own answers, but at least, by applying the Strategy Scan, the Strategy Matrix and the Performance Improvement Cycle, one can grasp its position, its strategic focus, a set of adequate interventions in order to lift the organisation's bottlenecks and enhance its basic competences, and its dominant context to 'colour' the interventions into fitting change activities.

Good surveys can provide management information from which one can tell if vitalisation or optimisation is most effective to enhance corporate performance. Frequently held strategic analyses can provide arguments to remain focused or shift to a next strategic orientation, prioritising a new set of interventions. Strategies can shift permanently within one context. This is relatively simple, but challenging enough.

6. Building up Experiences

Since 2000, Van Marrewijk is engaged in building an integral, multi-level management framework. Now it is in operation. Several research methods have been based upon the Cubrix and consultancy firms are currently applying the new understanding in change management, performance improvement and organisation development.

Supported by our state-of-the art research platform we are able to enable researchers worldwide with our techniques, software and research methods. This will boost our experience and further development of our methods

and understanding. This is an invitation to join our efforts in trying to build better businesses and a better society.

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Appendix

Transition Matrix Labels based on Spiral Dynamics and Global Excellence Model				
Development labels → Enablers :	Compliance-driven Order (Blue)	Profit-driven Success (Orange)	Care-driven Community (Green)	Systemic-driven Synergy (Yellow)
Leadership	Manager	Entrepreneur	Servant Leader	Emergent Leader
Strategy	Dominance through hierarchies	Autonomous growth due to competitive qualities	Stakeholder engagement; Chain oriented	Society oriented; seeking breakthroughs
Communication & Decision making	Top down; Directive; Legal procedures	Still cascading, with room for negotiations; good info from the bottom is always welcome	Bottom-up; group decides; Consensus based	Top-down and bottom-up balance; Holacracy; Consent based
People Management	Personnel & Administration; Working conditions	Human Resource Management	Human Talent Management	Human Capital Management
Learning & Innovation	Incremental (product) innovations; knowledge and competence management	Process innovation, and product diversification; professionalization through MD-training	Social Innovations; developing supportive structures for organizational learning	System innovations, based on in-depth understanding of corporate dynamics, sustainability and needs
Resource Management	Procedural supply relations based on strict pricing policies	Maintenance on process indicators	Outsourcing with strong relationships, peer audits	Co-creating; together-win; Sustainable Purchasing
Process Management	Activity Orientation	Process Orientation	System Orientation	Chain and Society Orientation

Notes

1) The ECSF is a European-wide research project, financed under Article 6 of the European Social Fund Regulation. It has the aim to design Corporate Sustainable and Corporate Responsible (CS-R) ways of doing business. Within the project, a basic conceptual framework is developed, integrating several proven theories, in order for organizations to address and interpret CS-R. The EFQM model is one of the founding models of ECSF. Contact: marcel@vanmarrewijk.nl or +31.6.8 1953 777

2) The consortium members were (academics); Erasmus University Rotterdam, Vrije Universiteit Amsterdam/IVM, Helsinki University of Technology, Triple

P Initiative; (Consultants): Virtu et Fortuna, SCS Consulting (Quality Organizations) KDI, European Organization for Quality, VCK, Excellence Ireland, Centre of Excellence Finland

3) For further reading, please read “a value based approach to ideal type organizations” in this edition, Spiral Dynamics (Beck and Cowan, 1996) and the website of the Spiral Dynamics Organization (NVC consulting and partners) at <http://www.spiraldynamics.org>.

4) See Van Marrewijk and Werre’s article “Multiple Levels of Corporate Sustainability” in JoBE May 2003 on DBR’s Value Audit (www.dbr.nl).

Abbreviations

4Q	Four Quadrants Model (Wilber)	EU	European Union
BE	Business Excellence	GEM	Global Excellence Model
CS	Corporate Sustainability	GPTW	Great Place to Work®
CSR	Corporate Social Responsibility	HPO	High Performance Organizations
CS-R	Corporate Sustainability and Corporate Responsibility	RSM	Rotterdam School of Management
ECSF	European Corporate Sustainability Framework	RTI	Research to Improve
EFQM	European Foundation for Quality Management	SDI	Spiral Dynamics Integral
EC	European Commission	TQM	Total Quality Management

Long-Term Outperformance of Equity Carve-Outs? — Evidence from Germany

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Received November 11, 2009; revised November 27, 2009; accepted December 10, 2009

Abstract

While there has been done a lot of empirical research on IPO performance in general only Prezas *et al.* [1] focus on equity carve-outs (ECOs) in comparison to common IPOs from an investor's point of view. ECOs are an often applied divestment alternative used by technology companies to refocus their core businesses. Our note is claiming to extent this distinct literature in two ways. Firstly, we add new insight from a European market, namely Germany, and secondly, we apply a wider methodological spectrum to compare IPOs and ECOs. We find that controlling for the specific return characteristics of IPOs there remain hardly any significant performance divergences between the two samples.

Keywords: Equity Carve-Out; Initial Public Offering, Long-Term Return, Underpricing

1. Introduction

According to Schipper/Smith [2], an equity carve-out (ECO) is defined by a company selling stock in a subsidiary via an initial public offering (IPO). From an investor's perspective there is some rare empirical evidence that these new listings outperform other initial public offerings in the long term¹. Vijh [3] who indirectly compares US equity carve-outs and common IPOs presents first findings in this direction and explains his results by the strategic focus of carve-outs, parents as an active and superior monitors and reduced overpricing due to reputational aspects². However, Brav *et al.* [4] showed that the results of Vijh [3] are likely to be induced by model misspecification. Prezas *et al.* [1] find a significant three year underperformance of equity carve-outs compared to common IPOs. The contradictive evidence presented so far indicates the valuable contribution of additional results from other stock markets. Our paper aims at analyzing the pricing and performance of equity carve-outs in Germany.

The remainder of this note is organized as follows: Section 2 provides a description of the methodological

approach and specification of the event study. The results of the event study are provided and discussed in Section 3. Section 4 concludes.

2. Data and Methodology

For analyzing the performance of German ECOs and other IPOs over different time horizons we apply the event-study framework. While the event study procedure is straightforward for small short-term event windows, the methodological issues of measuring long-term performance are discussed more controversially. Therefore, we point out the discussion on major methodological challenges a bit broader.

2.1. Sample Characteristics

Calculations are based on a sample from the IPO database of Deutsche Börse AG, transaction data was obtained for 348 initial public offerings. Due to several restraints, 303 securities remained. 19 could be identified as involved in an ECO transaction, using the sample of German ECOs by Stienemann [9]. Those 19 ECOs form the ECO sample, whereas the control sample or IPO sample is composed of the remaining 284 common IPOs. Due to only few recent transactions, the two-year control sample was reduced to 280 firms, whereas the three-year ECO sample and con-

¹The reaction of parent companies on the announcement of an ECO has been studied numerously. Weiser, *et al.* [5] provides a broad overview on the existing literature.

²See for theoretical support of these arguments e.g. Nanda [6], Brav/Gompers [7], and Cheung/Krinsky [8].

trol sample contained 16 and 240 firms, respectively.

As can be seen from Table 1, the size of the equity carve-outs (sample A) is both larger and subject to greater skewness than the size of the common IPOs (sample B). Although mean and median book-to-market equity ratios do not differ significantly, at least in economic terms, the dispersion in the common IPO sample is greater, possibly resulting from a larger sample size. A simple F-test shows that it seems unlikely for both samples to share a common population; however, this test requires independent random samples which are not given in this case. Thus, inferences about statistical differences cannot be made. However, due to the well-documented size and book-to-market effects in average returns, it has to be accounted for those economically significant differences using reference portfolios and matching firms matched by size and book-to-market equity as benchmarks as introduced earlier.

2.2. Applied Methodology

Fama [10] explicitly emphasizes the joint test of market efficiency with a model for expected returns, when analyzing outperformance over multi-year periods. Unfortunately, all predictive models are only incomplete descriptions of the systematic return generating process, leading to so-called “bad-model problems”. They become more serious with longer event windows. The same is true for the estimated variance which is needed to determine the statistical significance of observed abnormal returns. Using simulations, Kothari/Warner [11] find that “long-horizon [parametric] tests are misspecified [...] and the general conclusions are not sensitive to the specific performance benchmarks. Further, the tests can show both positive and negative abnormal performance too often.” Accordingly, the possibility arises that several observed delayed stock price reactions, including the underperformance of IPOs according to Ritter [12] are due to a “bad model” or test misspecification rather than mispricing.

Barber/Lyon [13] presents three possible reasons for

the observed bias; the new listing bias, the rebalancing bias and the skewness bias. Cowan/Sergeant [14] adds the overlapping horizon bias. The last two sources of biases can be expected to play a significant role in our analysis: (1) the skewness bias arises because long-term returns are found to be positively (right) skewed which represents a violation of the normality assumption of most statistical tests, leading to non-normal, left-skewed t-statistic distribution with a mean smaller than zero. Inferences based on the conventional t-statistic are thus biased. (2) Due to correlation in calendar-time, i.e. clustering of IPOs, many event horizons overlap in calendar-time. The consequences are content of the overlapping horizon bias: As firms are exposed to the same unpriced risk factors, e.g. common economic shocks during the event window, this translates into positive cross-sectional correlation within a sample. Since significance testing relies on the assumption of uncorrelated disturbances, the bias leads to a violation of the independence assumption, and thus has high impact on the statistical inferences.

As determined by descriptive statistics (see Table 1), the average common IPO and the average ECO differ significantly in size and book-to-market equity. Thus, using the simple average of both panels would lead to the bad-model problem. One possibility to bypass this problem is to match the sample securities with portfolios based on firm characteristics, such as size and book-to-market equity. This will be referred to as control portfolio or reference portfolio approach and is widespread in tests for IPO underperformance.

The returns of the respective stocks in the reference portfolio can either be equally weighted or value-weighted. As there is no common sense regarding which model is superior, we apply both. By using this approach, both the rebalancing bias and the new listing bias are controlled for. The sample and the reference portfolio are both compounded without rebalancing, they only include firms with similar trading records, and they are matched on size and book-to-market equity which was found to diminish possible return differentials.

The similar third approach uses single securities instead

Table 1. Descriptive statistics of the samples.

	Mean	Standard deviation	Median	Range
Panel A: Equity carve outs (N=19)				
Size (mio. Euro)	5.503,50	14.018,73	425,77	[39; 46384,22]
Book-to-market equity	0,23	0,13	0,21	[0,07; 0,61]
Panel B: Common initial public offerings (N=284)				
Size (mio. Euro)	412,11	1.487,79	165,58	[17,09; 23880,69]
Book-to-market equity	0,24	0,18	0,22	[0,01; 1,64]

of portfolios to match with the sample securities. This approach of matching firms or control firms is proposed by Barber/Barber/Lyon [12] and employed by Prezas *et al.* [1]. The rationale behind this adjustment is mainly derived from the skewness bias. Barber/Lyon [8] find that abnormal returns calculated using control firms instead of reference portfolios are reasonably symmetric. In addition, analogous to the reference portfolio approach, the new listing bias and the rebalancing bias are controlled for. As a forth approach we apply the cross-sectional Fama/French [15] three-factor-model.

There was also a lively debate on calculating returns over longer periods, discussing the pros and cons of cumulative abnormal returns (CAR) and the buy-and-hold or holding period abnormal return metric (BHAR). As stated by Fama [9], BHARs capture the return for an investor's passive trading strategy. Gompers/Lerner [16] formulates the concern that CARs tend to misrepresent performance when returns are highly volatile. Barber/Lyon [12] find that CARs suggest abnormal performance when there is none. This reservation to CARs let us recommend the use of BHARs, although Fama [9] points out that CARs experience fewer statistical problems since they are less skewed. However, regarding the investor's perspective of this study, the increased magnitude of the skewness bias is accepted in order to account for the significant volatility during the period under investigation in Germany. The cross-sectional sample variance of abnormal returns is calculated as suggested by Kothari/Warner [10] and Brav [17]. This approach corresponds to the paired difference t-test.*

In addition to the twofold cross-sectional dependence problem, the skewness bias constitutes a major problem for significance test specification, as already noted above. Therefore, Lyon *et al.* [18] propose a skewness-adjusted t-statistic t_{skew} in addition to the conventional t-statistic, which is supposed to reduce the associated bias. In order to estimate the statistical significance of the t_{skew} , we use a bootstrap application for approximating the empirical distribution of returns.

3. Empirical Evidence from Germany

Results for initial short-term underpricing are not robust across predictive models and aggregation methods, as shown in Table 2a. The equal-weighted reference portfo-

lio and three factor model yield similar results, showing a significant underpricing between 50-150%. Those predictive models provide robust results across aggregation methods, suggesting that smaller and larger ECOs are alike. Unfortunately, this is not supported by the other two predictive models, since the significant results tend to vanish. Matching firms shows a significant underpricing at the 10% level with the paired difference t-test; significances disappear when not accounting for inter-sample dependence. Assuming a small impact of the skewness bias for matching firms, this seems to be a case of underrejection due to the inflated variance underlying the t_{ind} , as there is supposed to be no intra-sample dependence in short returns. Thus, this presents an indication towards the greater underpricing of large ECOs.

The underpricing appears to vanish using value-weighted reference portfolios and matching firms combined with the value-weighted aggregation method. Not only are the initial day returns insignificant, they are even positive at about 53%. These results indicate that larger ECOs are engaged in greater underpricing.

The results for the long-term performance are presented in Table 2b. In the long-term, there is a significant underperformance for the 24-month holding period at about 20-30% with equally weighted aggregation and all models except matching firms. However, this underperformance vanishes with value-weighted aggregation, suggesting relatively better performance of larger ECOs. However, the t_{skew} suggests that the significance is attributable to the skewness bias. Thus, the null hypothesis of no longer-term performance divergence cannot be rejected.

4. Conclusions

Most abnormal returns, except for the initial day holding period with value-weighted reference portfolios, are significantly different from zero. Thus, the null hypothesis of no abnormal short-term holding period returns has to be rejected. Interestingly, ECOs were found more underpriced than IPOs in the short-term. These results are opposing to arguments by Cheung/Krinsky [8], arguing that underpricing is based on information asymmetries and that carve-outs should experience less misspricing, because they are already valued and monitored by the market prior the transaction.

According to our results, the null hypothesis of no long-term abnormal performance has to be rejected. Based on these results, the positive effects of active monitoring do not have to be rejected in general. However, negative consequences related to the asymmetric information hypothesis suggested by Nanda [6] evidently outweigh possible efficiency gains from superior monitoring.

Nevertheless, the discussions above illustrate the dependence of the results regarding alternative methodolog-

*Due to the overlapping horizon bias, paired difference tests might be misspecified in long-horizon event studies. Cowan/Sergeant (2001) show that there are two occurrences of cross-sectional correlation in long-term event studies with overlapping event horizons. They suggest a rather rough yet simple approach, arguing that not correcting for both kinds of cross-sectional dependence will lead to a better test specification than correcting for just one of the biases. Accordingly, the variance of differences would be estimated as if the sample i and the benchmark j were independent. Both significance tests are employed in this note.

Table 2a. Short-term performance/underpricing.

		Equal-weighted aggregation			Value-weighted aggregation		
		Mean	t_{dep}^1	t_{ind}^1	Mean	t_{dep}^1	t_{ind}^1
1day	Reference portfolios (equal-weighted)	-53,8%	-2,45 **	-2,21 **	-50,8%	-2,32 **	-1,95 *
	Reference portfolios (value-weighted)	-16,7%	-0,90	-0,82	32,2%	1,48	1,46
	Matching Firms	-3,8%	-0,17	-0,11	53,8%	2,05 *	1,56
	Fama-French (three-factor model)	-57,0%	-3,30 ***	-2,60 **	-158,3%	-5,37 ***	-4,12 ***
5days	Reference portfolios (equal-weighted)	3,6%	1,42	1,33	7,8%	2,85 **	2,72 ***
	Reference portfolios (value-weighted)	0,7%	0,25	0,24	-1,7%	-0,61	-0,59
	Matching Firms	1,2%	0,31	0,28	-3,1%	-0,81	-0,71
	Fama-French (three-factor model)	2,2%	0,94	0,79	4,3%	1,74 *	1,48

¹ *, **, *** denotes statistical significance at the 10%, 5%, and 1% level, respectively, according to the standard student's distribution.

Table 2b. Long-term performance.

		Equal-weighted aggregation			Value-weighted aggregation		
		Mean	t_{dep}^1	t_{ind}^1	Mean	t_{dep}^1	t_{ind}^1
24months	Reference portfolios (equal-weighted)	-34,9%	-2,36 **	-2,68 **	-21,3%	-1,41	-1,57
	Reference portfolios (value-weighted)	-31,6%	-2,28 **	-2,58 **	-19,1%	-1,35	-1,50
	Matching Firms	-72,2%	-1,09	-1,13	-17,3%	-0,26	-0,26
	Fama-French (three-factor model)	-19,2%	-1,86 *	-1,47	-11,4%	-1,08	-0,85
36 months	Reference portfolios (equal-weighted)	-7,8%	-0,97	-1,00	-10,8%	-1,34	-1,39
	Reference portfolios (value-weighted)	-8,0%	-0,99	-1,01	-11,1%	-1,36	-1,41
	Matching Firms	-8,4%	-0,61	-0,62	-0,4%	-0,04	-0,02
	Fama-French (three-factor model)	-4,2%	-0,62	-0,55	-6,2%	-0,91	-0,78

¹ *, **, *** denotes statistical significance at the 10%, 5%, and 1% level, respectively, according to the standard student's distribution.

² Significance using a bootstrap procedure was only determined for the 36 month period. No significant results were calculated

ies. The impact of different biases was examined, suggesting that further research is needed to confidently answer the question of performance differentials between ECOs and common IPOs. Our results suggest at least that the divergence is not as clear as argued by Prezas *et al.* [1].

5. Acknowledgment

Arnd Schikowsky passed away while working on this study. This paper is dedicated to him.

Large part of this work was completed when Christian Voigt was Research Assistant at the European Business School. The views expressed in this article are those of the authors and do not necessarily reflect the views of

Deutsche Börse AG, any of its subsidiaries, or anyone else.

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A Literature Review on the Studies of Internet Retailing Management

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Received October 26, 2009; revised November 23, 2009; accepted December 22, 2009

Abstract

This paper reviewed the studies of Internet retailing management. It found that, in general, most of the papers on the topic took focus on Internet retailing strategy and online merchandise management. Specifically, it drawn following conclusions: First, there were six major incentives for firms to adopt Internet retailing, including improving internal communication, improving operational efficiency, facing competition, enhancing customer services, reaching out to a wider audience, and improving relations with suppliers. Second, cost of Internet trading and consumer preference were negatively, while status of Internet retailing strategy, technology capability, Internet communication preference, Internet marketplace, and market development opportunity were positively, affect firms to adopt Internet retailing. Third, market positioning, business model, estimation of the market size, Internet-based innovative application, and strong brand of website were the key factors for the success of an online retailing website. Fourth, cross-channel conflict might be reduced by reconstructing the business process or adjusting the pricing strategy, while Internet retailing inventory might be improved by firms' zero inventory policy, in-stock inventory policy, and dynamic inventory policy. Finally, a firm's quality of logistics and delivery could be increased by high-value-package strategy and emergency transshipments. Implications of these conclusions were suggested.

Keywords: Internet Retailing, Internet Retailing Strategy, Online Merchandise Management, Online Store Management

1. Introduction

Retailing is the set of business activities that adds value to the products and services sold to consumers for their personal or family use [1]. Internet retailing is the retailing business on the Internet [2]. That is to say, on one side, providers sell products or provide services on their online website; on the other side, consumers buy products or services by accessing such website via connected computers (i.e., Internet). Digital products will be delivered to customers by Internet directly and non-digital products will be delivered by logistics.

Doherty and Ellis-Chadwick classified the studies of Internet retailing into three categories [3]. The first category is the studies from customer perspective, taking the focus on customer online purchasing behavior and psychology. The second category is the studies from retailer (i.e., company) perspective, taking the focus on the re-

tailing management, such as business model design and online store management. The third category is those from technology perspective, taking the focus on the innovation of emerging IT for the online retailing management. For example, Flash can be used to enhance the display of products.

This paper will review the studies of the second category for two reasons. Firstly, Internet retailing is developing rapidly, and research on Internet retailing management has important theoretical and practical significance [4]. In the market, failed and successful websites coexists. What factors affect the failures and successes of running Internet retailing? How should a firm design their business model and evaluate it? Studies on these questions are far from enough. Therefore, a review on the studies about these questions will expand the retailing theory in the cyber world and guide the management practice of Internet retailing. Secondly, no detailed review on Internet retailing management has been found in the literature. A detailed review on the studies of Internet consumer behavior, the first category, has been done by

The financial support of a NSF program (No. 70972102) from National Natural Science Foundation of China is gratefully notified.

Cheung, Chan and Limayem [5]. Although Doherty and Ellis-Chadwick [3] have reviewed the studies of Internet retailing (the second category) as a whole, their review for the studies of Internet retailing management is lack of details. To guide the future studies of Internet retailing management, it is necessary to review the studies on the topic in more depth and with more details.

The paper is organized as follows: Section 1 is a framework to summarize the papers. Section 2 reviews the papers on Internet retailing strategy. Section 3 reviews the papers on online merchandise management. Section 4 reviews the papers on online store management. Conclusions and implications are given at the final section.

2. Paper Selection and Classification

We used the term “Internet retailing” and “e-tailing” to search the papers in the EBSCO, Proquest and Science-Direct. 125 papers with full text were found. Among those papers, 86 in the perspective of consumer behavior and technology were weeded out, and 39 in the retailer perspective left, ranging from 1996 to 2007. We didn’t use the term “B2C” to search because it is a general concept which refers to all the business activity between buyers and sellers in the cyber world, such as retailing, intermediary, and infomediary.

There are three areas for retailing research, namely retailing strategy, merchandise management, and store management [1]. The retailing strategy is the basis of merchandise and store management, while merchandise and store management are the implementation of retailing strategy. Internet changes the way of retailing, but does not change the retailing itself [6]. So, we use this framework to organize the papers we selected. As shown in Table 1, Internet retailing strategy received more attention, and then online merchandise management. Few studies have been found exploring the issues on online store management.

3. Internet Retailing Strategy

Most of the early studies in this area were descriptive or assumptive. Many researchers believed that, by taking advantage of Internet such as 24 × 7 online and buying at home, Internet retailing is superior to traditional retailing. They predicted Internet retailing would replace traditional retailing [7–9]. However, this was wrong. Doherty *et al.* reported that few companies had set up their own online retailing website in 1999 [10]. Hart, Doherty, Kotzab, Madlberger and Ellis-Chadwick found that Internet usage among companies was at the early stage, i.e., firms’ websites were more for the informational purpose than for the trade function [11,12]. Chen and Leteney found that many traditional retailers had run both

online and offline shops at the same time [13]. In brief, Internet retailing didn’t flourish and traditional retailing was not replaced by Internet retailing.

As a result, researchers began to pay close attention to the following four questions: what are the incentives for a firm to adopt Internet? What factors affect a firm’s Internet adoption? How a firm should design its business model and marketing strategy based on Internet? How a firm should manage the online shop and offline shop at the same time?

3.1. Incentives for Adopting Internet

Seven papers about this sub-topic were identified from the three databases (see Table 1). These papers proposed and tested two internal and four external incentives.

Two internal incentives were found to have positive impact on firms’ intention of Internet adoption. The first is improving internal communication [13,14]. In daily work, employees have to communicate frequently to coordinate their works with others. Internet is capable of transmitting all kinds of information such as instant informal messages, formal documents, sound, and video at the same time with one integrated computer-based platform. Therefore, if a company wants to improve its internal communication, the tools of Internet-based communication will be the first choice. The second internal incentive is improving operational efficiency [15]. Internet-based information system (i.e., information system, such as ERP, Lotus Notes) is powerful for enhancing work efficiency, reducing cost, and simplifying workflow. It can be used to replace manual operations in daily work. Therefore, if the headquarter of a company wants to improve the operational efficiency, it is likely to adopt Internet-based information system.

Four external incentives were found to have positive impact on firms’ intention of Internet adoption. The first is facing competition, i.e., a firm feels a threat from competitor’s website [10,15,16]. In the competitive market, every company would try its best to gain competitive advantage. If a company have taken the advantage of Internet (e.g., setting up websites or adopting MIS), others are likely to feel a threat and follow the “me too” strategy to avoid falling behind. The second incentive is enhancing customer services [11,12,15]. Winning customers is one of the most important goals for a company. Internet-based website can play a role in winning customers. Specifically, customers may use website to search products, get related information, complain, and communicate with others. These activities are all helpful for a company to win customers by engaging in Internet retailing. The third incentive is reaching out to a wider audience [10,16]. Internet is an open system. It eliminates the borders of physical regions. With search engine

Table 1. Paper summary.

Areas	Focal questions	Number of Papers	Methodology	Conclusions
Internet re-tailing strategy	Incentives for adopting Internet	8	Quantity analysis based on statistics.	Six incentives, i.e. improving internal communication, improving operational efficiency, facing competition, enhancing customer services, reaching out to a wider audience and improving relations with suppliers, have positive impact on the intention of adopting Internet.
	Factors affecting the Internet adoption	6	Quantity analysis based on statistics and quality study based on case.	Two factors, i.e. cost of Internet trading and consumer preference, have negative impact on Internet retailing adoption. Five factors, i.e. status of Internet retailing strategy, technology capability, Internet communication preference, Internet marketplace and market development opportunity, have positive impact on Internet retailing adoption.
	Online business model and marketing strategy	6	Case study and paper research.	Five factors, i.e. market positioning, business model, estimation of the market size, Internet-based innovative application and strong brand of website, are the key for a successful online retailing website. And the business model and marketing strategy should be designed according to product purchasing frequency, product tangible or intangible and product differentiation.
	Multi-channel management	7	Game models.	Cross-channel conflict can be reduced in two ways. One is "integration" perception, which is aimed at reconstructing the business process; the other is "adjustment" perception, which is aimed at adjusting the pricing strategy of the two retailing channels.
Online merchandise management	Merchandise inventory strategy	4	Game models.	Zero inventory policy, in-stock inventory policy and dynamic inventory policy, are able to reduce Internet retailing inventory cost effectively.
	Merchandise logistics	4	Quantity statistics and game models.	High-value-package strategy and emergency transshipments are able to enhance the quality of logistics and delivery effectively.
Online store management	No focal questions	4	Paper research	No focus explicitly formed.

(e.g., Google or Yahoo) or catalog, it is easier for a customer to search things that he wants. Internet-based web site can help companies to win greater amount of and more remote customers. The fourth incentive is improving relations with suppliers [15,17]. It is very important for a company to keep close relationships with its suppliers given the importance of the supply chain in firm success. Many MIS (e.g., ERP, MRPII) are design to meet such needs. Therefore, those who want to improve relations with their suppliers will have higher intention to adopt Internet-based information system.

3.2. Factors Affecting the Internet Retailing Adoption

Six papers about this topic were found in the three databases, proposing and testing even factors related to the

aspects of company, customer and cyber world (see Table 1).

Three company factors, identified by previous studies, were found having different impact on firms' adoption of Internet retailing. Cost of Internet trading is negatively, status of Internet retailing strategy and technology capability are positively, related to firms' adoption of Internet retailing. If the costs of Internet trading such as logistics cost, organization expense, and operation cost are so high that the adoption of Internet retailing will reduce a company's profit, the company will loss it's enthusiasm for the adoption [18]. Status of Internet retailing strategy refers to the support from headquarters (i.e., general manager or chairman of the board) [18,19]. A headquarter has the right of using the resources such as money and technician in a company. If the headquarter supports the Internet retailing, it will provide the resources neces-

sary for the Internet retailing adoption. The Internet retailing adoption will go smoothly and deeply. Technology capability of a firm will affect firm's web page quality, speed of accessing, and online security [18–20]. In other words, the higher a company's technology capability, the higher the website quality is, and the better the Internet retailing adoption.

Of the two customer factors identified by previous studies, consumer preference for traditional offline shopping was found having a negative, while Internet communication preference was found having a positive, impact on firms' adoption of Internet retailing [18]. Many consumers may think Internet retailing is lack of touching products, so they prefer offline shopping to online shopping. This will discourage a firm to adopt Internet retailing. Internet communication are more preferred as more and more people are living with Internet [18]. Word-of-mouth is more effective for Internet retailing than for other tools of communication. These will help a firm to adopt Internet retailing.

Two cyber world factors have positive impact on the Internet retailing adoption. The first is Internet marketplace, i.e. market management and market rules [18,19]. Good cyber market management and rules are able to create a good cyber trading environment. A good environment is helpful for a company to run a retailing website efficiently, making it more likely to adopt Internet retailing. The second is market development opportunity i.e., the sales that a firm can archive through Internet retailing [16,18]. The more sales and profit a company can get through Internet retailing, the more likely and to higher degree that the company would adopt Internet retailing.

3.3. Online Business Model and Marketing Strategy

Online business model and marketing strategy refers to the following three questions, i.e., what to sell, whom to sell, and how to sell online. Six papers on these questions were found in the databases (see Table 1).

Some researchers tried to figure out the key points of successful online retailing websites. Ring and Tigert suggested that market positioning, business model, and estimation of the market size are the three key factors for a successful online retailing website [21]. These factors can be used by a company to obtain competitive advantage and survive in the market. Kotha found that the Internet-based innovative application such as online Flash games and strong brand of website are effective for attracting consumers [22]. Therefore, applying new techniques and building a good website reputation are key factors for a successful online retailing website.

Other researchers studied the business model and marketing strategy. For example, Peterson *et al.* pro-

posed that business model and marketing strategy should be designed according to the three aspects of products, i.e. purchasing frequency, tangible or intangible, and differentiation [23]. For instance, a firm should choose a strategy of online retailing, high price, and steep price cuts for electronic fashion magazine (the frequently purchased, intangible, and high differentiation products), while for gold bar (the infrequently purchased, tangible, and low differentiation products), the firm should try a strategy of offline retailing with advertising online and stable price.

3.4. Multi-Channel Management

Multi-channel means a company runs online and offline retailing channel at the same time, i.e., clicks-bricks [13,24,25]. As shown in Table 1, seven papers on this topic were found. These papers focused on how to reduce the cross-channel conflict, including Internet and traditional retailing contesting for money and equipment inside and for markets and suppliers outside [13,24,26].

Some researchers adopted the perception of "integration". They tried to reconstruct the business process to reduce the conflict. For example, Chen, Enders, Jelassi and Leteney [13,24] analyzed the business process of Internet retailing and traditional retailing respectively from the perspective of merchandise transferring. They found that the supply, purvey of information, communication, logistics, and transaction processes can be combined or partially combined. For instance, the supply of Internet retailing and traditional retailing, the advertisements and part of information purvey process, can be combined into one. This will reduce the conflict between a firm's Internet and traditional retailing.

Other researchers adopted the perception of "adjustment". They tried to reduce conflict through adjusting the pricing strategy of the two retailing channels. Generally, the online price is 14% lower than the offline price, so it is believed to be the origin of the cross-channel conflict [27]. Yao and Liu [6,26] analyzed the conflict by modeling with game theory. They found an equilibrium price exists between two retailing channels. This price is close to the offline price, but much higher than the online price. It will increase the traditional retailing sales but reduce the Internet retailing sales. However, the increase will be greater than the reduction, so the total sales will be greater.

3.5. Summary

To sum four conclusions can be drawn from the above review. Firstly, there are six incentives for firms' intention of adopting Internet retailing, i.e., improving internal communication, improving operational efficiency, facing competition, enhancing customer services, reaching out

to a wider audience, and improving relations with suppliers. Secondly, two factors, namely Internet trading cost and consumer preference for offline shopping, have negative impact on Internet retailing adoption. Five factors, i.e., status of Internet retailing strategy, technology capability, Internet communication preference, Internet marketplace, and market development opportunity, have positive impact on Internet retailing adoption. Thirdly, market positioning, business model, estimation of the market size, Internet-based innovative application, and strong brand of website are the key factors for a successful online retailing website, and business model and marketing strategy should be designed according to product purchasing frequency, product tangible or intangible, and product differentiation. Fourthly, cross-channel conflict can be reduced in two ways, i.e., “integration” perception which is aimed at reconstructing the business process and “adjustment” perception which is aimed at adjusting the pricing strategy of the two retailing channels.

4. Online Merchandise Management

Traditional merchandise management is the process by which a company attempts to offer the right quantity of the right merchandise in the right place at the right time in order to achieve the company’s financial goals [1]. Online merchandise management, similar to that of traditional retailing, is a management process of merchandise purchasing, sorting, and transporting. Eight papers were found on this topic (see Table 1), taking focus on inventory management and logistics or delivery management.

Researchers found that redesigning inventory policy for Internet retailing is able to reduce inventory cost effectively. Combining the zero inventory policy with the in-stock inventory policy, Bailey and Rabinovich proposed a dynamic inventory policy by applying a feature of Internet retailing and the asynchrony of goods payment and procurement [28]. Zhao and Cao studied the situations under which the zero inventory policy and in-stock inventory policy should be applied [29]. They found that the zero-inventory policy were preferred under a positive relationship between reservation price and impatience for delivery, whereas the positive-inventory policy is preferred when these two variables are independent of each other. Furthermore, a more rapid expansion of market is a favorable condition for the zero inventory policy [29].

Other researchers found that some new strategies are able to enhance the quality of logistics and delivery. Rabinovich and Bailey split the quality of logistics and delivery into three dimensions, namely availability, timeliness, and reliability [30]. They proposed that, because more attention is paid to high value package, increasing the value of package is able to ensure the quality of lo-

gistics and delivery from above three dimensions [30]. Elliot found that emergency transshipments could improve the quality of logistics and delivery [31]. Du *et al.* [32] developed a three-phase solution strategy (i.e., initial-route formation, inter-routes improvement, and intra-route improvement) to ensure the quality of logistics and delivery. The three-phase solution strategy was found being significantly better than conventional strategy in travel distance and delivery time.

In summary, inventory policies such as zero inventory policy, in-stock inventory policy, and dynamic inventory policy, are able to reduce Internet retailing inventory cost effectively. Some strategies such as high-value-package strategy, and emergency transshipments, are able to enhance the quality of logistics and delivery effectively.

5. Online Store Management

Traditional store management is aimed at enhancing utilization of the fixed assets and work efficiency [1]. Similarly, Internet retailing store management is aimed at enhancing the hits of web pages and work efficiency [33,34]. As shown in Table 1, four papers were found on this sub-topic.

Katerattanakul and Keng [33] proposed a framework for developing web pages, mapping the 27 factors of online store image on the physical store image. For example, the website response time is mapped on the aisle placement and width of physical shop. King and Liou [34] proposed a framework for evaluating the performance of retailing website. The framework consists of two facets of indicators, the user facet and the business facet. The user facet is made up with availability, customer loyalty, etc. And the business facet is made up with strategic position, complementarities, etc. Moreover, Alexis, Noreen, and Jiang [35,36] reviewed the extant IT, such as PC, PDA, and mobile phone. They predicted that more and more new IT will be introduced into Internet retailing. For example, the virtual reality is in prospect, giving customers a better shopping experience.

6. Conclusions and Implications

This paper reviewed the studies of Internet retailing management. We found that most of the papers focused on Internet retailing strategy management and online merchandise management. Following conclusions may be drawn. Firstly, there are six incentives for firms’ intention of adopting Internet retailing, i.e., improving internal communication, improving operational efficiency, facing competition, enhancing customer services, reaching out to a wider audience, and improving relations with suppliers. Secondly, two factors (cost of Internet trading and consumer preference) have negative impact on Internet retailing adoption while five factors (status of

Internet retailing strategy, Internet communication preference, etc.) have positive impact on Internet retailing adoption. Thirdly, five factors (market positioning, Internet-based innovative application, etc.) are the key for a successful online retailing website, and online business model and marketing strategy should be designed according to product purchasing frequency, product tangible or intangible, and product differentiation. Fourthly, the cross-channel conflict may be reduced effectively by reconstructing the business process or adjusting the pricing strategy. Fifthly, zero inventory policy, in-stock inventory policy, and dynamic inventory policy are able to reduce Internet retailing inventory cost. Finally, high-value-package strategy and emergency transshipments are able to enhance the quality of logistics and delivery.

These conclusions have useful implications for companies. Firstly, obtaining as much attention as possible from its headquarter, lowering the trading cost, and improving Internet retailing related technology are the silver bullets for a firm to adopt and improve its Internet retailing. Secondly, the Internet retailing business model and marketing strategy should be designed by the characteristics of products. Reconstructing the business process and adjusting the pricing strategy are the two ways to reduce the cross-channel conflict. Thirdly, in order to reduce the cost of inventory and guarantee the quality of logistics and delivery, a company should adopt new inventory policy and logistics strategy such as dynamic inventory policy and high-value-package strategy according to the environment and situations.

7. References

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Stylistic Differences across Hedge Funds as Revealed by Historical Monthly Returns

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Received October 23, 2009; revised November 23, 2009; accepted December 22, 2009

Abstract

This paper utilizes two clustering techniques to provide an objective method for classification of hedge funds. A data driven classification framework that utilizes monthly hedge fund returns as inputs, is shown to provide better comparisons among fund categories and can help investors in identifying common factors that can lead to better diversification strategies. Our clustering results indicate that other than the managed futures category, there are only three unique hedge fund styles. These three categories are the Equity Hedge, Fund of Hedge Funds and the Emerging Markets categories. None of the other hedge fund classifications such as Global macro, Distressed Securities, Merger Arbitrage, Convertible Arbitrage appear as a unique and independent category.

Keywords: Hedge Funds, Clustering, Management Style, Dynamic Trading Strategies

1. Introduction

In a seminal paper, Sharpe [1] proposed an elegant asset class factor model for performance attribution and style analysis of mutual fund managers. The model shows that with only a limited number of asset classes, it is possible to replicate the performance of a large universe of mutual funds. The success of Sharpe's model in capturing stylistic differences between mutual fund managers is largely attributed to the fact that most mutual fund managers are typically constrained to hold assets from a well-defined number of standard asset classes and are expected to perform according to relative return targets within their asset classes.

In theory, it should be possible to extend Sharpe's style factor analysis by adding regressors to proxy for the returns of the various hedge fund strategies. However, in practice, implementing such a strategy may not be feasible due to the infinite number of dynamic trading strategies that are used by hedge fund managers. As an alternative to the Sharpe's approach, which requires identifying factors a priori, we use cluster analysis to identify the

dominant styles in hedge funds. We use monthly returns to cluster the data and our goal is to see if there are unique style categories that are consistent with the return data.

Fung and Hsieh [2] were the first to extend the basic intuition of the Sharpe asset class factor model to the hedge fund industry through the use of Factor analysis. They factor analyze 409 hedge funds and CTA pools over the period January 1991 to December 1995, and find that there are five dominant investment styles in hedge funds. They were able to associate the five dominant styles generated quantitatively to the qualitative styles based on the trading strategies described in the disclosure document of hedge funds.

Brown and Goetzmann [3,4] study the monthly returns of 1296 hedge funds over the period 1989 through January 2000 and find that there are indeed a number of distinct styles of management¹ They use two different algorithms in their classification process. The first is a Generalized Style Classification methodology in which funds are assigned to categories through finding a local optimum via the minimization of a "within-group" sum of squares criterion over a specified time period², the second approach is a Style Classification algorithm in which the number of styles is pre-specified. They report the presence of at least eight distinct styles currently employed by hedge fund managers.

¹Brown and Goetzmann [4] use the TASS data where funds are classified into 17 different types.

²The details of the Generalized Style Classification algorithm are described in Brown and Goetzmann [3]. This procedure resembles switching regression and is also analogous to cluster analysis.

Although there are many statistical techniques that can be used to classify data, the technique that appears to be most directly suitable for the present application is cluster analysis³. We use both K-means Clustering and Hierarchical Clustering techniques to cluster the monthly returns for 2397 hedge funds for the period January 1994 through December 2003. Such a data driven classification framework can help in identifying common factors that can lead to better performance evaluation of hedge fund strategies. As pointed out by Liang [5], to understand the differences and similarities across investment classes, it is necessary to classify hedge funds into major investment classes in terms of performance, risk and fee structures.

Our results obtained through both clustering techniques indicate that other than the managed futures category, there are only three unique hedge fund categories. These three categories are the Equity Hedge, Fund of funds (FOF) and the Emerging Markets categories. None of the other hedge fund strategies such as Global Macro, Distressed Securities, Merger Arbitrage or Convertible Arbitrage appears as a unique and independent cluster. Moreover, we find that there are three unique clusters within the Equity Hedge category, two clusters for Fund of funds (FOF) and four independent clusters for the managed futures category.

Hedge funds use a wide variety of dynamic trading strategies. On one hand, macro funds are most directional, employing a top-down macro view to take advantage of the expected returns of various asset classes. On the other hand, there are market-neutral relative value arbitrage funds that aim to exploit temporary price anomalies between related assets, in equities or fixed income markets. In between these two extreme strategies, there are funds that aim to uncover undervalued asset opportunities in debt or equity markets without necessarily being market neutral.

Unlike mutual funds, hedge funds' focus primarily on absolute returns rather than benchmarks or relative performance. Hedge fund managers have the freedom to pursue a wide range of alternative investment strategies such as the use of derivatives, short selling and leverage, without having to adhere to the stringent SEC regulations and disclosure requirements⁴. As a result, hedge funds often have low or sometimes negative correlations with traditional market indices. Because of these unique characteristics, hedge funds as an asset class is considered to be an attractive complement to traditional investment strategies that can further help in portfolio diversification.

³Martin [15] also argues that cluster analysis is the most applicable technique to use in style classification. His results indicate that eight distinct clusters generate the most useful results.

⁴Starting in February 2006 however, certain hedge fund advisors have to register with the SEC.

2. Data and Descriptive Statistics Data Sources

The hedge fund data used in this study is obtained from the CISDM at the University of Massachusetts at Amherst. It covers 4,693 hedge funds from March 1972 through December 2003⁵. Of the total hedge funds in the database, 2397 are live funds and 2296 are defunct funds. The sample includes both U.S. domiciled funds and offshore funds. The variables reported in the database are fund name, strategy, management fee, incentive fee, minimum account size, management company, returns, assets, and net asset value per share⁶.

The database is survivor-bias free in the sense that it includes both live and dead funds. However, it may still be subject to reporting bias as some funds may at times deliberately choose not to disclose their information publicly⁷. We choose the period 1990-2003 as the sample period for this study for three reasons. First, this period was characterized by rapid growth of the hedge fund industry. Second, the pre-1990 fund data may be back-filled, as no funds covered in the database are reported as defunct before 1990. Thus, there may be a survival bias in the pre-1990 period. Third, this time period is long enough to cover more than one business cycle.

Four primary hedge fund database providers are common among researchers and industry professionals. Each of these data providers offers a different product. Hedge Fund Research (HFR) database has twenty-six categories of hedge funds. The TASS database is produced through the research subsidiary of Credit Suisse First Boston Tremont Advisors, has nine categories classified based on the investment styles of hedge fund managers. The Van Hedge maintains an extensive database and also provides detailed generic performance information on hedge fund styles. Finally, the CISDM hedge fund database, which presently incorporates both the ZCM/Hedge and the former MAR/Hedge provides a comprehensive coverage of all hedge funds and is the database used in this paper.

It is clear that database providers classify hedge funds in very different ways. All databases have their own indices based on their classifications. Hedge fund categories are all based on self-reported style classifications that are listed in a particular database. None of the databases seem to provide information on the complete hedge fund universe, and they seem to differ in the definition and identification of a hedge fund. The significant variations in the classification methods used across the

⁵We use hedge funds to refer to all funds reported in the CISDM, although the CISDM does not classify CTA/futures funds as hedge funds.

⁶Fund manager name, instead of the management company name, is reported for CTA/Futures funds.

⁷Unlike mutual funds that are heavily regulated under the Investment Company Act of 1940, hedge funds are not required to file fund information with the SEC.

available databases make it very difficult to conduct careful analysis of the performance of the various hedge fund strategies.

Exhibit 1 provides a complete list of hedge fund strategies and the number of funds within each strategy found in the CISDM database. Exhibit 2 provides summary statistics for the major hedge fund categories over the period January 1990 through December 2003. Mean returns, standard deviations, skewness, kurtosis and the average Sharpe Ratio for each of the strategies are estimated. It is interesting to note that the mean return column provides the most homogeneous results across hedge fund strategies. With the exception of Emerging Markets, most strategies provided a mean annual return between 9 and 14 percent. Standard deviations varied from .018 to .059. Skewness and Kurtosis varied the most and thus, it is likely that these third and fourth moments provided valuable information in our clustering process.

3. Clustering Methodology

Clustering analysis aims at sorting different objects into groups in such a way that the degree of association between two objects is maximal if they belong to the same group and minimal otherwise. This helps organize data into meaningful structures. Cluster analysis consists of a number of different methodologies for grouping objects of a similar kind into groups. Different clustering algorithms define different rules concerning how to cluster the objects into subgroups on the basis of the inter-object similarities. Our goal is to use the clustering methodology to classify funds that display small within cluster variation and large between-cluster variation. It is a data driven technique to objectively classify funds based on the monthly return characteristics of the funds.

The two most common kinds of clustering techniques are Hierarchical and Partitioning techniques. The Hierarchical method performs successive fusions or divisions of the data. Under this method, the allocation of a fund to a cluster is irrevocable. Once a fund joins a cluster it is never removed or fused with other funds belonging to some other cluster. The partitioning method, on the other hand, does not require the allocation of an object to the cluster to be irrevocable. As Dillon and Goldstein [6] show, objects may be reallocated if their initial assignments are found inaccurate and do not optimize the pre-defined criteria. This method breaks the observations into distinct non-overlapping groups. Different partitioning techniques differ with respect to the following criteria: 1) how clusters are initiated, and 2) how objects are allocated to clusters, 3) how already clustered objects get reallocated to other clusters.

Exhibit 1. Number of funds listed under each hedge fund strategy.

Hedge Fund Strategy	Number of Funds Listed in Strategy
Equity Hedge	527
FOF Diversified	398
Convertible Arbitrage	93
Merger Arbitrage / Risk Arbitrage	84
Global Macro	60
Event Driven Multi-Strategy	57
Distressed Securities	55
Equity Market Neutral	41
Emerging Markets: Global	36
Emerging Markets: Asia	33
FOF Equity Hedge	32
Fixed Income: Mortgage Backed	31
Fixed Income: Arbitrage	26
Sector: Technology	26
Sector: Financial	25
Sector: Healthcare/Bio Tech	25
Fixed Income: Diversified	23
Short Selling	23
FOF Equity Market Neutral	22
Emerging Markets: Latin America	21
Emerging Markets: Eastern Europe	17
Equity Non-Hedge	15
Sector: Miscellaneous	11
FOF Relative Value Multi-Strategy	10
FOF Distressed Securities	9
FOF Sector: Technology	9
Sector: Multi-Strategy	9
Fixed Income: High Yield	8
FOF Event Driven	7
Market Timing	7
Sector: Energy	7
Sector: Real Estate	7
FOF Emerging Markets	5
FOF Global Macro	4
FOF Convertible Arbitrage	3
FOF Fixed Income Arbitrage	3
FOF Short Selling	3
FOF Merger Arbitrage	2
FOF Sector: Healthcare	2
FOF Sector: Media & Communications	2
FOF Long Short Equity	1

Exhibit 2. Summary statistics and sharpe ratio for major hedge fund strategies.

Hedge Fund Categories	Mean returns (Annual)	Mean Returns (Monthly)	Standard Deviation	Skewness	Kurtosis	Sharpe Ratio
Convertible Arbitrage	12.78%	0.01065	0.02352	0.04200	9.75037	0.45281
Distressed Securities	12.91%	0.01075	0.02160	0.28020	2.78327	0.49769
Emerging Markets	22.83%	0.01902	0.05815	0.53526	4.91279	0.32709
Equity	14.57%	0.01214	0.05405	0.56866	10.60961	0.22461
Fixed Income	10.59%	0.00882	0.02160	0.10719	7.06639	0.40833
FOF Diversified	10.08%	0.00840	0.01878	0.10842	13.87208	0.44728
Global Macro	13.13%	0.01094	0.05998	0.06554	6.86377	0.18239
Merger & Risk Arbitrage	8.82%	0.00735	0.03954	0.58531	15.21462	0.18589
MF: Private Futures	11.05%	0.00921	0.05394	0.07068	5.83772	0.17075
MF: Public Futures	10.67%	0.00889	0.04942	0.78251	10.67304	0.17989
MF: Systematic	11.38%	0.00948	0.05655	0.64812	7.59567	0.16764

K-means, K-median, and K-center are a few of the methods that use partitioning techniques to cluster objects. In the following subsection, we describe the K-means clustering algorithm. The k-median and k-center techniques are similar in nature. Clustering methodology has been successfully applied to a wide range of research problems, such as in Banfield and Raftery [7], Das [8], Jiang and Zhang [9] and Marathe and Shawky [10].

3.1. K-Means Clustering

K-means is an iterative relocation algorithm in which an initial classification is modified by moving objects from one group to another such that it minimizes the within group sum of squares. The k-means algorithm is set up in the following way. Initial reference points, which may or may not be the centroid or mean are chosen and all the data points are assigned to clusters. K-means then uses the cluster centroids as reference points in subsequent partitioning, but the centroids are adjusted both during and after each partitioning. For data point x in cluster i , if centroid z_i is the nearest reference point, no adjustments are made and the algorithm proceeds to the next data point. However, if centroid z_j of the cluster j is closer to data point x , then x is reassigned to cluster j . The centroids of the "losing" cluster i , and that of the "gaining" cluster j are recomputed and the reference points z_i and z_j are moved to their new centroids. After each step, every one of the k reference points is a centroid or mean⁸.

If the data points or objects are tightly clustered around the centroid, the centroid will be representative of all the objects in that cluster. The standard measure of the spread of a group of points about its mean is the variance, or the sum of the squares of the distance be-

tween each point and the mean. If the data points are close to the mean, the variance will be small. A generalization of the variance, in which the centroid is replaced by a reference point that may or may not be a centroid, is used to indicate the overall quality of a partitioning. Specifically, the error measure E is the sum of all the variances:

$$E = \sum_{i=1}^k \sum_{j=1}^{n_i} \|x_{ij} - z_i\|^2$$

where x_{ij} the j th point in the i th cluster, z_i is the reference point of the i th cluster, and n_i is the number of points in that cluster. The notation $\|x_{ij} - z_i\|$ stands for the distance between x_{ij} and z_i . Hence, the error measure E indicates the overall spread of data points about their reference points. For best results, E should be as small as possible.

The k-means method requires one to specify the number of clusters in advance. To determine the optimal number of clusters, Hartigan [11] suggested the following rule of thumb. If k is the result of k-means with k clusters and $k+1$ is the result of k-means with $k+1$ clusters, then it is justifiable to add the extra cluster when

$$\left(\frac{\sum_{i=1}^k ESS}{\sum_{i=1}^{k+1} ESS} - 1 \right) * (n - k - 1) > 10$$

Here ESS represents the error within sum of squares and n is the size of the data set. In our study, we use Hartigan rule of thumb to determine the optimal number of clusters.

3.2. Hierarchical Clustering

The Hierarchical approach is the other most commonly used clustering technique. It performs successive fusions or divisions of the data. One of the distinguishing features of Hierarchical clustering is that once an object is

⁸For a detailed description of the K-means algorithm and other clustering techniques, see Faber [13], Hartigan [14], and Dillon and Goldstein [6].

assigned to a cluster, it is never removed from that cluster and fused with other clusters. Agglomerative methods form a series of fusions of the objects into groups whereas divisive methods partition the objects into finer and finer subdivisions. Hence, agglomerative methods eventually result in all objects falling in one cluster and divisive methods finally split the data so that each object forms its own cluster. In either case, the important issue is where to stop. Various agglomerative methods differ to the extent that alternative definitions of distance or similarity are used in the assignment rule. The divisive methods differ in the way initial split is carried out and how the already formed clusters are subdivided⁹.

In this study we use an agglomerative method proposed by Ward [12] known as the Ward's Error Sum of Squares method. This method attempts to minimize the sum of squares of any two clusters that can be formed at each step. The clustering procedure begins by assigning each object in a separate cluster. Two of the objects are then combined to form a single cluster so that the within cluster sum of squares is minimized. At the next stage, a third object is added to the cluster or two other objects are merged into a new cluster. This process of uniting clusters or objects continues while minimizing the error sum of squares. The cluster center changes each time a new case is added. This might mean that in the end some objects are no longer in the right cluster. The solution given by k-means provides a refinement over this process since the iterative relocation algorithm dynamically minimizes the within cluster sum of squares while maximizing the between cluster variability.

4. Empirical Findings

4.1. K-Means Clustering Results

Exhibit 3 provides the clustering results for the K-means algorithm¹⁰. The data was clustered in three different ways: 1) both hedge funds and managed futures are included, 2) only hedge funds are included and 3) only managed futures are included in the analysis. Panel A shows the individual clusters when both hedge funds and managed futures are included. Column 1 gives the number of funds in each cluster. Column 2 shows the number of funds that belong to the dominant strategy, and column 3 gives the percentage of funds in the dominant strategy. Column 4 reports the dominant strategy in each

cluster. Columns 5, 6 and 7 provide the mean, standard deviation and skewness of the returns of each cluster¹¹.

The results in Exhibit 3 indicate that of the ten identified clusters, four are classified as Equity Hedge, four are classified as managed futures, one is classified as Emerging Markets and one is classified as FOF. Note that none of the other hedge fund strategies such as Convertible Arbitrage, Fixed Income, Global Macro or Merger Arbitrage appeared as independent clusters¹². It is possible that managers in some strategies, such as Global Macro or Merger Arbitrage employ sufficiently different techniques from one another that they do not form an identifiable cluster.

While the large number of funds that belong to the Equity Hedge and the managed futures categories may contribute to the relatively large number of clusters that result for these two strategies, this fact cannot explain why we observe a unique cluster for Emerging Markets and not for Convertible Arbitrage, Merger Arbitrage or Global Macro¹³. Furthermore, the results in Panel A of Exhibit 3 shows that managed futures are quite different than hedge funds as most CTA clusters are usually dominated by CTA funds.

Panel B of Exhibit 3 presents the identified clusters for the hedge fund industry when managed futures are excluded from the sample. Interestingly, the resulting hedge fund clusters are not very different from the ones obtained before. In this case we obtain seven clusters, four are still Equity Hedge, two are FOF and one Emerging Markets. Further, Panel C provides clustering results separately for the managed futures category. Once again, we obtain four distinct clusters, two clusters classified as Public and two clusters classified as Systematic managed futures.

4.2. Hierarchical Clustering Results

We apply the Hierarchical Clustering approach not only as a viable alternative to the K-means procedure but also as a robustness test on the previously estimated clusters. The results of this approach are presented in Exhibit 4. Panel A of Exhibit 4 shows the resulting clusters when all hedge funds and managed futures are included in the procedure. Similar to the earlier results, we estimate nine clusters; six of them are classified as hedge funds and three are classified as managed futures. Of the six hedge fund clusters, three are classified as Equity Hedge, two are classified as FOF, and one is classified as Emerging Markets.

⁹For more detailed discussion on clustering techniques, see Dillon and Goldstein [6].

¹⁰We should note that in all our analysis, we eliminated clusters with less than 10 funds as being not statistically reliable or economically meaningful. Eliminating very small clusters did not have any material impact on the results.

¹¹A cluster is classified based on its dominant strategy. For example, a cluster will be classified as Equity Hedge if the largest percentage of its funds is from the Equity Hedge category.

¹²While Brown and Goetzmann [4] report a striking similarity between the styles they identify and those that are being reported by hedge funds, our results do not show such similarity.

¹³The number of funds in the Emerging Markets strategy is less than the number of funds in Convertible Arbitrage, Merger Arbitrage or Global Macro.

Exhibit 3. Individual cluster characteristics using K-Means Clustering.

# of Funds in Cluster	# of Funds in Strategy	% of Strategy to total funds	Dominant Strategy	Cluster Characteristics		
				Mean	STD	Skew
Panel A. All hedge funds and CTA's included in clustering						
125	42	33.60%	EH	0.0134	0.0441	0.4409
37	21	56.76%	EH	0.0174	0.0745	2.1621
30	16	53.33%	EH	0.0118	0.0748	0.2568
49	18	36.73%	EH	0.0154	0.0529	0.0057
26	22	84.62%	EM	0.0136	0.0623	0.0456
179	90	50.28%	FOFD	0.0084	0.0269	0.4530
146	145	99.32%	CTA	0.0129	0.0699	0.1964
441	117	26.53%	CTA	0.0092	0.0808	0.5337
58	58	100.00%	CTA	0.0062	0.0298	0.3757
72	71	98.61%	CTA	0.0072	0.0438	0.2416
Panel B. Only hedge funds included in clustering						
33	26	78.79%	EH	0.0168	0.0709	1.9429
35	26	74.29%	EH	0.0101	0.0977	0.4477
60	36	60.00%	EH	0.0127	0.0484	0.2628
21	16	76.19%	EH	0.0172	0.0863	0.2287
26	16	61.54%	EM	0.0204	0.0742	0.9700
356	107	30.06%	FOFD	0.0091	0.0177	0.1416
210	98	46.67%	FOFD	0.0100	0.0356	0.9020
Panel C. Only CTA's included in clustering						
119	36	30.25%	Public	0.00684	0.03396	0.42472
104	33	31.73%	Public	0.00654	0.03025	0.43880
62	22	35.48%	Systematic	0.01225	0.07034	0.09632
117	35	29.91%	Systematic	0.00732	0.04264	0.14448

Panel B of Exhibit 4 presents the clustering results when we exclude managed futures and only include hedge funds in the analysis. Once again, we obtain six clusters, three are classified as Equity Hedge, two are classified as FOF and one is classified as Emerging Markets. It is important to note the consistency of these results at two different levels. First, within the Hierarchical Clustering procedure, the clusters obtained with and without Managed Futures are essentially identical. Second, across both the clustering procedures, we obtain remarkably similar number of clusters and almost identical classifications when the entire hedge fund database is considered.

Finally, Panel C of Exhibit 4 provides clustering results when managed futures are examined separately. Similar to the K-means results, we obtain four distinct clusters for managed futures. Of these four clusters, two

are classified as Public Futures, one is classified as Private Futures, and one is classified as Systematic Futures. Once again, these results are very consistent with earlier results and provide further support for the notion that managed futures funds may be viewed as four distinct categories based on the four major asset classes on which futures contracts are usually traded.

5. Interpretation of Results

5.1. Why Do We Observe Three to Four Equity Hedge Clusters?

It is quite plausible to suspect that the three Equity Hedge Fund clusters represent the range of different strategies, approaches and specialties characteristic of equity hedge fund managers. Some managers add value through knowledge of special asset markets, others through trading skills, and yet others through superior asset pricing models¹⁴. Alternatively, the three clusters

¹⁴Fung and Hsieh [2] characterize hedge fund returns as being determined by three key factors; the returns from the assets held, their trading strategies, and their use of leverage.

Exhibit 4. Individual cluster characteristics using hierarchal clustering.

# of Funds in Cluster	# of Funds in Strategy	% of Strategy to total funds	Dominant Strategy	Cluster Characteristics		
				Mean	STD	Skew
Panel A. All hedge funds and CTA's included in clustering						
98	39	39.80%	EH	0.011	0.069	0.401
231	78	33.77%	EH	0.012	0.042	1.219
32	22	68.75%	EH	0.012	0.078	1.661
16	13	81.25%	EM	0.033	0.102	0.726
509	117	22.99%	FOF	0.008	0.013	0.211
231	85	36.80%	FOF	0.009	0.029	1.047
167	165	98.80%	CTA	0.010	0.070	0.303
133	114	85.71%	CTA	0.006	0.045	0.417
509	124	24.36%	CTA	0.007	0.032	0.277
Panel B. Only hedge funds included in clustering						
57	31	54.39%	EH	0.011	0.096	0.569
26	14	53.85%	EH	0.015	0.081	0.275
262	102	38.93%	EH	0.012	0.048	1.270
10	8	80.00%	EM	0.040	0.111	1.078
424	123	29.01%	FOF	0.008	0.014	0.213
262	96	36.64%	FOF	0.009	0.032	1.057
Panel C. Only CTA's included in clustering						
97	30	30.93%	PUB	0.012	0.063	0.221
120	36	30.00%	PUB	0.007	0.032	0.212
51	15	29.41%	PRI	0.007	0.068	0.286
124	37	29.84%	SYS	0.006	0.047	0.147

may reflect the three broad strategies utilized by equity funds. The three broad strategies are the macro funds, the funds that attempt to uncover undervalued asset opportunities, and the market-neutral relative value arbitrage funds. The macro style funds are the most directional and employ a top-down macro view to take advantage of the expected returns of various asset classes. This class of funds may represent the cluster with the highest level of risk as measured by the high levels of standard deviation and skewness¹⁵. The second strategy represents funds that aim to uncover undervalued asset opportunities in debt or equity markets without necessarily being market neutral. This class of funds is characterized by a middle of the range level of risk as measured by the standard deviation and skewness in Exhibits 3 and 4. The third category of funds represents the market-neutral relative

value arbitrage funds that aim to exploit temporary price anomalies between related assets, in equities or fixed income markets. This category is likely to be represented by the cluster with the lowest risk among the three Equity Hedge funds clusters.

5.2. Why Do We Observe Two FOF Clusters?

The results in Exhibit 4 with respect to the FOF clusters are very striking. In both Panel A and Panel B, the FOF clusters have comparable mean returns but their standard deviation and skewness are vastly different. These results strongly suggest that while FOF is supposed to be diversified across all hedge fund strategies, they seem to organize in two significantly different clusters with respect to risk. Evidently, specialization and philosophy within the FOF category appears to prevail, with one cluster perhaps representing the more risky directional strategies and the other cluster representing market-neutral, and more diversified strategies.

¹⁵Brown and Goetzmann [3] suggest that an appropriate criterion for evaluating style classifications is the extent to which these classifications can explain cross sectional differences in future year returns.

5.3. Why Do We Observe Four Managed Futures Clusters?

The observed four distinct clusters for managed futures are consistent with trading volume data for futures contracts¹⁶. Of the approximately total of \$8 billion worth of futures and options contracts traded in 2005, \$3 billion were on Equity Indices, \$2 billion were Interest Rate futures, \$1.8 billion in Individual Equities (mostly options), \$300 million in Agricultural Commodities, \$200 million in Energy, \$120 million in currencies and about \$100 million in Precious and Non-Precious metals. It is thus quite reasonable to expect that the four clusters we identified correspond to Equity index futures, Fixed Income futures, Options on Individual Equities and Commodity futures. Futures contracts on these four categories are likely to behave quite differently based on the characteristics of their respective underlying assets.

6. Summaries and Conclusions

This paper uses an objective clustering method for style identification of hedge funds. Monthly return data on individual hedge is used to provide a consistent classification of hedge funds. The data driven framework employed in this paper can provide better comparisons among fund categories and may help service providers, fund administrators and investors in identifying common factors that can lead to better diversification strategies. The CISDM database of the University of Massachusetts is used for this application. Our sample included 2397 live funds and covered the period January 1990 through December 2003.

We first estimated hedge fund clusters using the K-means approach. In a three stage procedure, we estimated clusters with and without managed futures, and then separately for managed futures. Of the ten independent clusters estimated with managed futures included, four are classified as Equity Hedge, four are classified as managed futures, and one is classified as Emerging Markets and one as FOF. None of the other hedge fund classifications such as Convertible Arbitrage, Fixed Income, Global Macro or Merger Arbitrage appeared as independent clusters. It is possible that managers in some strategies, such as Global Macro or Merger Arbitrage employ sufficiently different techniques from one another that they do not form an identifiable cluster.

When managed futures were removed from the clustering process, the resulting hedge fund clusters were not very different than before. We identify seven clusters, four are still Equity Hedge, and two are FOF and one Emerging Markets. Furthermore, the results obtained by separately clustering the managed futures category, indicate the pres-

ence of four distinct clusters, two of the clusters are classified as Public and the other two clusters are classified as Systematic Managed Futures.

We apply the Hierarchical Clustering procedure to check the sensitivity of the classification provided by the k-means technique. The results of this approach are very similar to the results of the k-means method, which suggests that the classification of funds is robust across different clustering methods. We estimate nine clusters; six of these clusters are classified as hedge funds and three are classified as managed futures. Of the six hedge fund clusters, three are classified as Equity Hedge, two as Fund of Hedge Funds, and one is classified as Emerging Markets. When we exclude managed futures, we obtain six clusters, three are classified as Equity Hedge, and two as Fund of Hedge Funds and one is classified as Emerging Markets. Similar to the K-means results, we obtain four distinct clusters for managed futures. These results provide support for the notion that the futures market may be viewed as four distinct categories based on the four major asset classes on which futures contracts are commonly traded.

The resulting clusters provide important insight as to the characteristics and structure of the hedge fund industry. We surmise that in spite of the very large number of hedge fund classifications within any given database, the strategies may be characteristically described by a rather few broad strategies. Our results indicate that hedge funds can be uniquely categorized into Equity, Managed Futures, Emerging Markets and FOF. Within Equity Hedge, there are three strategies, Macro, Opportunistic and Market-neutral. Managed Futures can also be categorized into four unique classes; Equity index futures, Fixed Income futures, Options on Individual Equities and Commodity futures.

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A Value-Based and Multi-Level Model of Macro Economies

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Received December 22, 2009; revised January 2, 2010; accepted January 20, 2010

Abstract

There is sufficient evidence that performance levels of various economic systems differ. All systems seem to have particular benefits, but all of them are adequately aligned with the dynamics and complexity of contemporary societies. In this paper, the author introduces a sequence of ideal type economic systems, based on Spiral Dynamics, a theory explaining levels of existence within people, groups of people, organizations and societies. Per type the author elaborates on the underlying value systems and relating institutional structures, such as leadership style, governance and measurement format.

Keywords: Value Systems, Economic Systems, Spiral Dynamics, Plan Economies, Capitalist Economies, Social Market Economies, Interdependent Economies

1. A “Multiple Level-View” on European Economies

Since the conclusion of the Lisbon European Council of 2000, one of the challenges for the European Union has been “to become the most competitive and dynamic knowledge-based economy in the world, capable of sustaining economic growth, with more and better jobs, and greater social cohesion”. This ambition challenge Europeans to seek a convergence between competitiveness and the quality of working life for employees, as the basis for promoting employee commitment, unleashing of organizational initiatives and the development of personal potential.

The actual breakthrough in formulating this challenge lies in the conceptual notion of economic development: thinking in terms of “and” in stead of “or”. Not seeking economic growth at the expense of people and planet, but striving to create a synergy by enhancing the quality of jobs and launching social innovations in order to support economic growth. Labor has become an asset, not just a resource.

The European Commission’s Directorate General (DG) for Employment, Social Affairs & Equal Opportunities launched the European Union (EU) Work Climate project to stimulate co-operative research and to promote the exchange of opinions and experiences between the parties actively involved in industrial relations, about:

- Working conditions in Europe from a comparative perspective based on the results of a study commissioned by the EU.

- How European workers compare their employment conditions in the companies were they work.
- European wide trends and single out benchmarks for different models of employment relations
- Whether there is a link between quality of work and productivity? If improvements in work climate and working conditions, increase the quality and efficiency of investment in human capital and does it translates into productivity gains?

The DG regards this social dialogue as the driving force behind successful economic and social reforms.

The DG granted this EU Work Climate project to the Institute of Labor Studies (IEL) at ESADE Business School. The fundamental aim of this project is to conduct a comparative analysis amongst 14 member countries based on standardized data pertaining to employment conditions supplied by Great Place to Work® Institute Europe. The latter has developed over the years a methodology (standardized instruments and sampling procedures) for data collection enabling them to choose the “best company to work for” in each country. The data bank includes information provided by employees and managers in over 2,500 companies in 14 EU member states in three consecutive years (2003-2005). The IEL gathered an international team of experts specialized in secondary data analyses of the Great Place to Work® data bank in order to identify trends and benchmark cases. Please kindly refer to the references for further information on this research and background on the Great Place to Work® model.

The Work Climate project revealed European trends on

the quality of work, showing differences between member states that could not be expressed in a single parameter. The first explanation is due to the nature of the concept of quality: it is multidimensional and built on a wide range of components which interact with one another (intrinsic job quality, skills, lifelong learning and career development, gender equality, health and safety at work, flexibility and security, inclusion and access to the labor market, work organization and work life balance, social dialogue and worker involvement, diversity and non-discrimination and overall work performance).

The second explanation, and topic of this paper, is the multi-leveled-ness of the European Work Climate. One of the outcomes of the study is the robustness and equality of the model structure, throughout the dataset. However, different levels of perception appeared through the different countries, showing clear and consistent countries typologies. The data suggested three categories: the leading Scandinavian countries, the lagging Mediterranean countries and a mixed group in between.

The outcome was embarrassing for Great Place to Work® Institutes since they claim that its model can be applied worldwide without cultural biases and in different economic contexts. True, Great Places to Work® are found everywhere, in 30 countries worldwide and in any economic sector. As the model is highly focused on the quality of management (Are they credible? Do they behave respectfully and fairly to employees?) And with data highly sensitive toward this factor, companies can become a great place to work® despite their economic environment. This is great news for managers who want to establish an employer of choice status, but it provides no clue in explaining the multi-levelled ness of European economies.

The author, member of the EU Work Climate project group, suggested to apply an explicit phase wise development approach he successfully used in the development of the EU sponsored European Corporate Sustainability Framework.

In 2003, van Marrewijk et al. introduced a multiple level approach to Corporate Sustainability and Corporate Responsibility (CS-R). They “colored” a generic definition of CS-R into a sequence of more specific definitions matching the development, awareness and ambition levels of people and organizations: CS-R was either oriented to compliance; success and entrepreneurship; community or synergy. Each emerging orientation included and transcended the previous ones. These definitions of CS-R were framed in a more generic phase-wise development pattern, based upon the Graves’ Level of Existence theory or Spiral Dynamics as it has been coined by Cowan and Beck (1996).

In 2004, in a Journal of Business Ethics publication, van Marrewijk described ideal type organizations, based upon four core value systems defined by professor Clare W. Graves. Per ideal type various organizational aspects

were described briefly, such as the leadership style, governance and decision making issues and measurement format. As a summary, he developed the Transition Matrix, indicating the paradigm shifts per management discipline, as they have developed in each of the ideal type organization models.

Formulating the EU ambitions towards 2010 by itself emphasized the stretch between current (or traditional) and espoused business practices. The majority of companies seems to be traditionally oriented at managing their (human) resources, i.e. seeking optimum returns on their investments while focusing on efficiency and cost control, while pioneering and leading organizations are practicing with emerging stakeholder oriented business concepts.

This situation pointed us to the following questions: What type of economy has supported the more traditional approach to economic growth? What are the limits to such economies? Why should and how can companies and economic systems transform to more complex systems? And what type of economies is more adequate in achieving the goals of the European Union? One way or the other, the multilevel and multidimensional nature ensure that the diversity across the European Union can be fully taken into account.

Understanding the dynamics between and within economic systems is essential for European policy making, both at the supra and national level.

This paper introduces the Spiral Dynamics Theory and presents five ideal type economic systems. The last chapter discusses the consequences for international economic policy making.

2. Ideal-Type Economic Systems Based on Spiral Dynamics

Clare W. Graves’ is the founder of the Emergent Cyclical Levels of Existence Theory. His successors, Beck and Cowan, renamed it “Spiral Dynamics” and successfully introduced Graves’ academic achievements to a wider audience. As professor in psychology and a contemporary of Maslow, Graves was interested in the question how the mind (thus people and groups of people) processes reality. Based on extensive empirical research Graves concluded that mankind has gradually developed eight core value systems or “worldviews”, so far. Each level of existence – constructed around a core value system – provide its own hierarchy of needs. Values are considered as coping mechanisms to meet specific challenges and to structure institutions in order to influence behavior. A value system is a way of conceptualizing reality and encompasses a consistent set of values, beliefs and corresponding behavior and can be found in individual persons, as well as in companies and societies. A value system develops mainly as a reaction to specific environmental challenges and threats: the systems brighten or dim as life conditions

(consisting of historic Times, geographic Place, existential Problems and societal Circumstances) change.

All entities-including organizations and economic systems-will eventually have to meet the challenges their context provides or risk the danger of oblivion or even extinction. If for instance societal circumstances change, inviting corporations to respond and consequently reconsider their role within society, it implies that corporations have to re-align their value systems and all their business institutions (such as mission, vision, policy deployment, decision-making, reporting, corporate affairs, etcetera) to these new circumstances. The quest to create an adequate response to specific life conditions results in a wide variety of survival strategies, each founded on a specific set of value assumptions and demonstrated in related institutions and behavior.

The development of value systems occurs in a fixed order: Survival; Security; Energy & Power; Order; Success; Community, Synergy and Holistic life system. Each new value system includes and transcends the previous ones, thus forming a natural hierarchy (or holarchy). Please refer to Table 1, especially the first six rows, for an introduction on the Spiral Dynamic theory.

Having discussed the issue with both Christopher Cowan and Don Beck, the co-authors of Spiral Dynamics, the author has chosen for a pairing of value systems as fundaments of economic systems:

- 1) Pre-capitalist systems, based on Security and Power (purple and red)
- 2) Classical economic systems, based on Power and Order (red and blue)
- 3) Capitalist economic systems, based on Order and Success/Entrepreneurship (blue and orange)
- 4) Social Economic Systems, based on Success/Entrepreneurship and Community (orange and green)

5) Interdependent Economic System, based on Community and Synergy (green and yellow)

Ideal types 2 and 3 are resource oriented systems and ideal types 4 and 5 are stakeholder or multiple-focus, oriented systems.

Each emerging system transcends and includes the previous ones. More complex economic systems include elements of less complex systems. Comparing economic systems should never become a model contest—which one is the prettiest?—or a black and white discussion. It is more sensible to discuss why capitalism experiences difficulties in accepting the values of a social market economy. Or, what elements of capitalism should a market economy cherish and preserve in order to sustain its system.

Each presentation of an ideal type economic system briefly touches upon the underlying value systems, the dominant worldviews and related, often psychological explanations of its agents, which brings forth supporting institutional arrangements and policies.

2.1. Pre-Capitalist Economic Systems, Based on Security and Power & Energy

2.1.1. Introduction of its Value Systems

The first three levels of existence mankind experienced are characterized as Survival, Security (bonding order) and Energy & Power (powerful self).

Historically, loose tribes evolved to clans, seeking refuge in kinships, rituals, holy ancestors and mystical nature. The value system supporting Security can also be observed in the mother and child relationship, deep feelings of belonging, but also pride and attachment to the group identity. Its color code is Purple.

Table 1. Summary of spiral dynamics.

Main Themes	Security (Purple)	Energy & Power (Red)	Order (Blue)	Success & Entrepreneurship (Orange)	Community (Green)	Synergy (Yellow)	Holistic life system (Turquoise)
Environment	A frightening world	Limitless challenges about boundaries of the territory and to be dominant over self and others within the territory	Ordered relationships requiring legitimization in order to ensure stability and security for the future	Many viable alternatives for progress, prosperity and material gain since change is the nature of things	The gap between people and their (material) possibilities has become disproportionately large	Complex problems that cannot be solved within the current systems as awareness of broad interconnections grows	The consequences of human actions threaten the planet's living systems and demand coordinated effort
Drive	Safety-driven	Exploitation-driven	Compliance-driven	Profit-driven	Care-driven	Systemic-driven	Holistic-driven
Life force	Physical and social safety and security	Conquering domination	Belief, moral duty stewardship	Achievement, changeability	Belonging, idealism	Understanding	Interconnections
Main focus	Group/collective. Bonding Order	Individual/self Powerful Self	Group/collective, Absolute Order	Individual/self, Enterprising Self	Group/collective, Egalitarian Order	Individual/self, Integrating Self	Group/collective, Holistic Order
Values examples	Reciprocity, respect and allegiance towards elders, mother love	Courage, vitality, strength, personal respect, personal power, rivalry, territorial, intimidation, hedonism, loyalty to persons, assertive	Clarity, discipline, one truth, responsibility, loyalty, duty, guilt, conformity, justice, obedience, orderliness, stability, clarity, one truth	Results, reward, image, quality, innovation, productivity, creativity, career advancement, enterprising, control personal esteem, image, satisfaction, competition	Consensus, conflict avoidance, teamwork, equality, participation, honesty and openness, being a decent person, harmony, trust, love	Insight, integrity, learning, long-term orientation, ability to reflect, flexibility, tolerance for uncertainty and paradoxes systems-thinking	Inspiration, interdependence, future generations, ability to forgive, wisdom, sufficiency, responsible living

Freeing themselves from kinships and family ties, people gradually experienced ways of expressing themselves guiltlessly and selfishly, so as to find immediate pleasure and avoid shame in a world of domination, threats and ego. Power & Energy-indicated with Red-can be easily recognized in feudal states, street gangs and war lords. Healthy Red can also be observed in top athletes and board of directors. It shows in perseverance when the going gets tough, in striving for victories and playing the power game. Unhealthy Red is often encountered in traffic (road rage), in large crowds (hooliganism), corporations (“rat” behavior) and among “party animals”.

Red lacks the capacity for long term sequential thinking. They feel no guilt, only the need to gratify impulses and senses immediately. Individual persons tend to manifest these energies especially when they are young (set limits and they will test it!) or in adverse times (CEOs, admirals) or provoked and challenged to bring out the best they’ve got. These manifestations relate to an environment with limited possibilities, with a shortage of sources, provoking entities to fight in order to gain control and get their share.

2.1.2. Features of a Pre-Capitalist System

With reciprocity as one of the main characteristics of the Security system, economics in the early ages was based on barter, on the exchange of food or early division of tasks, such as carving stones or making artifacts. Slowly excess supplies among clan members and within little hamlets were exchanged at regional markets and gradually money was introduced to support the emerging trade relations. A systems of guilds supported skilled professionals and artists. However, political leaders where dominant in societies. In exchange for security pheasants were ordered to offer physical help to build roads for their armies, assist in constructing public buildings, such as cathedrals, or provide parts of their harvest to feed soldiers or replenish the stocks of the lords.

In his 20 year reign Ming emperor Zhu Di was responsible for renovating the Chinese wall and expanded it with more than 1.000 km. To feed the million workers he assigned to widen and expand a canal system to allow hard wood freighters to ship grain and rice from the south to the north, which took another million workers. The jungles of nowadays Vietnam were stripped from teak wood to build over thousand of maritime vessels and treasure ships that sailed the oceans from 1421 to 1423, and colonized both coasts of the Americas, 70 years before the Europeans did. Last but not least, Zhu Di moved his capital to Beijing and built the Forbidden City.

These huge efforts, that took extensive planning and economic power, primarily emphasized the greatness of the emperor. The wall was meant to strengthen national security (Purple), but the opening of the Forbidden City with ambassadors of all relevant empires and kingdoms present, marked the stature of Zhu Di (Red). Maintaining and opening trade relations was a way to expand the

tribute system for the emperor, not to exploit colonies for gold as the Europeans did many years later.

Gavin Menzies (2002): 1421, the year China discovered America.

We can still observe these pre-capitalist economies in countries such as Afghanistan, with strong tribal structures, or war torn and impoverished countries such as Dafur and Malawi. Within European countries this system tends to marginalize and can still be observed when people sell homegrown vegetables from small market gardens or backyards, or products manufactured as personal hobbies. Also alternative money systems (local exchange currencies) relate to this type, supporting a time-for-time exchange of goods, but primarily services.

2.2. Classical Economic Systems, Based on Power & Energy and Absolute Order

2.2.1. Introduction of an Emerging Value System

When people learn to transcend the self, experience consequential thinking, they are able to live up to “higher ideals,” find pride and fulfillment in their work and accept sacrifices now so as to obtain rewards later. New values emerged that matched a quest for order, meaning and purpose. Feudal states transformed to empires with strong bureaucracies and military power to control and stabilize societies. Nation states emerged, emphasizing their (purple) identities, icons for belonging and pride en newly won (red) energy to stand out and (blue) efforts to standardize legal system and so forth.

Christianity, communism, armies and bureaucracies represented Absolute Order, providing a master plan that puts people in their proper places. Impulses are controlled through discipline, guilt and punishments. The rightful authorities seek order and stability and succeed in making their people believe to sacrifice themselves for future rewards.

People “with a lot of blue” live by the book. They try to comply with the laws, regulations, procedures and agenda’s that structure their lives. Life is relatively simple: for each problem there is a proven practice and a guide-book to help them solving it, step by step.

2.2.2. Features of a Classical Economic System

The grandeur and power of political leaders was envied by people who firstly succeeded in making fortunes in gradually growing money driven society, such as bankers, early industrialists and senior civil governors. Starting in the era of the renaissance up to today, new (business) leaders formed a new elite that purposefully arranged a political economic system that kept the “establishment” intact. As an old boys network, they took a pivotal position within society creating control functions to stabilize society and manage their economic sources in order to maintain their powerful position. When this system is

dominant in society leadership is executed transparently, but when confronted with strong influences from emerging systems the powerful connections of leadership will hide under the surface, but the elite continue to safeguard their powerbase.

Leadership implies providing direction and maintaining stability. They will never themselves, nor allow others to “rock the boat!” If necessary leaders manipulate, pretend, divide and rule or play the boss. With support of sufficient blue, the behavior of leaders can be characterized as authoritarian and custodial¹.

The archetype leadership activity is “managing”: formulating top-down planning schemes and policy deployment, determining control systems and budgets and designing and maintaining procedures and a clear division of tasks.

Strong governments with often inefficient bureaucracies try to control the status of each individual linking its position in the hierarchy or stratified society. Nation wide there is a strong sense of moral duty.

Taylorism and related scientific management is typically linked to Order. Their principles of standardization, specialization, maximization, concentration and centralization are features according to which business and the entire economic system is run. Various quality management concepts supporting a resource orientation are commonly applied in both business and government.

Although industrialization is rapidly increasing, trade and handicrafts remain predominant in urban life, while agriculture and fishery are the principle activities in the country side. The majority of companies is family owned, maintaining a strong purple bond. Markets are relatively undeveloped, especially markets for exchanging production factors such as labor and capital. New job positions are hardly presented transparently, as cooptation via family connections is commonly preferred for. Also life long employment schemes answer perfectly to the circumstances in this economic system. Capital markets gradually emerge as cooperatives among those with needs.

Economic thinking focuses on production systems with a strong bias towards resource and technology-oriented issues. Governments allow business to create economies of scale and vertical integration. This growth strategy supports the power base of the establishment.

Governments tend to protect their industries against foreign takeovers, and are often willing to financially support them despite proven inefficiencies. American agriculture and aerospace industries, Suez Gas in France, Telefonica in Spain and British Steel are but a few examples of sectors and companies receiving (financial) support from governments.

¹Davis (1967): Authoritarian refers to the authority of the leader, and the custodial (paternalistic) on the organization as a whole securing the (basic) needs of the employees.

Furthermore, this system is characterized by the existence of old boys networks and various types of corporatism or business groups. Success in Power and Order is measured in terms of personal prestige and material wealth of the few.

Performance measurement is not commonly applied; if so, apart from tax obligations, it is not shared openly.

The classical economic system comes in three varieties, all rooted in the value systems of Power and Order. These are 1) the neo-mercantile Developmental States, 2) the communist plan economies and 3) the traditional economic system from which the capitalist system gradually evolved.

Developmental States, coined by Chalmers Johnson (1986), show evidence of intensive, interdependent collaboration between government, bureaucrats and industrialists, particularly in heavy industries, and a planning rational how to gain long term national welfare. It has been successfully applied in countries such as post war Japan, the Asian tigers (South Korea, Singapore and Taiwan) and, contemporarily, the BRIC countries (Brazil, Russia, India and China).

Post War Japan was forced by allied powers to transform its old pre-war industrial conglomerates (Zaibatsu) into corporate networks (Keiretsu), in order to break the power of the pre war establishment. Under the surface of change, the old structure remained in tact. Japanese bureaucrats at the Ministry of Trade and Industry (MITI) and business leaders rejected the philosophy of laissez-faire and free trade of open markets. To them, these concepts were little more than protection for the economically powerful exporters. The strategy of Developmental States is the denial of extant hierarchy of comparative advantage. In close collaboration with industrialists, Japanese bureaucrats used economic interventions effectively to foster the technological development, capacity growth, and competitiveness of targeted industries. With export industries booming with first cheap and later quality superior products, the Japanese economy has grown rapidly up to the end of the eighties. Emerging influences in the world economy and growing complexities crumbled the old boys network and deteriorated the effectiveness of state interventions.

In Europe we have observed this neo-mercantile variety to some extent in Nazi Germany and pre-war Italy.

The Plan Economies, applied by communist regimes, differed with the former in two aspects: The apparatchiks, the party bureaucrats running the planning system, were quite dominant and worked strictly top down, while the old boys network in for instance Japan exchanged complex information between public and private sector representatives while using market intelligence and price information in their planning approach. The communist’s planning system was highly detailed but not as sophisticated. Despite remarkable achievements, the communist economies were less effective, especially on the world market, and resulted in extensive inefficiencies which

ultimately jeopardized their existence.

We can observe the traditional economic system in all western economies, as governments and bureaucrats are hardly part of the establishment or their collaboration is not backed up by a sophisticated planning system. In Mediterranean countries such as France, Spain, Greece and Italy, this classical/traditional economic system is still dominant. France also has institutions that relate to the neo-mercantile tradition.

A common example of applying traditional thinking in all western economies is the exhaustive rewarding of CEO's: it is not market competition, as they say, but getting what they think they deserve, being the "top dogs" of their organizations, (un)consciously imitating the grandeur of former kings and emperors.

2.3. Capitalist Economic Systems, Based on Order and Success & Entrepreneurship

2.3.1. Introduction of an Emerging Value System

With too much emphasis on values such as discipline, loyalty, duty, guilt, conformity, justice, obedience and orderliness the Order way attracts adverse effects such as:

- Limited problem solving capacity and reluctant creativity;
- Suffocating rules and procedures for companies and civilians;
- Planning and regulation is more important than the objective;
- One truth, one right way, always categorical.

When life conditions gradually changed, people boosted with Red energy could develop and adopt new competences, new ways in approaching new challenges, choosing new ambitions. Being born a "nickel" the "Enterprising Self" knows how to grow into a "dime", into something larger, gaining control over its destiny. Success is the new name of the game in an environment offering plenty opportunities to compete, win and make things better and better.

In Success multiplistic thinking evolved offering many options and choices. In Order, people compared to the standard, but with Success they benchmark themselves against competition and the number one. People centered in the value system of Success recognize change is the nature of things, creating new niches and introducing new technologies, enhancing life for many.

They work hard-preferably make others work hard for them-and risk time and money (not their life, as in Power) to achieve prosperity and material gain. They seek out the "good life" and abundance, rather than rewards hereafter. The expressions "keep up with the Joneses" and "if you can't make it, fake it" are typically Success and Entrepreneurship.

2.3.2. Features of Capitalist Economic Systems

Blue Order and Orange Success are the true fundaments

of the capitalist system. It started off with Adam Smith's *Wealth of Nations* (1776), and was strengthened by academia such as David Ricardo (1817) and John Stuart Mill (1859). The "invisible hand" and the concepts of comparative advantages, resource allocation and "liberty" were major steps in the development of market oriented economies. With an enormous outburst of energy the capitalist approach was spread throughout economies. As with Schumpeter's "perennial gale of creative destruction" old establishments crumbled or are gradually losing their power. With disciples as Milton Friedman (Free to choose) the market economy based on free competition was presented as a new religion. It would bring prosperity to all people and countries alike. An "American dream" lies ahead for anyone who would "Go West" and put his pioneering spirit to work.

A typical description of the Success value system is the world presented with plenty of viable alternatives for progress, prosperity and material gain. People and organizations realize that change is in the nature of things and (personal) success the name of the game. Both people and organizations act in a calculated way while striving for autonomy and independence, seeking progress and success with the best solutions. If they are allowed to, they try to master nature and exploit its resources.

This description relate to a set of characteristics of the capitalist economic system or Anglo-American approach. They refer to leadership, resource allocation and governance structures.

The archetype role of leaders in a capitalist system is the Entrepreneur: discovering niches as opportunities for success, putting together new "combinations", creating and generating the necessary means and enjoying the fruit of their labor. Burton Klein's "Happy Warrior" and, again, Schumpeter's "creative destruction" are classic illustrations of the entrepreneurial drive behind capitalism.

This calculative attitude, seeking the best option among a variety of alternatives, supports the functioning of markets, allocating resources in the most efficient way. With its focus on prices, the capitalist system is very much cost oriented. Creating shareholder value is the ultimate aim. The Order fundament of Taylorism, scientific management and various (financial) control techniques have enhanced their focus on returns on investment and profit maximization (revenues versus costs) while continuously balancing costs and benefits. Their Success impulses increased their competitive competences, such as marketing and product development.

Along with enormous progress in transportation and information technology, the capitalist economic systems inevitable emerged into "globalization". In stead of organizing production capacities within a local hierarchy, companies decided to decentralize their production system to "low wage" countries or leave these activities to the market entirely. It has become a matter of tuning transaction versus productions costs.

Due to innovative developments in information and transportation technologies, companies in the US, Europe, Japan, Korea and Taiwan were able to outsource parts of their production process to low wage countries. A simple shirt might have been produced in Vietnam, made of Turkish cotton, dyed in India, has Mexican buttons and Chinese pins and packaging method. A Singapore cargo ship transported it to the port of Rotterdam and during this trip the cargo changed ownership several times. This shirt is sold cheap, but contributes to profits anyway. Unfortunately the capitalist system hardly monitors the social consequences of this production system. The local farmer received hardly enough to finance a new harvest, Indian rivers are completely polluted, the working conditions in Vietnam are awful and the little girls that were sewing the shirt hardly get a wage at all. Local cultures are washed away by the icons of the global capitalized world.

The role of government and bureaucrats is simply to enable people and companies to compete freely and prevent market failures to occur. Based on a set of Order competences, the capitalist system provided the context for a Regulatory State, creating a level playing field for free competition through clear legislation and subsequent enforcement. This legal system ought to be effective and visible (law and order) rooting out everything that compromise the market mechanism. Additionally, the public sector must remain as small as possible.

Business' role in society is more or less independent and (a minimum level of) social welfare is the exclusive responsibility of the state.

Order was already purposeful and goals oriented, but through typically Success values such as image, quality, (process) innovation, productivity, creativity and being entrepreneurial, companies have become result-oriented. It reinforced the desire to compete and to become better.

The Order-Success value system resulted in a strictly fact-oriented approach to measuring performance. Success is primarily measured in terms of shareholder value, thus in money and commercial assets. Especially market share, growth figures, payout periods and returns on investments are crucial indicators to mark the results of their achievements.

The Anglo-American character of capitalism is emphasized in the clear distinction between the owners of capital and management of corporations. The executive managers' prime goal is to guarantee the highest profits and thus best return on their invested capital. Management is subordinate to the owners' interests and they can be fired when they fail to achieve the expected results, or rewarded when successful.

We can observe the capitalist system in all countries worldwide, from tiny spots in African cities, expanding zones in China to dominant positions in the UK and the USA.

2.4. Social Economic Systems, Based on Success/Entrepreneurship and Community

2.4.1. Introduction of an Emerging Value System

The success of the entrepreneurial capitalist way gave rise to a new value system as the negative effects could no longer be managed adequately. With profits gained at the expense of the weaker, the capitalist system generates dropouts. Its supportive value system tends to elitism, as Success is inattentive to a fair distribution. With a hang to quantity and profits, instead of quality and durability, Success creates "consumerism" and a huge waste stream. Capitalist societies tend to exploit and ultimately jeopardize their (natural) resources. At the personal level, striving for success often becomes compulsive, leaving orangists no time to enjoy their fruits.

The Purple reciprocity and Orange accumulation of material wealth paved the way for Green redistribution of society's resources among all. The self is once more being sacrificed, but this time in a world where care, love and belonging are paramount, where everything is relative and "truth" is a matter of context and the group's needs. The Egalitarian Order, as this value system has been labeled by Cowan, liberates humans from dogma and greed, promoting a sense of community and unity. Solidarity is felt with the weaker and dropouts, victims of a system exploiting resources and causing an unequal distribution of material wealth.

People and organizations with a lot of Community-sense try to explore the inner beings of themselves and others. They refresh spirituality and seek to bring New Harmony. Generally Community is anti-dogmatic, and since everyone is unique, anti-labeling and anti-hierarchy, but highly tolerant.

2.4.2. Features of a Social Economic System

The Dutch "Polder" approach—introduced in the White House by former Dutch Prime Minister Wim Kok—and Tony Blair's "Third Way" are strongly rooted in the values systems Success and Community. They question the outcomes of capitalist societies but remain centered in a market economy approach.

The capitalist-socialist transformation is quite dramatic, as one can observe strong resentments in the political arena discussing it. Three features of the capitalist system are subject to major change:

- The democratization of power: the old establishment has finally lost its powerful position, as decision making must include the interests of all stakeholders;
- Market failures: free competition does not necessarily generate the best outcomes to all; Governments have to intervene in markets to improve their performance;
- Resource allocation: as efficiency does not neces-

sarily include all costs, social issues are left to negotiations between social partners.

As the capitalist system focuses at managing resources and increasing shareholder value, the socialist market economy is primarily oriented at managing stakeholder interests: balancing the stakes of various groups in a market environment, of which the preconditions are set in the political arena or the negotiation table of social partners. As elites and establishments violate the sense of equality, especially regarding the distribution of wealth, and short term market arrangements jeopardize the interests of other stakeholders, such as employees, next generations and the ecological environment, new value systems emerge that inspire new institutions to make manifest a multi stakeholder approach.

In the level of development characterized as the Egalitarian Order or Community, the concept of an organization has changed. It is no longer regarded as an entity as such but as a group of people engaged in a process of organizing, of working together in trying to achieve common goals. It inevitably implies the involvement of all stakeholders, within and outside the organization. Community values, such as empathy, trust, kindness and care, support competences enhancing the ability to involve everyone (engagement) and listen carefully (dialogue). In 2003, the author phrased it as follows: “The principle of Agency (autonomy, self-determination), the right to be and act according to ones awareness, capabilities and best understanding of its situation, is balanced by the moral obligation to be accountable for its impact on the environment. It is this principle of Communion that limits freedom when it interferes with the freedom of others.”

In a socialist market economy resources are not exploited but cared for. In this system the exploitation of natural resources is counteracted with the ideology to protect and preserve ones habitat and those of other beings.

Employees are no longer considered resources and also customers are recognized as human beings. As Peter Drucker already noticed in 1952 “when hiring a worker, one gets a whole man,” In addition to the physical and intellectual capacities, human beings tend to include its emotional and spiritual dimensions. These capacities allow persons to better understand one other, learn from each other, collaborate more effectively and create a two-way flow of information, turning top down telling what to do into proper conversations and dialogues with all those concerned.

The archetype leadership style in Community is “coaching”—the servant leader. The servant leader, a term coined by Robert Greenleaf, implies a state of being, not doing: the first and important choice a leader can make is the choice to serve life, without which one’s capacity to lead is profoundly limited. Servant leaders enable professionals to grow and develop their talents. Instead of

providing solutions (as in Order), leaders should allow employees to create the answers themselves.

With typical values such as consensus, conflict avoidance, teamwork, equality, participation, honesty, openness, being a decent person and harmony, decision making in the context of Community is an, often time consuming, group process. Once the decision is reached, the buy-in is guaranteed and implementation can be done quickly. This type of consensus oriented decision-making implies that a new type of corporate governance structure has emerged, including a new role of management, a flat organization structure and shareholder value being balanced against the interests of other legitimate stakeholders.

Corporations influenced by this value system invite representatives of various stakeholders to the negotiation table. The first example, often supported by government regulations, is the workers councils, with its members voted by their colleague employees. Ideally, management and workers discuss corporate strategies and ways to enhance workers conditions. Corporate wise or collectively per industry union representatives negotiate wage schemes and packages of labor conditions, which, after an agreement with employer associations, is made law applicable for the entire sector.

Being care driven, companies tend to take better care of the workers and professionals. Absenteeism caused by work stress and incidents or work practices causing (permanent) injuries, such as RSI, are not only a costly affairs from employers perspective, but at the personal level, cause situations that must be brought back to its absolute minimum.

The Dutch laws on labor conditions are strict, obliging for instance all organizations to monitor the wellness of its employees and take actions whenever the outcome does not match the proper norms.

A second example of the centeredness of employees is talent management and human resource development. Due to increased complexity, organizations must invest in various ways to enhance personal skills and competences. It makes sense business wise (Success), but also supports the personal growth and professional development of employees (Community). These activities also increase employee flexibility and employability, which support the functioning of the labor market.

Especially in situations of labor shortages, companies try to become “employer of choice”. By practicing creating a culture of trust internally first, a company is much more authentic (and successful) in trying to create a culture of trust among suppliers and customers.

Having discussed, to some extent, the inequality of previous systems and the Rhineland ways of overcoming them, we now turn to the shortsightedness of markets and how socialist governments tend to counteract them.

In capitalist systems governments ought to support the

functioning of markets, and the smaller the governmental claim on resources and capacities the better. In social(ist) economic systems governments' primal role is to counteract the negative consequences of the market mechanism. They levy the financial outcomes of markets via taxes and social premiums and redistribute incomes to various groups who come short in maintaining decent life conditions.

Furthermore governments apply social regulations to prevent exploitation of workers as we have seen in extensive laws in enhancing labor conditions.

Governments stay at arm length when social partners, (employers - and employee associations) negotiate wages schemes, labor conditions and the functioning of markets in general. If requested governments such as in the Netherlands can lift collective agreements to law and made applicable to entire industries.

In addition to income policies and labor markets, socialist governments are inclined to influence markets that tend to favor specific interests at the expense of others, such as natural monopolies in energy and telecom.

Redistributing up to 65% of BNP, the scale and impact of governments in social economic systems is much larger than in previous systems. The sheer size of governments has made them significant motors in their national economies. However, the adverse effects of rigid bureaucracies, has also burdened socialist governments as the cause of stagflation.

Socialist's success is measured in terms of the quantitative as well as the qualitative impact for all stakeholders involved, including groups who do not take part in economic production or distribution. The socialist dashboard is much larger and more complex than the one of the capitalist system.

"God create the earth... and the Dutch the Netherlands". This American expression refers to the century old situation of Dutchmen commonly reclaiming low-lying stretches of land from a body of water by building dikes and applying various techniques to manage the level of water within so called "polders". A typical governance structure emerged in which all stakeholder participated expressing their desired water level and their financial commitment, enabling authorities to balance the various interests and to achieve the compromised goals. The polder metaphor is used by the Dutch and foreigners alike to express decision making process based on consensus.

In the Netherlands, unions have often tempered their requests for a raise of wages to meet other social goals and prevent a frustration of long term economic perspectives. This situation was the fundament of the Dutch Miracle with respect to economic growth and the smooth transition towards a service oriented economy.

The essence of the social economic system is the ability and willingness of talking together and being collectively responsible for the choices made. The socialist system creates fora to discuss complex dilemmas such as being

pragmatic or ethical, short-term profit oriented or sustainable. With all stakeholders present in the debates interests are expressed and respectively balanced, but sustainable solutions are hardly found.

We can observe this system as dominant in Continental Europe and especially the Netherlands and Scandinavian countries.

2.5. Interdependent Economic System, Based on Community and Synergy

2.5.1. Introduction of an Emerging Value System

Trying to be a nice, loving and decent person, are highly regarded qualities in Community. Conflict avoidance, however, also have negative consequences. With criticism smothered by love and judgments made relative to the situation at hand, decision-making risk non-functional and abstract outcomes.

Using each other's qualities for mutual growth, Community is able to create good learning conditions. However, the aura of an expert is badly regarded: consensus is more important than expertise and incompetence is not a reason to be laid off. With rising complexity levels, Community does no longer provide the ultimate solutions to the problems at hand. Furthermore, equality and consensus building may lead to pooling of ignorance.

Being confronted by chaos in a world at-risk, typical Community features such as the lack of leadership and expertise and the emotional and economic cost of caring are important arguments to develop new ways to cope with the ever increasing complexity of challenges.

Comprehension, understanding and connectedness are the buzzwords of Synergy. A person and organization centered in Synergy, express itself, but never at the expense of others or the earth. They will not say: "These people can't cook", but "This food is not of good taste".

In Synergy there is room for authenticity, since internal motivations matter a lot. Existentialism is strong.

People with values associated to Synergy can blend conflicting "truths", for it is able to see more colors and uses more senses at the same time. By focusing on functionality and applying competencies to get buy-in from others, Synergy is able to create win-win options and breakthrough solutions, seeking self-interest without doing harm to others and nature.

People dominantly centered in Synergy understand that the complexity of today's world cannot be solved within the current systems, as their awareness of broad interconnections grows. They recognize the inevitability of nature's flows and seek ways to accommodate "natural design". Understanding interconnectivities in all Wilberian quarters, seeking to grasp the very essence of their presence and by having created flexibility through breaking up structures into network organizations, people start to support all life in the most natural, sustainable, and

fitting ways.

In order to meet its drive, to be, to learn and to discover, persons with a lot of Synergy function best in a network with a strong sense of direction, while demanding flexibility and open systems. Values such as insight, long-term orientation, ability to reflect and tolerance for uncertainty and paradoxes support the drive for self-development and boost people's ability to learn and apply knowledge. They are able to learn from any source. With a mind that quickly wanders, they have difficulty in maintaining focus.

2.5.2. Features of an Interdependent Economy

The social (ist) economic system is still rooted in capitalist practices, with political leaders mitigating its outcomes primarily through income redistribution. Due to a strong Order dominance they believe they can construct an ideal society. Dutch parliamentary history shows various examples of launching growth policies in the expectation that this will fulfill the needs of people. Unfortunately, the majority of these interventions have failed to meet its targets, fueling the capitalist propagandists and often causing a shift in parliamentary power in favor of the right wing conservatives.

Blue linear thinking can not serve as a construction philosophy, a blue print for contemporary needs. Being able to better understand the subtleties of human nature (Community) and system dynamics (Synergy), the successors of the hard core socialists create room for organic growth, by allowing nature, structures and society to unfold itself. It seeks to facilitate the emergence of a natural design.

Indeed is there a future for a socialist politician? Is there a way out in the Anglo-Saxon vs. Socialist Market economy debate? What are the pitfalls that caused failure and what values and what competences do we need to create new institutions in line with the envisaged Interdependent Economy?

Community consensus building hardly results in innovative breakthroughs and sustainable solutions. Community lacks vision, lacks leadership to match collective needs with stakeholder interests and personal ambitions. Synergy possesses these qualities. Therefore one must expect that the interdependent economic system will find ways to overcome current challenges in western social economies.

A private initiative in the Netherlands, launched by a.o. McKinsey, conducted the largest Dutch online survey ever, taking place in September/October 2006 and 2008. More than 170,000 inhabitants, being a representative sample of the Dutch society, took 21 minutes of their time to respond to current issues.

The Dutch expressed a strong desire (90%) to attain a society build on solidarity, modesty and oriented towards quality of living. There is a wide support for measures stimulating growth of prosperity and simultaneously help

achieve the desired organization of society. They strongly support new economic reforms as long as this does not increase the pressure on the environment. Examples are a more flexible labor market, working at home, accept restrictions on deducting mortgages and intensify inservice training.

Unfortunately, confidence in government's policies and the authorities' execution thereof is very low (25%). Dutch citizens are very critical to the content of political parties, as they seem to root in traditional systems, thus unable to lead the Netherlands into the new era. (www.21minuten.nl)

The Interdependent Economic System seems to aim directly at the fulfillment of needs of all people. In addition to socialist redistribution policies, the new system seek to align vision with personal commitment, balance long term interests with short term needs and harmonize ideology with pragmatism. The life conditions that provoke Synergy to emerge are adequately matched by new ways sublimating "either - or" and "win - loose" arrangements.

Larger organizational entities are transforming - or breaking up - into network structures, demonstrating the drive behind Synergy. The Hollywood movie scene is a good example of a once highly successful oligopoly which broke up in numerous small professional clusters, who work together in a network for the duration of a project. Not far from Hollywood, in Silicon Valley, a network structure emerged bottom up, as independent professionals clustered into networks, creating the necessary competences to meet the challenges facing Synergy. Inertia transformed to flexibility, creating room for new strategies, new approaches to running economic activities resulting in improved performance levels.

Redistribution policies often resulted in pampering groups in need, stigmatizing their position as victims of the market economy. Interdependence, aligning the principles of agency and communion at a more complex level, emphasizes personal accountability or responsibility and acting accordingly. Interdependent economies educate those in need to reshape their futures. In popular terms: "when hungry, learn and enable them how to fish, instead of providing them just a fish".

The archetype leader in Yellow is the "Emergent Leader". He or she authentically connects visionary qualities to a practical and personal approach and is able to link the various qualities of previous contexts into one effective and coherent approach. Emergent leadership lifts people, organizations and societies to levels where adequate answers can be developed to meet current challenges. It supports the sublimation, the transition of living entities to emerging levels of existence.

Leadership as defined in terms of Synergy is no longer confined to what people do, but grounded in who people are. An authentic choice to serve life increases ones capacity to lead by allowing life to unfold through you. The

hierarchy between the leader and the led remains healthy: leadership is never dominating or abusing raw power. The leadership potential can be developed in everyone. It implies identifying the personal responsibility and the alignment between one's personality and ambitions with one's role within the network. Therefore, essentially, leadership is about learning how to shape the future.

Marketing as a concept is 60 years old. Human resource management became popular since the early nineties. What will be a new management discipline? "Synnovator", coined by the Center of Human Emergence, makes a good chance. This notion means to interconnect and vitalize. Companies explore new ways of cooperation and strategic partnership, both horizontally and vertically. By effectively working together with internal and external stakeholders, thus tapping into their competences and capacities, organizations find new opportunities to boost their performance. This time with respect to the triple bottom line: people, planet and profits.

Companies with a lot of Synergy tend to chose for a "people first strategy". They act as if they say: "We take care of the people. Our people take care of the business." They successfully allow professionals to be who they are and bring out the best they can. This way, highly skilled workers are able to create a sense of flow and achieve productivity levels which are unheard of in previous circumstances. According to research conducted in the USA, UK and Brazil, the very best Great Places to work®, being also listed at stock markets, score a four times higher financial growth than the average stock prices. Similar conclusions were drawn by Jim Collins in his best selling management book "Good to Great".

The Synergy value system is emerging rapidly at the personal and corporate level. Unfortunately, characteristic institutions of the interdependent economic system remain hypothetical. However, we can sketch the outlines of this approach:

- The scale of governments will decline again, as ministries no longer feel themselves being representatives of a particular stakeholder group, but act in the interest of the whole, while applying a better understanding of system dynamics;
- Bureaucracies, law enforcements and ministerial responsibility will be organized in more sophisticated manners;
- (Municipal) Authorities pro-actively support the concept of "great places to live", while collaborating with dedicated private and social institutes providing education, (health) care, safety, housing et cetera.
- Governments, social partners, individual corporations and NGO's work together intensively, exchanging information and using each others expertise to create breakthroughs in improving the quality of life for all;
- Governments and social partners should guarantee work protection in stead of job protection, empha-

sizing each others' role in taking personal responsibility in improving ones future opportunities;

- Social security systems are not focused at income distributions alone, but emphasize the inclusion of those in needs in social communities and economic systems. Kennedy's statement: "Ask yourself what you can do for your country, in stead of what your country can do for you", gets a new dimension.
- As globalization involves the whole world, supra national institutes must be initiated to meet its challenges, not to protect particular interests at the cost of others.

We can observe the early stages of this system as emerging in the Netherlands and Scandinavian countries.

3. Consequences for International Economic Policy Making

This paper described various economic systems that are aligned with their (historical) contexts, their challenges and ambitions. The models can be placed in a specific sequence of development, creating an organic flow of macro economic institutions. Figure 1 tries to summarize these models as stages of development, each model including two subsequent and dominant value systems. The color codes have been introduced in Table 1. The more complex, recently emerged systems transcend and include the less complex ones, the ones to their left, while the basic systems tend to marginalize as complexity emerges. We still tend to see the reminiscents of old systems, but their importance is decreasing.

Policy makers cannot choose from a menu card which system they like best. One cannot skip development levels. We have observed the troubles that occur when Afghani economic activities functioning at subsistence and pre-capital levels are forced into modern capitalist economies. It doesn't make much sense when Italian Mediterranean bureaucrats study Danish experiences.

Their first challenge is to transform into the next level. This is difficult enough as it is.

Even when traditional policies, approaches and economic structures fail to deliver improvements, in spite of the rising awareness that current institutions are no longer in tune with changing circumstances, it still isn't easy to adapt to new structures, new institutions, creating a new coherent model.

It helps to understand system dynamics. As a summary, Table 2 presents macro economic characteristics, structured according Spiral Dynamics.

The main questions arise, however, do political and economy leaders have the guts to move ahead, challenging the "ceilings" and collaborating with pioneering spirits.

Asking oneself if Europe's economic systems are converging to a particular level is implicitly raising the

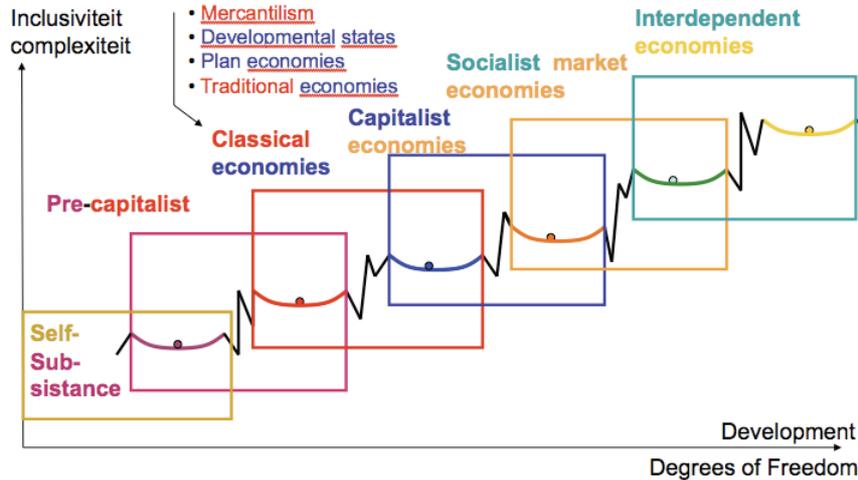


Figure 1. Phase wise development of economic systems.

Table 2. Macro characteristics inspired by spiral dynamics.

Main Themes	Security (Purple)	Energy & Power (Red)	Absolute Order (Blue)	Success & Entrepreneurship (Orange)	Community (Green)	Synergy (Yellow)	Holistic life system (Turquoise)
Scope	We are but a small and modest part of the world, given to us by the Gods, the natural spirits and our ancestors and should be left intact	The world is there to conquer, or at least control or safeguard its scares and vital resources	The world must be stabilized to maintain order (and maintain the current establishment and balance of power)	The world occurs at the local, national and globalized level, but is primarily restricted to economic parameters and opportunities	The world is one village, a brotherhood of man; has one climate and has no other place to go	The social and environmental degradation are inevitable when mankind is not able to act according to a systemic understanding of the whole	Interdependency. Each person or organization therefore has a universal responsibility towards all other beings, both present and future generations
Dominant political institution	Tribes, warlords	Feudal States, Tributary systems	Empires, Nation States, early democracies	NATO, Security Council, Top X-Roundtable	European Union, United Nations, UNTAD	Supranational governance, e.g. International Court of Justice	Not known yet
Style of decision making	The words of the elder; the in-crowd	Authoritarian; dictatorship	Procedural, top down decision making and policy deployment	Top down and bottom up; negotiations	Bottom Up; Consensus principle: everyone equally counts	Consent principle, anyone with a valuable contribution counts	All information counts, including from spiritual entities
Criteria for decision making	The decision ought to be taken in accordance with the proper rituals	Based on personal power and status	According the proper procedures, by the proper authority and in line with the basic purpose	Financial criteria: Shortest 'pay out period' and highest shareholder value	Social criteria: everyone must be included and heard	Balanced, functional decision making, taking into account all available expertise and considerations	In line with and in favor of holistic interests for survival of life on the planet
Main stakeholders	Elders	Old boys networks, elite, powerful ones	Legal authorities	Finance, owners and industrialists	Civilians, employees, deprived groups	All relevant stakeholders	All living creatures
Role and size of government	Emerging local authorities, around the elders	Supporting staff of the ruler and enforcement (like the mandarins in old China)	Dedicated bureaucracy designing and enforcing regulations	Public agencies, maintaining a level playing field for competition	Large bureaucracy supporting redistribution processes	Smaller but dedicated government officials conducting new societal developments	Resilient network of government institutions supporting the needs of the whole.
Dominant strategy	Providing security for levying taxes	Supporting emerging markets and boosting economic activities	Policy deployment; the constructive society	Level playing field; supporting globalized economies	Negotiation fora with stakeholder representatives	Creating breakthroughs in themes that endanger societies	Supporting habitats for the different needs
Example: orientation towards sustainability	Maintain what is there already, do not alter the current state	Constructing large statues, castles, cathedrals, mausoleums and other buildings expressing the grandeur of the leaders, the capitals, etc	Sustainability implies a system of legal rules and procedures enforcing people how to behave and how processes should be run	Sustainability is left to market forces that will impact social, ethical and ecological aspects into business operations and decision-making, provided it contributes to the financial bottom line	Sustainability implies the balancing of economic, social and ecological concerns, including initiatives that go beyond legal compliance and profit considerations	Sustainability implies a search for well-balanced, functional solutions creating value in the economic, social and ecological realms of corporate performance, in a synergistic, win-together approach with all relevant stakeholders	Sustainability is fully integrated and embedded in every aspect of the society, aimed at contributing to the quality and continuation of life of every being and entity, now and in the future

question if Europe offers uniform life conditions and value patterns that would allow all economies to adapt similar approaches. Unfortunately this is not the case. Brussels and the representatives of individual economies must live with this situation and must learn to turn it into an asset. At the same time it must support the emergence of modern institutions in response to the challenges of modern day economics due to the international systemic crises, such as climate changes, food and water shortages and the economic instability.

4. Acknowledgements

I thank people who commented on earlier drafts or presentations of this paper.

- Wilbert van Leijden en Paul Zuiker, authors of “Nederland op doorbreken”
- The people attending my lecture at the Rotterdam School of Management on this subject, including prof.dr. Gerard Zwetsloot, dr. Dirk van Dierendonck and dr. Andre de Waal;
- The Rhineland workgroup in the Netherlands, including professor Matthieu Weggeman;
- Associates of the Center of Human Emergence and Synnervate, such as Peter Merry and Morel Fourman
- Co-founders of Corporate Dynamics, being experts on Value management;
- Professor John Groenewegen, my former professor on Institutional Economics and Economic Systems, Erasmus University Rotterdam.
- Guido Enthoven, director of IMI—Instituut voor Maatschappelijke Innovatie

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Abbreviations

CS-R	Corporate Sustainability and Responsibility	EU	European Union
ECSF	European Corporate Sustainability Framework	IEL	Institute of Labor Studies, Esade Business School
ECLET	Emerging Cyclical Levels of Existence Theory		

On the Ideal Duration of Entrepreneurial Resources Commitment

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Received November 20, 2009; revised December 7, 2009; accepted December 14, 2009

Abstract

The paper proposes that the entrepreneur's perception of time in the form of average ideal duration of entrepreneurial resources commitment is an important personal trait. The entrepreneur develops a particular checking filter for the entrepreneurial involvement on which the evaluation of entrepreneurial opportunities is based. The concept of ideal time dimension of entrepreneurial engagement is crucially related to the development of structural prototype prevailing in space and time. Three main influences have been located with respect to the formation of duration on entrepreneurial commitment: microeconomic influences, long-term macro-environmental influences and short-term macro-environmental influences.

Keywords: Entrepreneurship, Time Commitment, Payback Period

1. The Traditional Treatment of Preference in the Allocation of Investment Resources

The significance of preference of time in the bibliography, which is related to the allocation of resources and investment decisions generally, has been shown in at least three different approaches: the first refers to the rate of preference of time (RTP) of the neoclassical model [1, 2]; the second refers to the payback period criterion [3]; and the third to the concept of the intrinsic time of investors [4].

In the standard literature of project evaluation the payback criterion and hurdle rates criterion are often used. Lefley [3], in a review article on the PB method, states that the PB method is an important, popular, primary and traditional method [5] and is particularly used in advanced manufacturing technology projects [6]. Wambach [7] connects payback criterion and hurdle rates with the values of waiting. The hurdle rate is (usually) based on subjective assessments and the perceived level of project risk [3], particularly in cases in which future cash flows increase with time [8].

2. Perception of Time as a Cultural and Personal Entrepreneurial Trait

According to Bird [9] the entrepreneurship engagements in the resources-time interface have at least three time

elements: perception, anticipation and action. Perception refers to people who are good judges of feasibility or the potential to instigate activity [10]. Anticipation denotes the future tense and touches on the possibilities of future states. It draws upon individuals' abilities to recognise the future. Jaques [11] outlines two dimensions of time related to anticipation: succession and intuition. The latter captures the complexity of moving forward in time. The size and the value of the firm are fundamentally linked to the entrepreneur's intentions.

According to Shane and Venkataraman [12] entrepreneurship means the process by which opportunities to create future goods and services are discovered, evaluated and exploited. In the framework of a well-structured theory for tracing and developing entrepreneurial opportunities [13] two levels of analysis appear. The first includes the process of tracing and developing entrepreneurial opportunities (development, recognition, perception, discovery and evaluation) while the second includes the factors that influence this process (entrepreneurial alertness, information asymmetry and prior knowledge, discovery versus purposeful search, social networks and finally personality traits).

The individual according to his sensitivity alertness [14, 15] reacts to the information he receives and recognises the entrepreneurial opportunity. The entrepreneurial opportunities are continuously evaluated either within a formal or informal process [16]. The individual informally collects information until it takes a more for-

mal form and particularly when the collaboration of third parties is necessary in the search for essential resources. If the result of this process is satisfactory, then a feasibility study is produced.

The entrepreneur develops his entrepreneurial alertness either on the grounds of backward or forward interpretation [17] of incoming information and only to the level that he keeps pace with his time preference. For example, he excludes from his evaluation all information (in this case preference for short-term entrepreneurship) connected to long-term entrepreneurship. Thus entrepreneurial alertness is not a complete process but a unilaterally developed sensitivity which is biased in favour of short-term actions. Note that in cases where a long-term perception of time prevails in society, then the long-term entrepreneurial trap can arise where no immediate results in entrepreneurial activity are taking place. Thus, the time preference is a personal attitude of the entire process of opportunity tracing and development.

The final phase of the evaluation by using time discount of future inflows constitutes only part of the influence of the time preference on the process of entrepreneurship. Time preference is much more important in all previous stages of the process of opportunity, identification and development.

3. The Macro-Environment and the Perception of Time

The macro-environment of entrepreneurship includes the economic and social dimensions. Central governments policies, local government aspects and financing systems [18] influence the general economic conditions of entrepreneurship [19]. The work ethic and cultural values shape the social background of the entrepreneurial environment [20].

Regarding the macroeconomic environment and its relation to the personal process of evaluation of time, we can trace a number of factors which seem to be able to shape it:

1) An entrepreneur who lives in a richer economic environment (per capita income), as compared to a poorer one, will obviously make a different evaluation. Under these circumstances, it is logical for the future to have a higher value since the present facilitates the resolution of most current personal and social problems.

2) Moreover, in an economy with higher rates of growth, for the same reasons the future is valued higher than the present [21]. The opposite is held in an economy with low rates of growth.

3) The entrepreneur is influenced by the phase of business cycle. If he is in the exodus of the recession phase he would prefer the future to the present, and the opposite in the upward phase.

4) The nominal interest rates combined with inflation

rate indicate the evaluation of time, since they theoretically express the conditions of perfect competition and equilibrium markets.

5) A factor of similar importance emanates from the political environment and generally from the conditions of political stability. The entrepreneur who is active in an area with continuous political agitations and applications such as continuous changes in the administrative machine and in the tax system etc., will give with difficulty a higher value to the future over the present.

6) An entrepreneur who lives in an unstable economic environment will obviously show a higher preference for the present over the future. We may consider variability of income as a satisfactory proxy of instability of economic environment [22]. It is, therefore, logical to assume that he puts more weight on the present than on future periods.

7) Another factor that influences the evaluation of time is public finances conditions. A non-investment budgetary deficit of central government is in itself a powerful signal, *ceteris paribus*, for the entire society about the preference for the present versus the future.

8) The administrative burdens created by the operation of bureaucracy in terms of cost for the operation of firms are a serious factor that influences the process of evaluation of time [23], included the corruption cost that is probably more serious in the least developed economies. The higher this type of transactions cost, the higher the preference of present versus future is.

9) The legal framework of exploitation of entrepreneurial patents is one more factor which determinates the relationship between present and future. The non-existence of such a framework makes time disappears from the process of exploitation of an entrepreneurial idea [24]. The more its exploitation is developed for the short term, the less is the risk of losing the benefits from its exploitation.

10) The conditions of the job market considerably influence the time horizon of an entrepreneurial idea. When the job market is characterised by rigidity, the entrepreneur is led to abandon the flexibility that constitutes a basic element of entrepreneurship [18].

11) We should also give a great deal of attention to the more general geo-strategic factors of the entrepreneurial environment. Thus, an entrepreneur who is active in a region where national conflicts (wars, changes of borders, exterior threats) succeed one another, is being very logical in having a powerful preference for the present over the future.

4. Cultural Entrepreneurial Idiosyncrasies and the Perception of Time

The literature [23,25–27] shows a very clear picture of the level of research concerning the role of culture in the

entrepreneurship.

1) The relation of individualism vs collectivism with entrepreneurs' perception of time is difficult to determine. We will stick to the idea that societies dominated by collectivist views have negative effects on the duration of entrepreneurial activities. This is because they usually do not promote the importance of individualist action.

2) Societies that show low uncertainty avoidance usually have high confidence in the future. Geletkanycz [28], raising a point of preference between a forward-looking vs more historical perspective, considers this perception to be a fifth cultural dimension, also known as Confucian Dynamism.

3) We could also accept that societies characterised by a high tolerance of social inequality (power distance) accept higher values for entrepreneurial activities. Also they accept a higher value for the future over the present since they usually promote perceptions of future expectations.

4) Societies which are characterised by masculinity (a materialist and achievement orientation) give more value to the future. Importance is given to maximising prosperity in the present life. Consequently if this requires certain sacrifices in the short-term present, it is quite bearable as long as it is extended into a short number of future periods.

5. The Entrepreneur's Personal Characteristics and the Specifics of the Project

Here we can specify two distinct sources which influence the entrepreneurial perception of time: personal characteristics and the microeconomics of the project. In the first category we should include: a) family situation; b) age; c) health; and d) educational level. Thus, marital status combined with personal characteristics may have mixed effects on the preference of present over the future. We may say that the higher the personal obligations, the higher the preference for the present. The same applies to the entrepreneur's health condition. A good health creates conditions of preference for the future while the younger the entrepreneur is, the higher is the preference for the future. Finally, a high level of education encourages a preference for the future since it is related to human investments, which are originally accumulated on an expectations basis.

The microeconomics of the project include:

1) The nature and the origin of the resources that are to be used. The marginal value of obtaining each additional money unit depends on the way that it comes into the entrepreneur's possession. The harder the way, the higher is its marginal value and consequently the higher is the preference for the present over the future.

2) A financial structure based on devotion to high own

capital creates conditions of higher preference for the present.

3) The greater the size of the project, the greater the preference for the present. In contrast greater the size of the firm, the more confidence there will be in the future and consequently there will be greater preference for the future.

4) The sector in which the entrepreneur is working is very likely to influence his or her time preference. Entire sectors are characterised by ephemeral activities and entrepreneurs have a powerful preference for the present over the future.

6. Cognitive Factors, Entrepreneurial Motives and the Perception of Time

Following Locke [29] all entrepreneurial factors are the result of the combination or integration of cognition and motivation. The main cognitive factors are knowledge (industry, technology), skills (selling, bargaining, leadership, decision-making, planning etc.) and abilities (intelligence etc.) [30]. The possession of all the above factors develops vision. Vision may include opportunity fit, venture diagnostic and opportunity recognition. Entrepreneurial cognitions tend to be distinct from those of other business people, are universal and differ by national culture [27].

Do cognitions affect entrepreneurs' perception of time? The answer that can be given in principle is positive even though it needs a lot more research to certify the degree of interaction. Thus it is obvious that when the businessman possesses good knowledge of the industry, he knows with precision the ideal horizon of his entrepreneurial activity. He also has a great perception of time which is formed about the specific industry in which he is operating as if is influenced by the precise business cycle phase and the life cycle of the product [31].

In any case we generally accept that the more developed cognitive factors are, the more easily the entrepreneur may be willing to extend the time horizon of his entrepreneurial effort and the more he will value the future over the present.

7. The Entrepreneurial Perception of Time: A Field Research

According to the analysis a Questionnaire was formed [32] with which we addressed 420 businessmen of SMEs in the Greek analysis whose own capital was smaller than 10,000,000 Euros (EU definition of SMEs) in the period 2002–2006. The size and sectoral structure of the firms in the sample were representative of the corresponding measures in the Greek economy. It is quite difficult to formulate questions that would concern all factors in the six different groups as we have located

them. This would require a much broader and cross-cultural field research. However, very few factors were excluded.

We define duration as the time interval during which he should be dedicated to a precise entrepreneurial activity and not to any other. Then, in order to count the significance of the rest of the factors, we evaluate their influence on the change of this duration.

The size and sector of the firms chosen is distributed as follows: 20% of the firms are active in industry, 44% in trade and 36% in services. The respondents' rate to the questionnaire was 32% to the total number of firms initially chosen. In 38% of the firms it became impossible to locate the entrepreneur; in 1% of cases the firms' data were not correct, 1% of the firms were subsidiaries and the refusal rate was 28%. The research was conducted with personal interviews by a professional team.

From the answers to the questionnaire we estimate that the Average Ideal Duration of Entrepreneurial Commitment (AIDEC) is 5.57 years. The AIDEC is compared to Payback Period (PB) which is 3.91. The difference between AIDEC and PB criterion is statistically significant at a 95% level of significance. The finding of the difference in statistical significance leads us to the conclusion that the entrepreneur shapes an image for the time dimension of his involvement in the entrepreneurial effort which is larger than the requirement to take back his money but is not large enough to justify his involvement in investments that require long-term involvement. This finding is, up to a point, related to the fact that we refer to SMEs that can not accurately be distinguished for the realisation of huge investments (with long-term depreciation).

Thus the entrepreneur gradually develops his entrepreneurial activity in a time horizon for each stage that varies around 5.57 years.

An important issue that arises is to what extent the AIDEC found, apart from picturing the time and geographical conditions under which the field research was conducted, is directly connected with the amount of investment referred to in the questionnaire (500,000€). Indeed, there is a question in the questionnaire that aims to reveal the relative elasticity that connects the project size and the AIDEC. So, if the project size is 2,000,000€ then the AIDEC would be 6, 31 years. The difference found in the AIDEC is statistically important at a 95% level of significance. However, if the project size rises exorbitantly, the elasticity may become irrelevant.

The answers to the questionnaire were categorized into six different groups (Categorization details are available upon request). The six groups are as follows: macro-environmental variables (Group 1); cultural entrepreneurial idiosyncrasies (Group 2); personal characteristics (Group 3); microeconomics of the project (Group 4); entrepreneurial motives (Group 5); and cognitive variables (Group 6). Since between the variables multicol-

linearity is inherited and the amount of the data used is large, we employed factor analysis (with varimax rotation) on each group as a data reduction technique to reveal the main influences on the AIDEC. The analysis (Table 2) shows that the variables of Group 1 can be reduced to two principal components: G1PC1 and G1PC2 eigen values greater than one, accounting for the 68.6% of the variation in the macro-environmental variables. The variables of Group 2 can also be reduced to two principal components G2PC1 and G2PC2 which account for the 65.4% of the variation of the cultural and entrepreneurial variables. The variables of the Group 3 can be reduced to one G3PC1 which account for the 41.7% of the variation of the personal characteristics variables. The variables of Group 4 can be reduced to two, G4PC1 and G4PC2, which account for the project. Finally the variables of Group 5 can be reduced to three, GP5C1, G5PC2 and G5PC3 which account for 77% of the variation of the entrepreneurial motives variables. The principal components are uncorrelated.

Then we employ the Stepwise regression technique with the AIDEC as an independent variable and the G_jPC_i as independent variables. The model with the higher adjusted R square (37.3%) includes the G4PC1, the G1PC1 and G1PC2. (Table 1)

The three principal components exercise positive influences on the AIDEC. The first includes the origin of resources, the leverage influence, the project size influence and the payback period variable. The G2PC1 includes the rate of growth-income level, the bureaucracy, corruption influences and the labour market conditions. Some might characterise interest rate fluctuations, the level of risk-return them as the long term micro-environmental factor. The third includes the influence of business circles phase, relationship and finally the geo-strategical and political condition influences. This component could be characterised as the short-term macro-environmental factor.

An interesting point for discussion emerges from the exclusion of the member factors included in Groups 2 and 4 as explanatory variables of the AIDEC. It is case 4 of cultural entrepreneurial idiosyncrasies and entre-

Table 1. Statistical significance of principle components on AIDEC.

AIDEC = 5,567+0,42G4PC1 + 0,91G1PC1 + 0,71G1PC2					
t-test	33,182	1,95	4,56	3,78	$\bar{R}^2 = 0,37$ $R^2 = 0,39$
(Sig.)	(0,00)	(0,00)	(0,00)	(0,00)	
F =	24,64				
Sig. ≈	0,00				

Table 2. Principal components, variables' scores and influences on the AIDEC.

Variables	G4PC1			G1PC1			G1PC2		
	<i>The microeconomics influences</i>			<i>The long-term macro-environmental influences</i>			<i>The short term macro-environmental influences</i>		
	<i>Rotated components scores</i>	<i>Difference from AIDEC</i>	<i>T-test (Sig)</i>	<i>Rotated components scores</i>	<i>Difference from AIDEC</i>	<i>T-test (Sig)</i>	<i>Rotated components scores</i>	<i>Difference from AIDEC</i>	<i>T-test (Sig)</i>
The origin of resources (zero cost)	0,66	-0,6	2,011 (0,05)						
Increased leverage (financial structure)	0,80	-0,9	4,153 (0,00)						
Project size increase	0,82	+0,74	-2,830 (0,01)						
Increase payback period	0,57	-0,35	2,447 (0,02)						
Higher rate of growth-income				0,88	-1,23	5,720 (0,00)			
Reduction of bureaucracy-corruption				0,86	-0,70	2,877 (0,01)			
Labour market improvement				0,87	-0,74	3,523 (0,02)			
Business cycles phase (recession)							0,79	1,13	-4,520 (0,00)
Interest rate increase							0,79	-0,25	0,987 (0,33)
Increased risk-return relationship							0,50	-0,31	1,170 (0,24)
Deterioration of geo-strategical, political conditions							0,80	+0,5	-1,534 (0,13)

Note: Only scores greater than 0, 4 absolute value are shown. There are all statistical significant at 5% level. See Koutsoyiannis (1977)

preneurial motives which have been found irrelevant to the AIDEC. So, perception of time emerges as a new independent entrepreneurial trait non-dependent either on the knowledge of cultural values or on the known entrepreneurial motives. On the contrary, it has a protogenic character that could influence the rest of the entrepreneurial traits. This point may also give chance for further research.

An important issue that should also be investigated is connected to the extent that some factors have an effect on AIDEC. The positive factors (not all of them) function towards the decline of AIDEC. The negative factors function towards its increase. Thus, it seems that for the entrepreneur there is a notional time of entrepreneurial involvement that in any case would be better if it was smaller. The entrepreneur accepts for it to be lengthened only when he is forced to by external conditions. Thus, when he obtains part of his capital by a non-costing method (lottery or by state's grants), the entrepreneur

does not think that, in this case, he should have more patience to disengage from his entrepreneurial activity, but that the conditions have been created for his easier disengagement. The same happens when a) the financial leverage is increased; b) the payback period is increased; c) he lives in a wealthier economy; d) the costs of bureaucracy decline; and e) the conditions of the labour market improve. The opposite happens when the size of the project increases, if recession conditions prevail, and if conditions of political stability are getting worse.

There are two findings which require further comment, regarding the influence of the interest increase and the level of risk-return relationship. Here we revert to orthodox economic behaviour. This means that declining influences are exercised on the AIDEC on the basis of the following arguments: it seems that the entrepreneur has a notional time of entrepreneurial involvement that in any case would be better if it was smaller. But when the cost of money is increased or the time of systematic risk

is increased, then his notional time of entrepreneurial involvement declines. Thus when the entrepreneur is forced by external conditions that concern the whole of the economy in which he is active, he compromises and accepts a longer AIDEC.

8. Conclusions

This paper has supported the idea that perception of time which concerns the average ideal duration of entrepreneurial commitment is an important personal trait. In other words, if the entrepreneur has formed a particular checking filter for the extent of the entrepreneurial involvement, he will never check on the possibility of being involved in larger scale entrepreneurial efforts. The new point proposed by this article at the theoretical level is that the rejection of these entrepreneurial activities is not performed according to a project appraisal criterion but is at an earlier level, which is at the beginning of the search and analysis of entrepreneurial opportunities.

Consequently, the perception of the AIDEC may be on a large scale responsible for the observed phenomenon of the reproduction of light production prototypes that are observed in specific geographical districts and for a long period of time.

The article proposes six factor groups that are responsible for the formation of AIDEC: macro-environmental factors, cultural entrepreneurial idiosyncrasies, personal characteristics, the microeconomics of the project, entrepreneurial motives and cognitive factors. Each group consists of a series of partial factors.

A research was conducted to locate the average ideal duration of entrepreneurial commitment. In this it was ascertained that an AIDEC of a specific duration (5.57 years) was specified according to the time and space characteristics of the field research conducted.

In this article it has been verified that the entrepreneur has a non-one-directional behaviour towards the formation of AIDEC and the factors that form it. Factors that have positive influence on entrepreneurial commitment, and allow entrepreneurs to disengage faster, function towards the reduction of AIDEC. In contrast, external factors that form a negative entrepreneurial environment force entrepreneurs to accept a longer AIDEC. The elasticities of AIDEC with its factors of influence are small. This non-one-directional behaviour could probably be connected with the cyclical and subjective perception of time through the states of the world in which the entrepreneur is engaged. The willing entrepreneur on the one hand conceives from past experiences that his disengagement may be delayed but will eventually come. On the other hand he recognises that the activation of certain factors may shorten the AIDEC for which he is happy.

What is shown from the above analysis is an 'AIDEC trap' for the economic policy that wishes to influence the

production prototype towards the investments with a long average duration of entrepreneurial commitment.

In conclusion, we may argue that the analysis reveals that the average duration of entrepreneurial commitment is formed by long-lasting influences on entrepreneurial behaviour which enter with the form either of microeconomic variables or long-term or finally short-term macro-environmental influences.

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Appendix

Instructions for filling the questionnaire

1) We have chosen entrepreneurs from firms with equity up to 10,000,000€ and established the year as being after 1980.

2) The enterprises are representative of the sectoral structure of enterprises active in the Greek economy.

3) The answers must be given by the entrepreneur or 'the person in charge of the economical decisions' of the enterprise.

4) The answers are based on the following assumption: the rest of the factors that could influence the answer, apart from those involved in the question, remain stable.

Consider that you have already planned an investment of 500,000€ in the field in which you are active or in any other field under the present circumstances. This investment is viable and profitable. For this investment any amount may be spent from your personal fund up to 500,000€. According to this investment you regain your fund in a specific period of time that you know today and which satisfies you. If you were to choose the ideal for your rate of return in a 1–10 years period of time, what would it be?

Please bear in mind that we define 'duration' as the period of time to which you are committed in any way, either by your personal work or by the commitment of your personal or external funds to a particular investment and to no other entrepreneurial activity.

Question 1

Tick THE YEARS									
1	2	3	4	5	6	7	8	9	10

Question 2

your money for this investment?

In a period of 1–10 years, when do you want to take back

ONE ANSWER

TICK THE YEARS									
1	2	3	4	5	6	7	8	9	10

Question 3

average ideal duration for this investment, in a 1–10 year period of time, if each of the following alternative conditions prevail?

Now I would like you to tell me which would be the av-

YEARS										
1. If you were active in a richer economy with higher rates of growth, low variability of income and small public deficits	1	2	3	4	5	6	7	8	9	10
2. If you were in a downturn of the economy	1	2	3	4	5	6	7	8	9	10
3. If the rates of interest were significantly increased	1	2	3	4	5	6	7	8	9	10
4. If the investment had twice the possibility of failing, but also double the rate of return	1	2	3	4	5	6	7	8	9	10
5. If the government had taken serious measures against bureaucracy, corruption and copyright piracy	1	2	3	4	5	6	7	8	9	10
6. If the government had taken measures for the improvement of labour market conditions	1	2	3	4	5	6	7	8	9	10
7. If political and geostrategical conditions were to deteriorate	1	2	3	4	5	6	7	8	9	10

Question 4

I will itemise various types of personal circumstances and I would like you to tell me about your relation to

them. Please answer according to the scale from 1 to 10, where 1 signifies that this behaviour does not mean anything to you and 10 signifies that it means everything.

	Not at all									Fully
1. You take care of your personal entrepreneurial interests	1	2	3	4	5	6	7	8	9	10
2. You avoid situations of uncertainty	1	2	3	4	5	6	7	8	9	10
3. You accept economic disparity	1	2	3	4	5	6	7	8	9	10
4. You are trying to achieve the highest possible level of living	1	2	3	4	5	6	7	8	9	10

Question 5

I will itemise various types of personal circumstances and I would like you to tell me about your relation to

them. Please answer according to the scale from 1 to 10, where 1 signifies that this behaviour does not mean anything to you and 10 signifies that it means everything.

	Not at all									Fully
1. You are a risk-taker	1	2	3	4	5	6	7	8	9	10
2. You are capable of controlling things	1	2	3	4	5	6	7	8	9	10
3. You wish to be independent of external interventions	1	2	3	4	5	6	7	8	9	10
4. You tolerate ambiguity	1	2	3	4	5	6	7	8	9	10
5. You are a creative person	1	2	3	4	5	6	7	8	9	10

Question 6

Now I would like you to tell me which would be the av-

erage ideal duration for this investment, in a 1–10 year period of time, if each of the following alternative conditions prevail?

	YEARS									
1. You have won all of the 500,000€ yesterday in the lottery and you use them in the investment. Generally speaking you may get this amount without cost or any kind of obligation (i.e. state free grants)	1	2	3	4	5	6	7	8	9	10
2. From the 500,000€, 100,000€ were from your own money and the 400,000€ were borrowed	1	2	3	4	5	6	7	8	9	10
3. The required investment capital was 2,000,000€ instead of 500,000€	1	2	3	4	5	6	7	8	9	10
4. If the payback period is significantly increased	1	2	3	4	5	6	7	8	9	10

DEMOGRAPHIC DATA

1. SECTOR (choose one from the list):

- Industry 1
- Trade 2
- Services 3

2. EQUITY CAPITAL (1998–2002):

3. PERMANENT WORKING PERSONNEL OF THE FIRM:

4. FOUNDATION YEAR:

5. SALES:

6. TOTAL OF ASSETS (1998–2002):

7. PROFITS BEFORE TAX (1998–2002):

RESPONDENT'S DEMOGRAPHIC INFORMATION

8. AGE: How old are you?

9. EDUCATIONAL LEVEL: what is your highest level of education/studies?

- Illiterate/not all the classes of primary school (till the second grade) _____ 1
- From the third grade-primary school graduate (till 12 years old) _____ 2
- High school graduate (3 classes) (till 15 years old) _____ 3
- High school graduate (6 classes) (16–18 years old) _____ 4
- Higher education graduate (19+ years old) _____ 5

Highest education graduate (university) _____ 6

10. FAMILY STATUS: You are :

Married _____ 1
Single _____ 2
Divorced or widow _____ 3

How to Support Innovative Behaviour? The Role of LMX and Satisfaction with HR Practices

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Received November 26, 2009; revised December 14, 2009; accepted December 17, 2009

Abstract

Innovative behaviour of employees refers to a key aspect of organizational effectiveness: the creation, introduction and application of new ideas within a group or organization in order to benefit performance. Using data from a Dutch and German survey in four technical organizations (n=272) we developed and tested two models to explain the relationships between Leader-Member-Exchange (LMX), satisfaction with HR practices (employee influence, flow, rewards and work content) and innovative behaviour. As expected both LMX and satisfaction with HR practices were positively related to innovative behaviour. Furthermore, we found evidence that satisfaction with HR practices mediates the relationship between LMX and innovative behaviour. No significant interaction effects between LMX and satisfaction with HR practices on innovative behaviour were found.

Keywords: Innovative Behaviour, Leader Member Exchange, Satisfaction with HR Practices, Technical Organizations

1. How to Support Innovative Behaviour?

For contemporary organizations, the financial attractiveness of their products and/or services is mostly not enough to guarantee sustainable survive: goods also have to be of high-quality and preferably unique [1,2]. Uniqueness refers to innovation: “the development and implementation of new ideas by people” [3]. It is claimed that innovative behaviour of employees defined as the creation, introduction and application of new ideas within a group or organization in order to benefit performance [4,5] is crucial for the long-time survival of organizations [3,6–9].

Given the importance of innovation, there is a growing interest among scholars trying to answer the question why and under which circumstances employees express innovative behaviour within their organization. To gain such critical employee contributions, scholars argue that the development and implementation of Human Resource Management (HRM) is vital [10]. In general HRM is defined as the management of people and workplace to achieve competitive advantage and involves both HR professionals and (line) management. Although a lot of research has been done in the last two decades, and strategic HRM researchers have converged in their

belief that HRM is associated with organizational outcomes, the understanding of the “HRM-performance” relationship, including innovative behaviour is still open to question [11].

In stead of the written HR practices, such as selection and recruitment, performance appraisal, and pay (for performance) attention is moved to the perception of employees regarding the HR practices in a firm. Employees’ perceptions of HR practices are likely to precede employee behaviour links in the causal chain: to exert their desired effect on employee behaviour, HR practices first have to be perceived and interpreted subjectively by employees in ways that will engender behavioural reactions [11,12]. And, as we know from psychology that people perceive reality differently, we can expect that employees interpret HR practices differently. In this study, we focus on employees’ satisfaction with HR practices [13,14]. Because satisfaction with HR practices can be seen as a facet of job satisfaction we examine the relationship between satisfaction with HR practices and job satisfaction as well.

When including employees’ satisfaction with HR practices, the role of the direct supervisor can not be underestimated. Many companies delegate operational HRM to those who lead employees directly [10] and as a

result several key HR administrative tasks—hiring, performance management and compensation—have been devolved to line managers [10]. Since supervisors have some degrees of freedom in dealing with these practices, their decisions and behaviours can be seen as major antecedents of employee attitudes and behaviours. Leader-Member-Exchange (LMX) theory suggests that leaders do not use the same style in dealing with all subordinates, but develop a different relationship with each subordinate on a dyadic basis [15–18]. To date, despite agreement on the importance of the relationships employees have with their supervisor (e.g. [20]), relatively little has been done to study the relationship between LMX and innovative behaviour (see for exceptions [20–22]).

This study contributes to the filling of the knowledge gap related to innovative behaviour in three ways. First, in stead of the (formal) HR practices as described by HR managers or direct supervisors, we focus on the satisfaction employees have regarding the HR practices. Second, since it can be assumed that both employees' satisfaction with HR practices and LMX influence innovative behaviour, we consider the relationship between satisfaction with HR practices and LMX on innovative behaviour. Third, in this study we relate a single-item measurement for general job satisfaction to satisfaction with HR practices. Consequently, using survey data from 272 medium to high-educated technical employees from a Dutch and three German industrial companies, we formulated the research question as follows: How can the relationships between LMX, satisfaction with HR practices, and innovative behaviour be explained?

1.1. Satisfaction with HR Practices and Innovative Behaviour

Beer *et al.* [13] distinguished four HR practices: employee influence, human resource flow, rewards, and work systems. Employee influence refers to a process that allows employees to exercise influence over their work and the conditions under which they work. Human resource flow refers to issues of recruitment, selection, development and ending the contract of organizational members. Rewards are concerned with how employees are rewarded for their work. They include monetary rewards such as pay, bonuses and profit sharing, and non-monetary rewards such as holidays and health insurance. Work systems refer to a particular combination of job tasks, technology, skills, management style and personnel policies and practices. Given the sample of this study – technicians, we separate primary (monetary) from secondary (non-monetary) rewards and refer to work content as work systems.

Innovative behaviour refers to discretionary employee behaviour, behaviour that goes beyond prescribed role expectations and is not directly or explicitly recognized

by any formal reward system [23,24]. The link between employees' satisfaction and innovative behaviour as a discretionary behaviour can be explained by social exchange theory [25]. Reciprocity lies at the heart of the social exchange perspective [26,27]. Economic exchange refers to employment relationships where the conditions of employment are specified and “fixed quid pro quo” is the nature of exchange: a fair day's pay for a fair day's work. Social exchange refers to relationships that entail unspecified future contributions, inducements and obligations and allows parties to reciprocate through discretionary behaviours [28,29].

Employees' satisfaction can be seen as an important predictor of discretionary behaviours like innovative behaviour as theory suggests that whether employees give their efforts wholeheartedly to the organization and produce up to their potential depends to a large part on the way they feel about their job and work environment (e.g. [21,22,30]). Therefore, the norm of reciprocity is important in explaining discretionary behaviour in organizations. This line of reasoning assumes that satisfaction with HR practices is viewed by employees as organization's commitment towards them which is then reciprocated back to the organization by employees through positive behaviours, like innovative behaviour [12,14]. Hence, this means that we can formulate our first hypothesis: satisfaction with HR practices is positively related to innovative behaviour (Hypothesis 1).

1.2. Leader Member Exchange (LMX) and Innovative Behaviour

The basic premise of LMX theory is that leaders establish higher quality exchanges with some of their followers (in-group members) while with other followers leaders rely more on the terms of employment in forging exchanges (out-group members). Research suggests that the quality of the exchanges between employees and their leaders are predictive of attitudinal job outcomes. Examples of attitudinal outcomes which are related to LMX are satisfaction, leader support and organizational commitment (e.g. [17,20,31]). Sanders and Schyns [27] provide evidence that workers' perceptions of the helpfulness of their supervisor are positively related to their willingness to show discretionary behaviour like cooperative behaviours and assisting co-workers. Low-quality exchange relationships, on the other hand, are characterized by more formal, role-defined interactions that result in hierarchy-based downward influence and distance between the parties [32].

Prior research has found that LMX is related to innovative job performance [20–22]. Janssen [4] found evidence that employees responded more innovatively to higher levels of job demands when they perceived that their efforts were fairly rewarded by their leader. This

means that employees who perceive a fair balance between supervisor's inducements relative to their work efforts will respond with more innovative behaviour. Referring back to social exchange theory additional arguments can be derived for a relationship between LMX and innovative behaviour. Employees personify the organization since everything an organization does, it does through human beings. Direct supervisors can act as organizational agents. Employees tend to view actions by agents of the organization as actions of the organization itself [33]. Therefore, they reward favourable supervisor treatment with desired behaviours. Hence, we can formulate our next hypothesis: LMX is positively related to innovative behaviour (Hypothesis 2).

1.3. Satisfaction with HR Practices, LMX and Innovative Behaviour

In general, two lines of reasoning related to the relationships between satisfaction with HR practices, LMX, and innovative behaviour can be found in literature. The first states that satisfaction with HR practices mediates the relationship between LMX and innovative behaviour: satisfaction with HR practices can explain the relationship between LMX and innovative behaviour [17]. The second states that the interaction between satisfaction with HR practices and LMX relates to innovative behaviour: LMX and satisfaction with HR practices stimulate each other and this leads to more innovative behaviour [12].

1.3.1. Satisfaction with HR Practices as a Mediator

Positive leader experiences and expectations appear to be associated with favourable leader behaviour towards followers such as the assignment of challenging tasks, distribution of rewards, and constructive feedback (e.g. [34,35]). Moreover, research on Leader-Member-Exchange (LMX) shows that the quality of the relationship between supervisor and subordinate strongly impacts employee perceptions concerning the quality of HR practices (e.g. [36,37]). For example, employees' satisfaction of influence will be shaped fundamentally by their personal experience with their supervisor. Furthermore, LMX is related to the job satisfaction of employees [17]. Given that members in high quality dyads perceive more favourable treatment than members in low quality dyads it is not surprisingly that the former have been found to be more satisfied with their jobs than the latter. This means that we can expect that LMX is positively related with satisfaction with HR practices and satisfaction with HR practices are positively related to innovative behaviour. Hence we formulate the following hypothesis: satisfaction with HR practices mediates the relationship between LMX and innovative behaviour (Hypothesis 3).

1.3.2. Interaction between Satisfaction with HR Practices and LMX [47]

Bowen and Ostroff [12] suggest that leadership behaviour and HR practices, in terms of a high HR system, can stimulate each other and increase the willingness to show discretionary behaviour. Thus, the quality of HR practices as perceived by the employees is not necessarily perceived as a consequence of line management behaviour or responsibility. In this way satisfaction with HR practices is regarded as a context within which individuals function. In commenting on contextualization in organizational behaviour research Rousseau and Fried argue that the explicit addressing of contextual factors is necessary for enhancing the comprehensiveness and creativity of research findings [47]. In terms of LMX and satisfaction with HR practices this means that satisfaction with HR practices can be seen as a context in which the relationship between LMX and innovative behaviour is embedded. We can also provide an alternative argument for this interaction effect of satisfaction with HR practices and LMX. Not all direct supervisors have responsibilities and power on the HR practices of their subordinates. In such a situation, HR practices are shaped outside the leader-member relationship [38]. Hence we formulate the following hypothesis: the interaction between satisfaction with HR practices and LMX is positively related to innovative behaviour (Hypothesis 4).

2. Method

2.1. Sample

The survey included 272 employees in four Dutch and German technical organizations (response rate for the four organizations varies between 42 to of 66%). Participation was voluntary for all employees, and confidentiality was assured. Respondents with supervisory tasks were excluded from this sample.

Of these 272 respondents 200 are men (74%). 75 employees (52%) are between 25 and 35 years old and 45 employees (31%) between 35 and 45 years old. 89 respondents (62%) worked less than 5 years within the organization, 29 respondents (20%) between 5 and 10 years and 26 respondents (18%) worked ten years or longer in the organization. Finally, 73 respondents (27%) finished their secondary vocational education. 76 respondents (28%) finished their higher vocational education and 41 (15%) achieved their university degree.

The four organizations differ in the number of respondents (between 32 and 135) and in terms of the age of the employees ($F(3, 265) = 19.92, p < .01$), education ($F(3, 265) = 4.74; p < .01$) and tenure within the organization ($F(3, 265) = 18.88, p < .01$). The organizations did not differ in terms of sex distribution within the organization ($\chi^2(3) = 2.37, n.s.$)

2.2. Procedure

All employees had access to computers. Employees received an e-mail with a link to the questionnaire. The e-mail contained supplementary information about the subjects that the questionnaire contained and the utmost confidence in which respondent answers are treated. Respondents had a week time to fill out the questionnaires. The introduction letter of the questionnaire contained supplementary information to motivate and inform the respondent about the questionnaire.

2.3. Measurements

Following Janssen [4] innovative behaviour is measured by a nine-item scale, an example being “How often does it occur that you create new ideas for difficult issues?” Respondents were asked on a five-point-scale ranging from 1 “never” till 5 “always” to give their opinion. Given the high inter-correlations between the idea generation, idea promotion, and idea realization subscales (all above .82) these subscales were conceived to combine additively to create an overall scale of innovative work behaviour. The scale was found reliable (Cronbach’s $\alpha = .92$).

Leader-Member-Exchange was measured using the twelve-item scale of Grean *et al.* [34]. Examples of this scale are “My supervisor would come to my defence if I were ‘attacked’ by other”, and “My supervisor is a lot of fun to work with”. The response format was a five-point scale ranging from 1 “disagree completely” till 5 “agree completely”. The scale was found reliable (Cronbach’s $\alpha = .92$).

For the different aspect of satisfaction with HR practices we combined previous scales from Torka [38], and Van den Heuvel. For all items of the HR practices the response formats ranged from 1 “very dissatisfied” till 5 “very satisfied”. For measuring satisfaction with employee influence two sub-dimensions were distinguished: employee voice (an example: “How satisfied are you with the extent to which your opinion is sought regarding (changes in) your job?”) and participation in decision making (an example: “How satisfied are you with the extent to which you can co-decide on (changes in) your job?”). Each dimension was measured with three items. Although these two sub-dimensions are theoretically fundamental different, given the high inter-correlations between these two sub dimensions, they are taken together. Moreover the different items of the two sub-dimensions loaded on one factor. The scale turned out to be sufficient (Cronbach’s $\alpha = .93$).

Satisfaction with HR flow was measured using a five item-scale excluding outflow issues. An example of this scale is: “How satisfied are you with the guidance you were given during the first six months of your employ-

ment at this organization?” The scale turned out to be sufficient (Cronbach’s $\alpha = .76$). Satisfaction with primary rewards was measured using a nine item-scale. An example of this scale is: “How satisfied are you with your salary”. The scale turned out to be sufficient (Cronbach’s $\alpha = .95$). Satisfaction with secondary rewards was measured using a five item-scale. An example of this scale is: “How satisfied are you with the wide-ranging package of secondary terms of employment”. The scale turned out to be sufficient (Cronbach’s $\alpha = .94$). Satisfaction with work content was measured using an eight item-scale. An example of this scale is: “How satisfied are you with the variation offered by your job?” The scale turned out to be sufficient (Cronbach’s $\alpha = .86$).

Furthermore the respondents were asked to give a score (1 till 10) for their job satisfaction in general. The average of this score is 7.08 (SD = 2.05).

2.4. Analyses

To control for the possibility that socio-demographic differences in the predictor and outcome variables might lead to spurious relationships, gender (0 = male, 1 = female), age (year of birth was recoded), educational qualifications (1 = secondary education, 2 = higher education, and 3 = university), and tenure in the organization (number of years) were entered as control variables in the analysis. Moreover, we controlled for country (location of the organization) and for nationality of the employees (1 = German, 2 = Dutch, and 3 = other). Because these variables did not have a significant effect, nor did they influence the other effects these effects are not presented in the Tables.

Because all variables in this study were based on self reports and collected at a single point in time, Harman’s one factor test was used to investigate the potential influence of common method variance. Therefore, the items of the dependent and independent variables were submitted to a principal components analysis with oblique rotation. The results show seven factors (innovative behaviour, LMX, and satisfaction with five HR practices) with an “eigenvalue” greater than 1, accounting for 49.38 percent of the variance. Each item “loaded” on its appropriate factor, with primary loadings exceeding .40 and cross-loadings lower than .25. This strongly suggests that the measures of the predictors are independent of the dependent variable and that common method bias is likely to have a very limited effect.

Given our mean interest to explain employee-to-employee difference in innovative behaviour we decided to test the hypotheses with an ordinary regression analyses on individual level and not to use multi level analyses, although the data is nested within four organizations. Moreover the intra class correlation of innovative be-

haviour is low: .02, meaning that only two percent of the variance of innovative behaviour can be explained by differences between the four organizations (in other terms: 98 percent of the variance of innovative behaviour occurs within organizations). Moreover, both LMX and satisfaction with HR practices can be seen as individual characteristic in nature.

To test the mediating effect (H3), in reference to the method of Baron and Kenny, we first checked whether the effect of LMX on satisfaction with HR practices was significant (first part of Table 3), and furthermore if the effect of LMX on innovative behaviour is significant and decreased or disappeared when adding the mediator (satisfaction with HR practices) to the model (second part of Table 3). To test the interaction-effect of satisfaction with HR practices and LMX (H4) the Aiken and West and Cohen *et al.* method was used (Table 3).

3. Results

3.1. Descriptive Statistics and Correlations

Table 1 presents means and standard deviations, and zero-order Pearson correlations for the variables investigated in this study. Regarding the satisfaction with the HR practices, the respondents are more satisfied with work content than with the other HR practices (influence: $t(244) = 12.25, p < .01$; flow ($t(260) = 8.340; p < .01$), primary rewards: $t(257) = 17.02; p < .01$; and second rewards: $t(243) = 6.62, p < .01$). In addition, employees are more satisfied with influence and flow than with rewards ($t(243) = 7.95, p < .01$; $t(246) = 7.97; p < .01$).

Innovative behaviour is positively related to LMX ($r = .25, p < .01$), satisfaction with work content ($r = .26, p < .01$), and satisfaction with influence ($r = .30; p < .01$). Moreover innovative behaviour is positively related with level of education ($r = .16, p < .01$). LMX is positively related to all forms of satisfaction with HR practices except secondary rewards: influence ($r = .47, p < .01$), flow ($r = .30, p < .01$), primary rewards ($r = .28, p < .01$) and work content ($r = .42, p < .01$). Furthermore, LMX is negatively related to age ($r = -.21, p < .01$) and tenure ($r = -.34, p < .01$). All of the different forms of satisfaction with HR practices are positively interrelated to each other, and to the overall measurement of job satisfaction.

3.2. Facet and Global Measures of Satisfaction

To examine the relationship between the satisfaction with the HR practices and the overall job satisfaction we conducted a regression analysis with the overall job satisfaction as dependent variable and the control variables in the first model and satisfaction with the HR practices as the independent variables in the second model (see Table 2). While age is positively related to the overall

job satisfaction ($\beta = .24, p < .01$), tenure and education level are negatively related to the overall job satisfaction (respectively $\beta = -.19; p < .05$; $\beta = -.15, p < .05$). All significant effects disappeared however when satisfaction with the HR practices were added to the model, meaning that satisfaction with HR practices mediates the relationship between characteristics of the employees and overall satisfaction. Related to the satisfaction with HR practices the results show that especially satisfaction with work content ($\beta = .60; p < .01$), and to a lesser extent satisfaction with flow ($\beta = .13; p < .05$) and primary rewards ($\beta = .13, p < .05$) are related to the overall job satisfaction. The individual characteristics and the satisfaction with the HR practices explain 55 percent of the total variance of the overall job satisfaction.

3.2.1. Test of the Hypothesized Models

The results of the regression analysis to test the different hypotheses are reported in Table 3. In the first model the individual variables are added (Step 1). Sex is negative related to innovative behaviour (men report more innovative behaviour; $\beta = -.20; p < .01$), and education level is positive related to innovative behaviour ($\beta = .17; p < .01$). H1 predicted a positive relationship between LMX and innovative behaviour. Given the beta of LMX in Model 2 (second part of the Table, Step 2; $\beta = .19, p < .01$), H1 can be confirmed.

H2 predicted a positive relationship between satisfaction with the HR practices and innovative behaviour. In line with this hypothesis positive relationships are found for satisfaction with influence ($\beta = .27; p < .01$), and work content ($\beta = .20, p < .01$). Contrary to the hypothesis satisfaction with primary rewards show a negative relationship with innovative behaviour ($\beta = -.19; p < .01$). No significant effects were found for satisfaction with flow and secondary rewards. This means that H2 can be confirmed for satisfaction with influence and work content yet have to be rejected for satisfaction with primary rewards, and can not be confirmed for satisfaction with flow and secondary rewards.

To test the mediating effect of satisfaction with HR practices in the relationship between LMX and innovative behaviour (H3) first the relationship between LMX on the satisfaction with HR practices are examined (first part of Table 3). Although the effect of LMX on satisfaction with secondary rewards is only marginal ($\beta = .12; p < .10$) the results show that LMX is positive related to the HR practices, meaning that the first part of the mediating effect can be confirmed. Furthermore, the effects for the individual characteristics differ for the forms of satisfaction. While women are more satisfied with the primary rewards, men are more satisfied with the work content. And while education level is positively related to satisfaction with flow, it is negatively related to satisfaction with primary rewards and work content. In ge-

Table 1. Means, Standard deviations and zero order Pearson Correlations for the variables used in our analysis.

	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Innovative behaviour	3.15	.75											
2. LMX	3.67	.73	.25**										
<i>Satisfaction HR practices</i>													
3. Influence	3.20	.68	.30**	.47**									
4. Flow	3.38	.77	.09	.30**	.57**								
5. Primary Rewards	2.79	.80	-.06	.28**	.44**	.29**							
6. Secondary Rewards	2.78	.88	.08	.12	.28*	.14*	.30**						
7. Content	3.71	.67	.26**	.42**	.55**	.57**	.32**	.15**					
8. Job satisfaction	7.08	2.05	.17*	.31**	.48**	.54**	.38**	.20**	.69**				
9. Sex	.26	.44	-.08	.16**	.16**	.06	.17**	-.06	-.10*	.03			
10. Tenure	2.27	1.27	-.05	-.34**	-.15**	-.16	-.13*	-.05	-.12*	-.04	-.11		
11. Age	2.38	1.02	.07	-.21**	-.09	-.08	.04	.07	.09	.07	-.11	.65**	
12. Education	1.88	.64	.16**	.09	-.09	-.06	.14*	.05	-.04	.09	.18**	-.06	.11

Table 2. Results of a regression analysis with job satisfaction as dependent variable and satisfaction with the HR practices as independent variables.

Variables	Model 1	Model 2
<i>Control variables</i>		
Sex	.08	.07
Tenure	-.19*	.08
Age	.24**	-.02
Education	-.15*	-.06
<i>Satisfaction with HR practices</i>		
Influence		.01
Flow		.13*
Primary rewards		.13*
Secondary rewards		.08+
Work content		.60**
Explained variance	.04	.55

Table 3. Results of regression analysis with innovative behaviour as dependent variables.

	Influence	Flow	Primary rewards	Sec. rewards	Content	Step 1	Step 2	Step 3	Step 4	Step 5
<i>Control variables</i>										
Sex	.10	.02	.16**	-.07	-.16**	-.20**	-.16*	-.06	-.07	-.07
Tenure	-.17*	-.07	-.23**	-.14	-.14**	-.09	-.06	-.05	-.05	-.05
Age	.29**	.04	.29**	.19*	.27**	.26	.22*	.05	.17*	.19**
Education	-.01	.13*	-.12*	.04	-.12*	.17*	.16*	.14*	.13	.13
LMX	.45**	.29**	.24**	.12+	.47**		.19**		.11	.07
<i>Satisfaction with</i>										
Influence								.27**	.19**	.17**
Flow								-.10	-.06	-.07
Primary Rewards								-.19**	-.22**	-.22**
Sec Rewards								.07	.07	.07
Work content								.20*	.18*	.17*
<i>Interaction LMX – Satisfaction with</i>										
Influence										-.19+
Flow										-.07
Primary Rewards										.03
Sec Rewards										.13
Content										.08
Adjusted R ²	.27	.10	.16	.04	.25	.05	.11	.15	.22	.23
R ² change	.17	.08	.06	.02	.20		.06	.10	.17	.01

**= p<.01; *=p<.05;

neral, tenure is negatively related, and age is positively related to satisfaction with the HR practices.

To test if satisfaction with HR practices mediates the relationship between LMX and innovative behaviour, satisfaction with the HR practices is added to Step 2 (see Step 4; second part of the Table). The results show that the significant effect of LMX disappeared (from $\beta = .19$, $p < .01$ to $\beta = .11$, *n.s.*), while some of the HR practices show a significant effect (influence: $\beta = .19$; $p < .01$; primary rewards: $\beta = -.22$, $p < .01$, and work content: $\beta = .20$, $p < .01$). This means that we can confirm H3: satisfaction with HR practices mediates the relationship between LMX and innovative behaviour.

In addition we test if LMX mediates the relationship between satisfaction with HR practices and innovative behaviour. Comparing Step 4 with Step 3 no significant effect of the satisfaction with HR practices disappeared when LMX is added, nor did LMX show a significant effect.

To test H4 the interaction effects between LMX and satisfaction with HR practices were added to the model (Step 5). None of interaction effects were found significant. This means that H4 can not be confirmed.

4. Discussions

The aim of this article was to answer the question if satisfaction with HR practices and Leader-Member-Exchange (LMX) can explain innovative behaviour, and, if so, to examine how satisfaction with HR practices and LMX are related to innovative behaviour. To clarify these relationships we used data from employees working in technical organizations in the Netherlands and Germany. The results of this survey study lead to the following conclusions. First, satisfaction with HR practices, especially satisfaction with influence and work content are positively related to innovative behaviour; satisfaction with primary rewards is however negatively related to innovative behaviour. Second, LMX is positively related to innovative behaviour. Third, in stead of an interaction effect between satisfaction with HR practices and LMX, satisfaction with HR practices mediates the relationship between LMX and innovative behaviour. Furthermore, we found that satisfaction with influence, primary rewards and especially work content are positively related to general job satisfaction.

Next to the conclusions the results demand answers for two issues: the effect of satisfaction with primary rewards on innovative behaviour and the relationship between the HR practices and general job satisfaction. First, in contrast to our hypotheses we found a negative effect of satisfaction with primary rewards to innovative behaviour: the more employees are satisfied with their salary the less innovative behaviour they show. Moreover, satisfaction with primary rewards was positively

related to the overall job satisfaction. In other words, satisfaction with pay influences discretionary behaviours negatively, but employees' general satisfaction positively.

One explanation might be related to our measurements. Tremblay *et al.* [41] conclude that the use of a general pay satisfaction measure could influence conclusions on pay satisfaction and its correlates. We measured overall pay satisfaction composed of the three pay satisfaction dimensions. The authors suggest to differentiate between three dimensions: 1) compensation amount—satisfaction with the amount of individual compensation considering work done and effort put in; 2) compensation comparison—satisfaction with individual compensation relative to other people and other jobs (distributive justice concerning pay or pay equity; [39,40]) and compensation practices—satisfaction with compensation increase policies and the criteria employed in determining compensation structure. Research shows that distributive justice perceptions play a more important role for employees' attitudes than procedural justice in job satisfaction and satisfaction with the organization [41]. Therefore, we assume that social comparisons (distributive justice) concerning pay may predict innovative behaviour better than self-comparisons and general measures of pay satisfaction.

We can present two alternative explanations for the negative relationship between pay satisfaction and innovative behaviour. First, pay can not replace good management. In other words, when employees are satisfied with pay, but other organization inducements lack such as job characteristics tailored to employee needs, management does not offer the motivators necessary for discretionary behaviour. Second and related to Herzberg's theory, Deci suggests that compensation may only influence performance strongly for those individuals who have high endorsement of money ethic. In contrast, extrinsic rewards such as money may also undermine people's intrinsic motivation to a task [42]. Considering the last-mentioned explanation, the sample of our study consists of medium to high educated technicians, often referred to as knowledge workers. Several authors argue that for knowledge workers the work content is most important in work life [43,44] and our results show that for this occupational group the work content is one of the two HR practices important for innovative behaviour. Thus, knowledge workers are foremost intrinsically motivated and for them (over) compensation may poison the willingness for discretionary behaviour turning their preliminary relational psychological contract into a transactional contract braking extra-role behaviour [28].

The other HR practice important for technical employees' innovative behaviour is influence or *voice*: a process that allows employees to exercise influence over their work and the conditions under which they work. Since our results show that not all HR practices influence

medium to high-educated employees in their innovative behaviour, we assume that for them voice concerning different HR practices is not equal important. The results suggest that voice concerning the work content is most important. Therefore, future research on HR practices should include employees' opportunities for voice taking into account different practices as well as include different occupational groups in general [14].

Earlier studies collected data from single respondents in each firm—mostly HR managers or other top managers—and were related to written HR practices within a firm. This approach has been widely criticized because of its subjectively character, and of its focus on intended in stead of espoused HR practices as perceived by employees: one of the explanations for the inconclusive results of studies on the HRM-performance link in general (e.g. [45]). We can assume that employee attitudes are influenced not so much by the way these HR practices are intended to operate as by the way they are actually implemented by line managers on a day-to-day basis [14]. Therefore in this study we focused on the employees' experience of the HR practices because we know that behaviour is mostly driven by employee interpretations in stead of practices as described by managers.

Our data showed that general job satisfaction is not in the same way related to the HR practices: general job satisfaction is related to satisfaction with influence and with primary rewards and is especially related to satisfaction with work content. The results show that it makes sense to separate the different HR practices. After all, researchers and managers want to gain insight in the impact of different facets of HRM on general job satisfaction. Given our results it can be expected that satisfaction of HR practices and job satisfaction differ in their antecedents and in their consequences. More research is needed to the different facets of job satisfaction and their interrelationships.

The practical implication of this study is that in order to improve employees' innovative behaviour within technical organizations attention should be paid to the managers and the relationships they have with the subordinates. This study shows that LMX is positively related to satisfaction with HR practices, and satisfaction with HR practices is positively related to innovative behaviour. The relationships managers have with their employees can be improved by providing a formal and informal training for managers to improve their leadership qualities, and by making them aware of the impact of their relationship with the employees. Research shows that leaders with different backgrounds need other kinds of training to become effective [46].

On the other hand, research shows that the perception of employees of the leadership is not only influenced by the manager yet is influenced by characteristics of the employees as well [27]. For instance, the more the em-

ployee and the manager are alike in terms of personality, the higher the relationship between employee and manager is qualified by the employees. This means that attention can be paid to the similarity between managers and subordinates when employees are hired and teams are created. Furthermore employees can become aware that they can influence their perception of and their relationship with the manager.

This study has limitations and strengths. First we have to make a causality remark due to the cross-sectional limitations. Future research could be extended but also deepened by a qualitative part: collecting in-depth information on HR practices as perceived by top-managers, supervisors and different subordinates. Second a social desirability in the answers of the respondents should be taking into account as a possible limitation. Furthermore, research shows that the career commitment of knowledge workers moderates the relationship between company practices and organizational commitment as well as turnover intention. Therefore, further research should include commitment to work, career and commitment to the organization into account and should examine the relationships between commitment and innovative behaviour [20].

Strength of this study is that we focused on LMX and satisfaction with HR practices, and how these are related to innovative behaviour. It appeared that LMX and satisfaction with work content and with influence had the strongest influence in explaining innovative behaviour. Furthermore, the results show that satisfaction with HR practices mediates the relationship between LMX and innovative behaviour, meaning that the relationships the supervisor have with his or her subordinates have, via satisfaction with HR practices, an impact on innovative behaviour of employees.

5. Acknowledgements

The authors would like to thank Suzanne Siep, Thomas Kowalewski, Britta Lange, Britta Ruschoff and Maria Demir (master students of psychology; University of Twente, the Netherlands) for part of the data collection.

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Hybrid Decision Models in Non-Proportional Reinsurance

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Received November 18, 2009; revised December 14, 2009; accepted December 17, 2009

Abstract

Over the past years, risk measurement and therewith risk measures became more and more important in economics. While in the past risk measures were already adopted at the deposit of credit and shareholders equity, the approach now generates two hybrid decision models and applies them to the reinsurance business. The two introduced models implement a convex combination of risk measures and with it provide the possibility of modelling risk attitudes. By doing that, for the two hybrid decision models on the one hand can be shown, which risk attitude leads to the acceptance of a reinsurance contract and on the other hand, a deductible of which height an insurer is willing to undertake. Hence the possibility exists to identify the risk attitude of an insurer. In return, due to the knowledge of risk attitudes, under similar conditions the possibility arises to establish recommendations about the extent of the deductible at reinsurance contracts.

Keywords: Insurance; Optimization; Risk; Decision Analysis

1. Introduction

The application of risk measures gains more and more importance. These measures can be applied on the one hand in the determination of the deposit of equity capital and on the other hand in the modelling of decision models considering the risk attitude. First of all, in Section 2 a short insight into the topic reinsurance should be given, in order to introduce subsequently the profit function of an insurer for a non-proportional reinsurance contract. In Section 3 two complementary decision principles will be introduced. These use a hybrid preference functional for the determination of the deductible. With the help of this the optimal deductible of an insurer can be determined depending on the insurers risk attitude (see Section 4). The interpretation of the results follows in Section 5 and will be completed by a prospect in Section 6. Hence the aim of the article is to show possibilities of integrating risk attitudes into the determination of deductibles.

2. Non-Proportional Reinsurance

An insurer uses a reinsurance [1–3] for risk limitation and risk diversification of its compulsory treaty indemnity with its private customer. Thereby the aim of a reinsurance is to replace a part of the assumed ambiguous costs of the losses by fixed costs. These fixed costs represent the recompense of the reinsurance, the

so-called reinsurance premium. Hence the reduction of the risk charge plays a central role for the insurer.

In this process reinsurance has two fundamental tasks: First, to restrain the annual variation of the loss burden of the insurer and second, to ensure the solvency of the insurance company in the extreme event of loss. Consequently the violation of the solvency [4] is the highest risk, which the insurer wants to avoid.

Reinsurance contracts can be distinguished in the reinsurance form and hence in the limitation of the obligation or voluntariness of the acceptance of risks, but also in their type. The distribution of risk is crucial for this differentiation between the insurer and the reinsurer. The risk is divided between the parties either in a proportional or non-proportional way [5,6]. In the following the focus is only on the non-proportional reinsurance.

The non-proportional reinsurance is characterized by a liability of the reinsurer which is only influenced by the amount of loss. This implies in connection of the arrangement of the contract, that the reinsurer only contributes to the loss in case the determined limit of loss is exceeded. This limit of loss is called deductible. The loss burden undertaken by the reinsurer is called reinsurance loss. It is necessary that the reinsurance loss

$$RL(d, X) = \begin{cases} 0, & \text{for } x < d \\ X - d, & \text{for } d \leq X \end{cases} = X - \min(d, X),$$

whereas d is the deductible and X the loss that evolves

from the private customer business. The loss describes a random variable with a distribution function and the corresponding density f . This density is zero for negative values, due to the non-existence of negative losses.

In return for the acquired reinsurance protection the insurer pays the reinsurance premium $RP(d)$. The basic structure of such a premium contains the expected reinsurance loss and an additional profit mark-on. The profit mark-on can refer to the expected reinsurance loss on the one hand and to the variance or to the standard deviation on the other hand [7]. In the following the premium is applied with a profit mark-on, which is linked to the expected reinsurance loss.

Definition 1

$E(RL(d,X))$ is the expected reinsurance loss and γ the profit mark-on of the reinsurer with $\gamma \geq 0$. Then $RP(d) := (1 + \gamma) E(RL(d,X))$ is called reinsurance premium.

Additionally to the incomes and costs from the reinsurance business the reinsurer possesses the insurance premium Pr from the private customer business minus the loss X . Additionally the insurer has the costs of operation B . Consequently the profit function of an insurer has the following form

$$G(d, X) = Pr - B - X - RP(d) + X - \min(d, X) \\ = Pr - B - RP(d) - \min(d, X).$$

an insurer has the choice between different decision principles. For each decision principle a preference functional, modelling its behaviour, exists. In this process the aim of an insurer is to maximize its profit function in reference to the deductible.

3. Decision Principles

A situation is identified as decision under risk [8,9] in case the possible entry scenarios as well as their entry probabilities are known. Consequently this case applies to an insurer, as the cedent knows the loss distribution from historical data and hence the insurer can estimate the possible loss as well as its probability.

In the following, two hybrid models are introduced and applied to the reinsurance problem. Both decision models represent a weighting between expected value and conditional expected value. The first preference functional uses the Conditional Value at Risk (the lower conditional expected value) and the second preference functional the upper conditional expected value of the target function.

The preference functionals have the following form

$$\Phi_{\alpha,\lambda}(G(d, X)) = \frac{1-\lambda}{1-\alpha} E(G(d, X)) \\ + \frac{\lambda-\alpha}{1-\alpha} E(G(d, X) | G(d, X) \leq g_{\alpha}(d))$$

and

$$\Phi_{\beta,\delta}(G(d, X)) = \frac{1-\delta}{1-\beta} E(G(d, X)) \\ + \frac{\delta-\beta}{1-\beta} E(G(d, X) | G(d, X) \geq g_{1-\beta}(d)),$$

whereas α and λ are the risk parameters of the first preference functional and β and δ are the risk parameters of the second preference functional with $\alpha, \beta \in [0,1]$ and $\lambda, \delta \in [0,1]$. It is necessary that

$$\frac{1-\lambda}{1-\alpha} + \frac{\lambda-\alpha}{1-\alpha} = 1 \quad \text{and} \quad \frac{1-\delta}{1-\beta} + \frac{\delta-\beta}{1-\beta} = 1.$$

Furthermore $g_{\alpha}(d)$ is the α -quantile of the profit in the first and $g_{1-\beta}(d)$ is the $(1-\beta)$ -quantile of the profit in the second functional. Both preference functionals can be applied amongst others in the Newsvendor problem [10,11] with risk preferences [12,13].

In the Newsvendor model a trader wants to sell a product at the price p . However the product can only be sold within one time period. The trader buys the product at price c and in case of not selling can return it at the price of z . The analogy between the News-vendor and the reinsurance model is represented in Poser, Wagner [14].

Both preference functionals represent risk neutrality in case of equality of their risk parameters. In this case both functionals are equal the expected profit. In case $\alpha < \lambda$ the lower expected value has a positive influence on the preference functional and represents risk aversion. Analogical in the second functional the upper expected value has a positive influence for $\beta < \delta$ and consequently reflects risk taking. In cases $\alpha > \lambda$ and $\beta > \delta$ the lower and upper expected value is integrated negatively and represents risk taking for the first decision functional and risk aversion for the second one. It should be present that the complementary preference functionals have the same results.

The two following questions shall be clarified for the two introduced preference functionals:

- 1) At which risk attitude the insurer decides in favour of the reinsurance?
- 2) If the insurer decides in favour of the reinsurance, which level of the deductible is preferred?

4. Determination of the Deductible

In this section the deductible is determined with the help of two preference functionals depending on the risk attitude of a decision maker. The profit function is dependent on the loss while the lower and upper expected value comprise the profit quantile.

From Chart 1 can be noticed, that the $\alpha \cdot 100\%$ low-

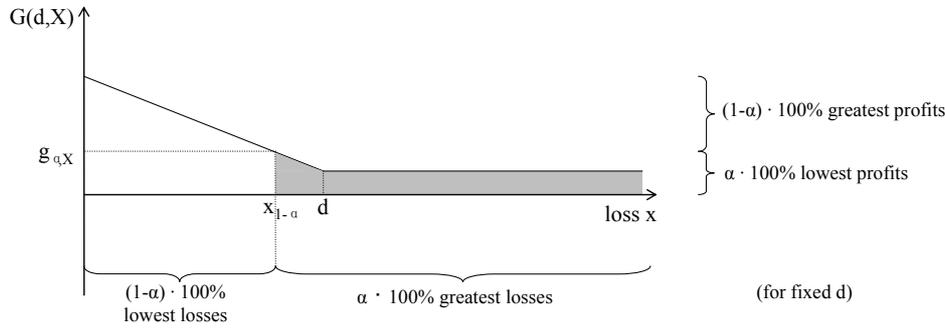


Chart 1. Profit function of the insurer with α -profit quantile.

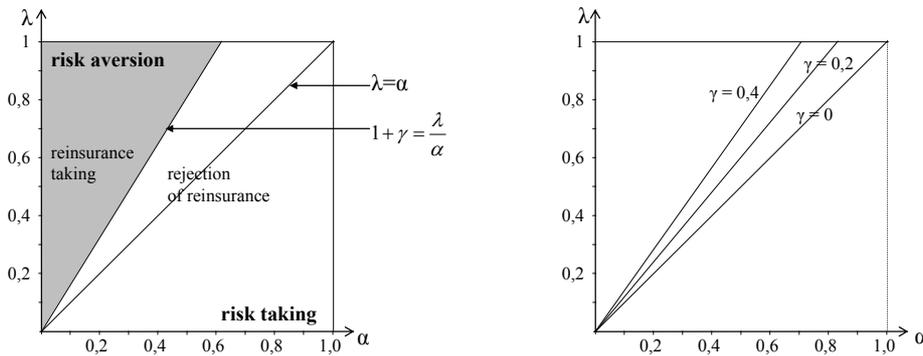


Chart 2. Risk preference space for the preference functional $\Phi_{\alpha,\lambda}(G(d,X))$.

est profits are realized with the $\alpha \cdot 100\%$ greatest losses. Consequently $(1-\alpha) \cdot 100\%$ of the losses are located below the loss quantile. Consequently it is the $(1-\alpha)$ -loss quantile.

Hence the following equation applies

$$E(G(d,X) | G(d,X) \leq g_\alpha(d)) = E(G(d,X) | X \geq x_{1-\alpha}),$$

whereas $x_{1-\alpha}$ indicates the loss quantile. Analogical the $\beta \cdot 100\%$ greatest profits¹ appear at the $\beta \cdot 100\%$ lowest losses. $\beta \cdot 100\%$ of the losses are located below the β -loss quantile. Hence the following applies

$$E(G(d,X) | G(d,X) \geq g_{1-\beta}(d)) = E(G(d,X) | X \leq x_\beta),$$

whereas x_β characterizes the β -loss quantile. Hence it is possible to maximize the two preference functionals. The two following theorems verbalize this.

Theorem 1

Let $G(d,X) = \text{Pr-B-RVP}(d) - \min(d,X)$ be the profit function of an insurer and

$$\Phi_{\alpha,\lambda}(G(d,X)) = \frac{1-\lambda}{1-\alpha} E(G(d,X)) + \frac{\lambda-\alpha}{1-\alpha} E(G(d,X) | X \geq x_{1-\alpha})$$

¹These are the profits lying above the $(1-\beta)$ -profit quantile.

²The proof of theorem Theorem 1 can be found in the appendix.

its objective function. Then the maximizing problem $\max_d \Phi_{\alpha,\lambda}(G(d,X))$ has the following implicit solution

$$F_X(d^*(\alpha, \lambda)) = \begin{cases} 1, & \text{for } 1 + \gamma > \frac{\lambda}{\alpha} \\ \frac{(1-\alpha)\gamma}{(1-\alpha)(1+\gamma) - (1-\lambda)}, & \text{for } 1 + \gamma < \frac{\lambda}{\alpha} \end{cases}$$

with $\alpha \in]0,1[$, $\lambda \in [0,1]$ and $\gamma \geq 0$.²

Theorem 2

Let $G(d,X) = \text{Pr-B-RVP}(d) - \min(d,X)$ be the profit function of an insurer and

$$\Phi_{\beta,\delta}(G(d,X)) = \frac{1-\delta}{1-\beta} E(G(d,X)) + \frac{\delta-\beta}{1-\beta} E(G(d,X) | X \leq x_\beta)$$

its objective function. Then this maximizing problem $\max_d \Phi_{\beta,\delta}(G(d,X))$ has the following implicit solution

$$F_X(d^*(\alpha, \lambda)) = \begin{cases} 1, & \text{for } 1 + \gamma > \frac{1-\delta}{1-\beta} \\ \frac{\beta\gamma}{\beta(1+\gamma) - \delta}, & \text{for } 1 + \gamma < \frac{1-\delta}{1-\beta} \end{cases}$$

with $\beta \in]0,1[$, $\delta \in [0,1]$ and $\gamma \geq 0$ [16].

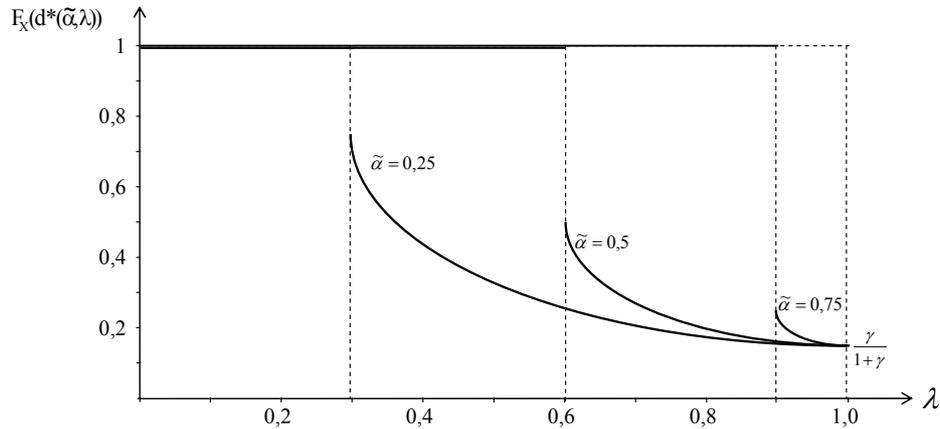


Chart 3. $F_X(d^*(\tilde{\alpha}, \lambda))$ for a given $\tilde{\alpha}$.

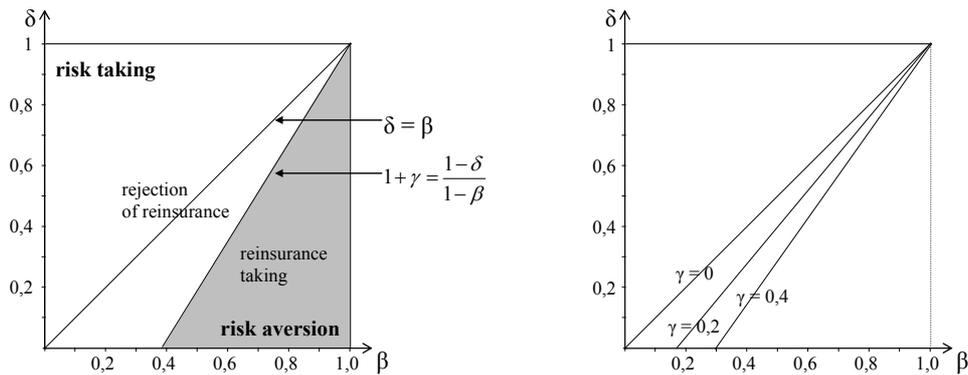


Chart 4. Risk preference space for $\Phi_{\beta, \delta}(G(d, X))$.

5. Interpretation

At first the risk preference space for the preference functional $\Phi_{\alpha, \lambda}(G(d, X))$ is examined. This one is illustrated by the left figure of the Chart 2. The space is splitted into two halves by the angle bisector. The surface above the angle bisector ($\alpha < \lambda$) contains all $\alpha - \lambda$ - combinations for risk aversion and below ($\alpha > \lambda$) all combinations for risk taking. The angle bisector ($\alpha = \lambda$) itself is the combination for risk neutrality.

Furthermore within this figure appears the border between the optimal solutions $1 + \gamma = \frac{\lambda}{\alpha}$. The value of the distribution at the optimal deductible below that border thereby is $F_X(d^*(\alpha, \lambda)) = 1$ and above $F_X(d^*(\alpha, \lambda)) = \frac{(1 - \alpha)\gamma}{(1 - \alpha)(1 + \gamma) - (1 - \lambda)}$.

The conclusion can be drawn, that the insurer with $F_X(d^*(\alpha, \lambda)) = 1$ chooses a deductible to the extent of the greatest losses. This implies, that the insurer wants to

bear every occurred loss himself. In this case the cedent rejects the reinsurance. In the case $1 + \gamma < \frac{\lambda}{\alpha}$ the distribution of the optimal deductible fulfils

$$F_X(d^*(\alpha, \lambda)) = \frac{(1 - \alpha)\gamma}{(1 - \alpha)(1 + \gamma) - (1 - \lambda)} \in [0, 1 - \alpha].$$

That implies, that the insurer intends to take the reinsurance. At the border $1 + \gamma = \frac{\lambda}{\alpha}$ the insurer is indifferent between the optimal solutions.

The right figure of Chart 2 illustrates the changing of the border between contract taking and rejection depending on the profit mark-on of the reinsurer. The border moves in an area of higher risk aversion for a higher profit mark-on γ . So the insurer has to surmount this mark-on before he chooses the contract. In case, that the profit mark-on gamma is zero the risk neutrality line is the border between contract taking and rejection.

A further question is: If the insurer decides in favour of the reinsurance, which level of deductible is preferred? It can be adhered, that in case of choosing the reinsurance the value of the distribution at the optimal

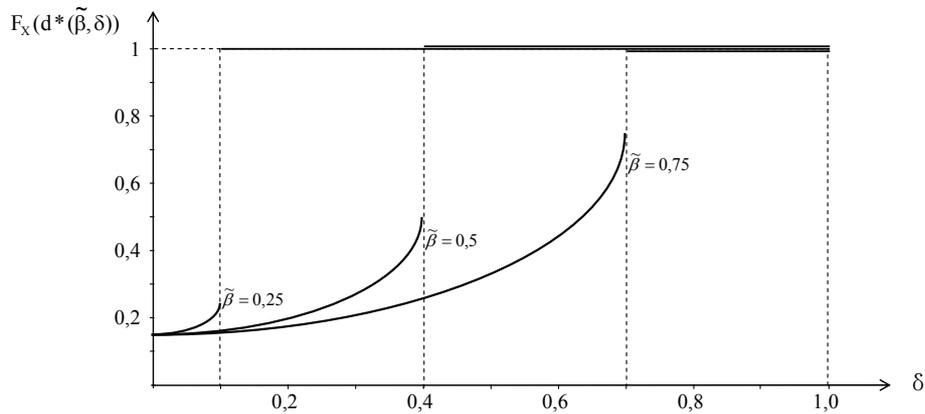


Chart 5. $F_X(d^*(\beta, \delta))$ for a given $\tilde{\beta}$.

deductible decreases with the increase of risk aversion ($\lambda \rightarrow 1$). That implies, that the cedent wants to release more risk to the cessionary. Chart 3 illustrates this for a given α .

At the point of the highest risk aversion ($\lambda = 1$) the value of the distribution at the optimal deductible is $\frac{\gamma}{1+\gamma}$ and so independent of the risk parameter α .

Within the chart a profit mark-on of 20 % is assumed.

Now the results of the preference functional $\Phi_{\beta, \delta}(G(d, X))$ are observed. The left figure of Chart 4 shows the risk preference of the preference functional. The space is divided into two halves by the angle bisector as well. This time the space above the angle bisector ($\beta < \delta$) contains all β - δ -combinations for risk taking and below all combinations for risk aversion. The angle bisector itself describes the combination for risk neutrality.

Likewise the border between the optimal solutions $\left(1 + \gamma = \frac{1 - \delta}{1 - \beta}\right)$ is illustrated in this figure. The value of the distribution at the optimal deductible above this border is $F_X(d^*(\beta, \delta)) = 1$ and below

$$F_X(d^*(\beta, \delta)) = \frac{\beta\gamma}{\beta(1+\gamma) - \delta}.$$

It can be concluded, that an insurer with $F_X(d^*(\beta, \delta)) = 1$ chooses the deductible in the amount of the greatest possible loss and consequently rejects the reinsurance.

In the case $1 + \gamma = \frac{1 - \delta}{1 - \beta}$ the value of the distribution at the optimal deductible fulfils

$$F_X(d^*(\beta, \delta)) = \frac{\beta\gamma}{\beta(1+\gamma) - \delta} \in [0, \beta[.$$

Hence the cedent decides in favour of the reinsurance. The border between accepting and rejecting the reinsurance depending on the profit mark-on of the reinsurer, is illustrated by the right figure of Chart 4.

It likewise can be recognized, that the purchase decision of the reinsurance moves in an area of higher risk aversion with increasing profit mark-on of the reinsurer. Consequently it is necessary that the higher the profit mark-on of the reinsurer is, the greater the risk aversion of the decision maker has to be, so that he purchases the reinsurance.

Concluding this, the following question remains: Which deductible, depending on the risk attitude with the β - δ -preference functional, does the insurer choose in case of accepting the reinsurance? In this situation the value of the distribution at the optimal deductible decreases with an increase of risk aversion ($\delta \rightarrow 0$). That means, that the insurer wants to release more risk to the reinsurer. This is illustrated by Chart 5 for a given β .

Concerning both decision principles it can be concluded, that risk taking as well as risk neutral insurers reject the reinsurance. For risk aversion in contrast, two cases can be distinguished: On the one hand the case of lower risk aversion $\left(1 + \gamma > \frac{\lambda}{\alpha} \text{ rather } 1 + \gamma > \frac{1 - \delta}{1 - \beta}\right)$, where the reinsurance is rejected as well and on the other

hand the case of higher risk aversion $\left(1 + \gamma < \frac{\lambda}{\alpha} \text{ rather } 1 + \gamma < \frac{1 - \delta}{1 - \beta}\right)$, where the insurer decides in favour

of the reinsurance. That implies that only an insurer having enough risk aversion decides to take the reinsurance. In case that the reinsurance is accepted, the deductible decreases with the increase of risk aversion. It can be stated, that the higher the risk aversion is, the more risk is transferred to the reinsurer by the cedent.

The interpretations of results are identical for both preference functionals. For this reason it is irrelevant, whether using the preference functional with the lower or with the upper expected value. It is possible to find for each α - λ -combination of the first preference functional a β - δ -combination of the second preference functional.

The analogy is $\alpha = 1 - \beta$ and $\lambda = 1 - \delta$.

6. Prospect

With the solutions of the optimal deductible it is possible to detect the risk preference of the insurer in case of knowing the loss distribution and the coverage limit. Furthermore the optimal deductible for a different assumed loss distribution can be calculated when knowing the risk preference of the insurer.

The introduced models only consider the maximization of the profit function in reference to the deductible. One possible prospect is the application of the hybrid decision model for the maximization of the profit function in reference to the cover or continuative the maximization of a two dimensional model with deductible and cover.

Furthermore an investigation of the models could be made with the use of a fair premium and also the consistence to decision theories could be established.

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Appendix

Proof of Theorem 1:
The following applies

$$\Phi_{\alpha,\lambda}(G(d, X)) = \frac{1-\lambda}{1-\alpha} E(G(d, X)) + \frac{\lambda-\alpha}{1-\alpha} E(G(d, X) | X \geq x_{1-\alpha})$$

The first derivation of the preference functional is generated and the following can be received

$$D_d(\Phi_{\alpha,\lambda}(G(d, X))) = \frac{1-\lambda}{1-\alpha} D_d(E(G(d, X))) + \frac{\lambda-\alpha}{1-\alpha} D_d(E(G(d, X) | X \geq x_{1-\alpha})).$$

At first the first differential of the expected profit and also of the conditional expected value has to be determined. For the profit function of the insurer can be assumed $G(d, X) = Pr - B - X - RP(d) + RL(d, X)$. For the expected profit can be obtained

$$\begin{aligned} E(G(d, X)) &= E\left(Pr - B - X - RP(d) + \begin{cases} 0, & \text{for } X < d \\ X - d, & \text{for } d \leq X \end{cases}\right) \\ &= Pr - B - E(X) - RP(d) + \int_0^d 0 dF_X(x) + \int_d^\infty (x - d) dF_X(x) \\ &= Pr - B - E(X) - RP(d) + \int_d^\infty (x - d) dF_X(x) \quad ^3 \\ &= Pr - B - E(X) - RP(d) + \int_d^\infty x dF_X(x) - d[1 - F_X(d)]. \end{aligned}$$

By the use of differentiation and the main theorem of the infinitesimal calculus for the expected profit follows

$$\begin{aligned} D_d(E(G(d, X))) &= -RP_d(d) - d \cdot f_X(d) - (1 - F_X(d)) + d \cdot f_X(d) \\ &= -RP_d(d) - 1 + F_X(d) \end{aligned}$$

In the case $F_X(d) \geq 1 - \alpha$ is for the conditional expected value essential, that

$$\begin{aligned} E(G(d, x) | X \geq x_{1-\alpha}) &= \frac{1}{\alpha} [Pr - B - RP(d)] [1 - (1 - \alpha)] - \frac{1}{\alpha} d [1 - F_X(d)] \end{aligned}$$

³It is necessary that

$$\int_d^\infty (x - d) dF_X(x) = \int_d^\infty x dF_X(x) - \int_d^\infty d dF_X(x) = \int_d^\infty x dF_X(x) - d \int_d^\infty dF_X(x) = \int_d^\infty x dF_X(x) - d [1 - F_X(d)].$$

⁴It is necessary that $\frac{1-\lambda}{1-\alpha} + \frac{\lambda-\alpha}{1-\alpha} \frac{1}{\alpha} = \frac{\alpha(1-\lambda) + \lambda - \alpha}{\alpha(1-\alpha)} = \frac{\alpha - \alpha\lambda + \lambda - \alpha}{\alpha(1-\alpha)} = \frac{\lambda(1-\alpha)}{\alpha(1-\alpha)} = \frac{\lambda}{\alpha}$.

⁵It is necessary that $RP_d(d) = (1 + \gamma)[-1 + F_X(d)]$.

$$\begin{aligned} &- \frac{1}{\alpha} \int_{F_X^{-1}(1-\alpha)}^d x dF_X(x) \\ &= [Pr - B - RP(d)] - \frac{1}{\alpha} d [1 - F_X(d)] \\ &- \frac{1}{\alpha} \int_{F_X^{-1}(1-\alpha)}^d x dF_X(x), \end{aligned}$$

whereas F^{-1} is the inverse function of the loss distribution. In general, the generalized lower inverse

$F^*(a)$ of the distribution function $F(x)$ is required.

This has the following definition $F^*(a) := \sup\{x \in \mathbb{R} | F(x) \leq a\}$, whereas $a \in [0, 1]$. On the contrary, if one assumes a continuous and strictly increasing distribution function then the generalized lower inverse is equal to the inverse function F^{-1} of the loss distribution. In the following a continuous and strictly increasing distribution function should be assumed.

The first derivation of the conditional expected value is

$$\begin{aligned} D_d(E(G(d, x) | X \geq x_{1-\alpha})) &= -RP_d(d) - \frac{1}{\alpha} (1 - F_X(d)) + \frac{1}{\alpha} df_X(d) - \frac{1}{\alpha} df_X(d) \\ &= -RP_d(d) - \frac{1}{\alpha} (1 - F_X(d)) \end{aligned}$$

and so it is essential for the first derivation of the preference functional, that

$$\begin{aligned} D_d(\Phi_{\alpha,\lambda}(G(d, X))) &= \frac{1-\lambda}{1-\alpha} [-RP_d(d) - 1 + F(d)] \\ &+ \frac{\lambda-\alpha}{1-\alpha} \left[-RP_d(d) - \frac{1}{\alpha} (1 - F_X(d)) \right] \\ &= -RP_d(d) + \left[\frac{1-\lambda}{1-\alpha} + \frac{\lambda-\alpha}{1-\alpha} \frac{1}{\alpha} \right] [-1 + F_X(d)] \\ &= -RP_d(d) + \frac{\lambda}{\alpha} [-1 + F_X(d)] \quad ^4 \\ &= -(1 + \gamma)[-1 + F_X(d)] + \frac{\lambda}{\alpha} [-1 + F_X(d)] \quad ^5 \\ &= \left[\frac{\lambda}{\alpha} - (1 + \gamma) \right] [-1 + F_X(d)]. \end{aligned}$$

Therefore the optimal solution $F_X(d^*) = 1$ can be obtained. For the second derivation of the preference functional follows

$$D_{dd}(\Phi_{\alpha,\lambda}(G(d, X))) = \left[\frac{\lambda}{\alpha} - (1 + \gamma) \right] f_X(d).$$

It is necessary that $\left[- (1 + \gamma) + \frac{\lambda}{\alpha} \right] f_X(d^*) < 0$ and

$1 + \gamma > \frac{\lambda}{\alpha}$ because the loss density is not negative.
Hence $F_X(d^*(\alpha, \lambda)) = 1$ is the maximum in the case of
 $1 + \gamma > \frac{\lambda}{\alpha}$.

In the case $F_X(d) < 1 - \alpha$ the conditional expected value is

$$\begin{aligned} & E(G(d, X) | X \geq x_{1-\alpha}) \\ &= \frac{1}{\alpha} \int_{F_X^{-1}(1-\alpha)}^{\infty} [Pr - B - RP(d) - x + x - d] dF_X(x) \\ &- \frac{1}{\alpha} [Pr - B - RP(d) - d] \int_{F_X^{-1}(1-\alpha)}^{\infty} dF_X(x) \\ &= \frac{1}{\alpha} [Pr - B - RP(d) - d] [1 - (1 - \alpha)] \\ &- Pr - B - RP(d) - d, \end{aligned}$$

After differentiation it is necessary that $D_d(E(G(d, X) | X \geq x_{1-\alpha})) = -RP_d(d) - 1$.

Consequently for the first derivation of the preference functional can be obtained

$$\begin{aligned} & D_d(\Phi_{\alpha, \lambda}(G(d, X))) \\ &= \frac{1 - \lambda}{1 - \alpha} [-RP_d(d) - 1 + F_X(d)] + \frac{\lambda - \alpha}{1 - \alpha} [-RP_d(d) - 1] \\ &= -RP_d(d) - 1 + \frac{1 - \lambda}{1 - \alpha} F_X(d) \\ &= -(1 + \gamma)[-1 + F_X(d) - 1 + \frac{1 - \lambda}{1 - \alpha} F_X(d)]^6 \\ &= \gamma + \left[-(1 + \gamma) + \frac{1 - \lambda}{1 - \alpha} \right] F_X(d) \end{aligned}$$

Therefore the optimal solution is

$$F_X(d^*(\alpha, \lambda)) = \frac{(1 - \alpha)\gamma}{(1 - \alpha)(1 + \gamma) - (1 - \lambda)}.$$

Now the determination of the second derivation for the identification of the type of optimum can be made. It is necessary that

$$D_{dd}(\Phi_{\alpha, \lambda}(G(d, X))) = \left[-1(1 + \gamma + \frac{1 - \lambda}{1 - \alpha}) \right] f_X(d).$$

As the loss density can not receive negative values, the second derivation of the preference functional is negative in case that $1 + \gamma > \frac{1 - \lambda}{1 - \alpha}$. The following question arises:

When does the optimum exist? At first $F_X(d^*(\alpha, \lambda)) \geq 0$ is observed. This equation can be assumed, when the denominator of the solution is not negative. It is necessary, that

$$(1 - \alpha)(1 + \gamma) - (1 - \lambda) \geq 0 \Rightarrow 1 + \gamma \geq \frac{1 - \lambda}{1 - \alpha}.$$

Therefore $F_X(d^*(\alpha, \lambda))$ is a maximum, for $F_X(d^*(\alpha, \lambda)) \geq 0$. The second step $F_X(d^*(\alpha, \lambda)) < 1 - \alpha$ is observed. It is necessary, that

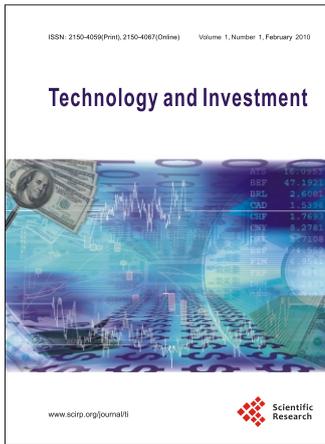
$$\frac{\gamma(1 - \alpha)}{(1 - \alpha)(1 + \gamma) - (1 - \lambda)} < 1 - \alpha$$

and this is equivalent to $1 + \gamma < \frac{\lambda}{\alpha}$, because

$$\begin{aligned} & \frac{\gamma(1 - \alpha)}{(1 - \alpha)(1 + \gamma) - (1 - \lambda)} < 1 - \alpha \Rightarrow \gamma < (1 - \alpha)(1 + \gamma) - (1 - \lambda) \\ & \Rightarrow (1 - \alpha)(1 + \gamma) - (1 + \gamma) + \lambda > 0 \Rightarrow (1 - \alpha - 1)(1 + \gamma) + \lambda > 0 \\ & \Rightarrow -\alpha(1 + \gamma) + \lambda > 0 \Rightarrow 1 + \gamma > \frac{\lambda}{\alpha} \end{aligned}$$

The result is, that the maximum exists, when the other maximum $F_X(d^*(\alpha, \lambda)) = 1$ does not exist.

⁶It is necessary that $RVP_d(d) = (1 + \gamma)[-1 + F_X(d)]$.



Technology and Investment (TI)

ISSN 2150-4059 (Print) ISSN 2150-4067 (Online)
<http://www.scirp.org/journal/ti>

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