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Scope and Coverage

The International Journal of Business & Applied Sciences (IJBAS) is a double-blind peer reviewed journal of Business and Applied Sciences Academy of North America (BAASANA) that provides guidance for those involved at all levels of business and applied sciences. The journal publishes research papers, the results and analysis of which will have implications or relevance to policy makers and practitioners in relevant fields. IJBAS gives priority to empirical/analytical research papers. The field of business and applied sciences is a complex one. It is influenced by the many social, technological and economic changes evident in the world today.

IJBAS publishes original papers, theory-based empirical papers, review papers, case studies, conference reports, relevant reports and news, book reviews and briefs. Commentaries on papers and reports published in the Journal are encouraged. Authors will have the opportunity to respond to the commentary on their work and those responses will be published. Special Issues devoted to important topics in business, applied sciences, and related topics, will be occasionally published.

The journal is an invaluable support to academics and researchers in the field, and to all those charged with setting policies and strategies for business and social organizations. The journal includes reviews of current literature, applied research articles, case studies and histories, as well as special and themed issues.

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**Journal Index**

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Editorial

The papers published in this issue of the *International Journal of Business & Applied Sciences (IJBAS)* focus on corporate social responsibility, emotional intelligence and decision making styles, railway vigilance monitoring device, and 2015 Women’s World Cup.

The *IJBAS* continues to attract high quality scholarly works that are not only cross-disciplinary, but add significant dimensions of international perspectives. The present volume contains four papers focusing on different themes relating to business and applied sciences.

The first paper entitled ‘Maximizing or satisficing decision making styles and emotional intelligence: An empirical investigation’ by Brandon William Soltwisch and Keiko Krahnke explores the relationship between emotional intelligence and decision making styles using Schwarz (2002) maximizer/satisficer questionnaire. Results indicate that emotional intelligence is significantly associated with maximizing tendencies of searching for more information and setting higher standards when making decisions. Decision makers who are endowed with emotional intelligence also find it significantly low level of difficulty in making decisions, and suggest that they utilize emotional capacities to guide their decision making process.

The second article by Yuqi Gu, William Bosworth, and Yong Wang entitled ‘Corporate Social Responsibility as Social Capital’ investigates the potential value of firms’ investments in corporate social responsibility (CSR). Results show that firms whose stocks are short-sold during the test period have invested significantly more in CSR as compared to the firms whose stock didn’t go through the same pressure. The results also indicate that CSR could be more valuable to firms operating under unfavorable conditions.

The third article by Ricard W. Jensen entitled ‘Examining the Extent to Which the 2015 Women’s World Cup Increased Tourism from the United States to Canada: Investigating the Role of Marketing, Media, and Special Events’ explores the extent to which US based fans traveled to Canada for the 2015 Women’s World Cup, the venues fans attended, the amount they spent, and their motivation to travel to Canada participate in the event. This study also examines the role of marketing strategies used to generate interest in the event and attract tourists; the study also evaluates the impact of advertising, the other traditional media and social media in promoting the event. The study highlights that the tourists from the United States to Canada for the World Cup was largely influenced by the success of the American Women’s National Team, the Fox TV coverage of the tournament and the growing interest in women’s sports in the USA. In addition, the analysis also reveals a relationship between transportation infrastructure and tourism as cities which provide better infrastructure seem to attract more tourists.

The final article by Michel Sauvignon entitled ‘Analysis of a French Railway Vigilance Monitoring Device: Description of a Method to Evaluate the Level of Vigilance and the Relationship with Motility Performance’ examines relationships between motility behavior, variations in vigilance and responses to screen signals. Thus, the main purpose of the study was to explore extreme state of drowsiness and mainly to establish a rule between computerized vigilance studies and biomechanical behavior. This study uses a simplified monotonous driving task to study the physiological and behavioral parameters. Such a system opens new perspective for detection of decreases in vigilance before the driver becomes sleepy.

In conclusion, I hope that you will find the articles presented in this issue interesting and useful. *I would like to take this opportunity to thank* all those who submitted manuscripts for this issue.
also thank all of the reviewers for providing insightful and constructive feedback to authors. I hope that you will consider submitting your research works to *IJ BAS* in the future.

Sincerely,

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Maximizing or Satisficing Decision Making Styles and Emotional Intelligence: An Empirical Investigation

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Abstract

This paper explores the relationship between emotional intelligence and decision making styles using Schwarz (2002) maximizer/satisficer questionnaire. The data collected from 124 participants revealed several interesting findings for research and practice. Results indicate that emotional intelligence is significantly related to the maximizing tendencies of searching for more information and setting higher standards when making decisions. Emotionally intelligent decision makers also find it significantly less difficult to make decisions, suggesting they utilize emotional capacities to guide their decision making process. Results and implication for the field are discussed in relation to the current study.

Keywords: Emotional Intelligence, Decision Making Styles, Maximizer, Satisficer

Introduction

The effectiveness of leaders’ decisions is often based on multiple, and often interrelated, dimensions that extend beyond their immediate system and sphere of influence. In an increasingly complex and globalized world, decisions we make often have far-reaching consequences both in time and space; therefore, leaders have to be cognizant of the impact of their decisions. Leaders are under more pressure to make ethical decisions and decisions with a long-term perspective, being mindful of future consequences on multiple stakeholders.

It has become clear that an intellectual intelligence alone is not adequate to lead effectively and make appropriate and wise decisions. In fact, Goleman (2004) noted that emotional intelligence is more important and is what distinguishes outstanding leaders from ones that are adequate. Decision making in general has become far more complex as well with the advancement of technology. Technology has brought more transparency and easier access to a wealth of information at our finger tips, but at the same time, we have become more overwhelmed, and even confused, by so much information and “competing interpretations of major world events driven by ideology and informed by selective ‘evidence’” (Kelly, 2006, p. 21). Because of the often contradictory nature of the complex issues we face and the information we find, the ability to recognize and discern relevant information and knowledge is more necessary than ever before. With the information overload we experience in today’s world, careless and satisficing decision making can manifest in detrimental outcomes. Thus, a leader’s ability to sift through information and identify relevant outcomes for all stakeholders becomes paramount.
Emotional intelligence involves four interrelated abilities: perceiving, utilizing, understanding, and managing emotional information in oneself and in others (Salovey & Mayer, 1990; Mayer & Salovey, 1997). Therefore, the construct has been defined as “the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others,” (Mayer, Salovey, & Caruso, 2000, p. 88). Daniel Goleman brought emotional intelligence to the forefront of research and practice when his pivotal book titled “Emotional Intelligence” was published in 1995 (Goleman, 1995). Since then, emotional intelligence has proven to be a key trait for successful business leaders.

Research on emotional intelligence has shown that these interrelated abilities predict a broad range of essential work outcomes (See Lopes, Cote & Salovey, 2005 for review). For example, emotional intelligence has been associated with increased ability to manage stress on the job (Caruso & Salovey, 2004), it has been associated with better overall work performance (Van Rooy & Viswesvaran, 2004) and increased interpersonal sensitivity on the job (Lopes, Grewal, Kadis, Gall, & Salovey, 2006).

Several researchers have shown that emotional information plays a fundamental role in the decision making process. Antonio Dimasio, head of the neurology department at The University of Iowa, has discovered that emotional signals help the brain to establish priorities and weigh alternatives during the decision making process (Dimasio, 1994, 1999). Since Dimasio’s important discovery, other researchers have shown that individuals evaluate risk more by emotional feedback than through cognitive appraisal of estimated outcomes (Loewenstein, Weber, Hsee, & Welch, 2001). It is clear that individuals utilize emotional information to aid in the decision making process, especially when time is of the essence. This study aims to further understand that process by measuring the connection between someone’s emotional competence and their decision making style, whether they tend to maximize or satisfice.

The term satisficing was introduced by Herbert Simon (1955) to describe a decision making process that sought out good enough options rather than searching for optimality. Later, Simon proposed that individuals satisficed because they didn’t have the cognitive capacity to analyze all of the options (Simon, 1972). In this regard, satisficing was a product of limited cognitive ability rather than a tendency of the decision maker. Even though it is clear that no individuals have unlimited information processing capabilities, there are key differences in individual’s tendencies to search for information when making decision (Schwarz et al. 2002). Maximizers prefer to seek out more alternatives when making a decision, while satisficers are inclined to select options that meet their minimum criteria. Thus, maximizers exert more resources in the decision making process to seek the best outcomes rather than settling for ones that are good enough. Schwarz and his colleagues (2002) developed a measure that identified three key dimensions of maximizing: information search, decision making difficulty, and high standards in decision making.

Subsequent research suggests that maximizers reported that they were generally less happy, optimistic, and satisfied with their choices (Schwarz, 2004). They were also more likely to display regret, perfectionism, and depression after making a decision. Schwarz (2004) reasons that maximizers often look at what could have been rather than being satisfied with their current choice. In a study investigating career choices and outcomes, Iyengar et al. (2006) found that maximizers search for more jobs after graduation and end up earning starting salaries 20% higher than satisficers (Iyengar, Wells, & Schwarz, 2006). However, they tend to be more stressed and less satisfied with their jobs. Another study suggests that maximizers are less loyal to particular products, causing them to switch to other providers when better opportunities are presented (Lai, 2011). Thus, maximizers may be less loyal to specific brands as they seek to try find new alternatives. It is clear that maximizers are likely to spend more energy to find the best options, however, they are not always satisfied with their choices as they are constantly searching for better alternatives. Since emotional information plays a key role in establishing priorities and weighing alternatives (Dimasio,
the goal of this study is to understand how emotional abilities influence someone’s tendency to maximize or satisfice. Hypotheses are developed and empirically tested in the next sections. Then, results, conclusions, and implications are discussed in relation to the current findings.

Emotional Intelligence and Decision Making

Although there have not been many studies linking emotional intelligence and decision making, there has been some recent work suggesting that emotional intelligence may play a central role in the decision making process. Emotional information tends to allow individuals to focus their attention on important aspects of the decision making process (Daniels, 1999). People who pay more attention to their feelings will redirect their attention from problems of less importance to those that are more eminent (Salovey & Mayer, 1990). Environmental scanning involves the capacity to acquire important information that can be used to make strategic decisions (Thomas, 1980). In a study of 592 international school supervisors, Rahim and Marvel (2011) discovered that supervisors who were higher in emotional intelligence were more efficient in scanning the environment for relevant information when making strategic decisions. A study by Brown and colleagues (2003) suggested that participants with higher levels of emotional intelligence made better career related decisions, resulting in higher overall satisfaction with their occupation. Others have proposed that emotionally intelligent decision makers will be more effective in taking on change initiatives and promoting organizational learning on the job (Scott-Ladd & Chan, 2004). The success of emotionally intelligent decision makers is largely attributed to their capacity to weigh alternatives and see other points of view.

Empathy, which is usually defined as the affective or cognitive state where we can experience another’s experience or plight, or the ability to put one’s self in another’s shoes. Empathy also considered to suspend judgment and bias to be able to walk in another’s shoes (Greason & Cashwell, 2009). This is an important aspect of emotional intelligence. Goleman (1998) identified empathy as one of the most critical skills in the emotional intelligence construct as it allows leaders to identify with others.

Senge and Krahnke (2014) proposed empathy in a broader sense and called it transcendent empathy, which is the ability to move away from the localized self, see the larger systems, and make deep connections across time and space. A wise leader who has transcendent empathy understands systems, sees patterns and relationships, and cause and effect. This ability is the foundation to being able to make thoughtful decisions with understanding and anticipating far-reaching consequences. This holistic view of decision making may encourage emotionally intelligent individuals to anticipate the impact of each alternative on their own and others’ future emotional states. As they seek to understand the impact of their decisions on themselves and others, they will be more likely to search for information when making decisions, and less likely to settle for options that meet their minimum criteria. Thus, the following hypothesis is offered.

Hypotheses 1: Emotional Intelligence will be positively correlated with information search in decision making, so that those that are higher in emotional intelligence will also search for more information when making decisions.

Research has shown that emotionally intelligent negotiators are better at navigating the bargaining process, allowing them to achieve better outcomes than those that are less emotionally intelligent (Fulmer & Berry, 2004). Emotional intelligence has also been shown to increase decision making effectiveness in consumers. In several experiments involving consumer product selection, emotionally intelligent consumers were more likely to pick healthier food products and higher quality brands of digital cameras based on their attributes than participants who were less emotionally intelligent (Kidwell, Hardesty, & Childers, 2008).

Researchers have suggested various ways that emotions may color judgments and decision making accuracy (Erher, 1991). One possibility is the influence of mood congruence, where decision makers’ base judgments on their current mood state rather than appropriately weighing alternatives (Johnson & Tversky, 1983). Another potential for biased decision making is when current affective states influence the way people access information in the brain. Emotional systems in the brain are highly integrated with memory, causing people to retrieve familiar cues when experiencing specific affective states (Mayer, DiPaolo, & Salovey, 1990; Erher, 1991). For example, situations that generate fear and anxiety may cause someone to recall other times when they experienced similar emotional reactions. Studies by Seo & Barret (2007) and Fenton-O’Creevy et al. (2010) showed that emotional regulation, a key component of the emotional intelligence construct, may play an important role in reducing various decision making biases.

Recently, there have been several studies investigating the impact of emotional intelligence on strategic investment decisions. A case study by Myeong-Gu and Barret (2007) investigated 101 stock investors over a period of 20 days in order to explore how regulating emotions during affective experience impacts decision making accuracy. The results of their study indicated that those who experience heightened emotional reactions while making decisions were more accurate in picking stocks than those who were less emotional. Also, those who were better at identifying and differentiating their current emotional states made better stock predictions since they were able to reduce potential biases associated with flawed emotional reactions (Myeong-Gu & Barret, 2007).

A field study of 118 traders working in four different investment banks in London showed that traders who regulated their anticipatory emotional responses while making investments performed significantly better than those who did not regulate their emotional responses (Fenton-O’Creevy, Soane, Nicholson, & Williams, 2010). The authors attribute this performance advantage to traders’ ability to strike a balance between understanding how emotional information impacts their judgment and being able to regulate their emotions in a way that prevents them from committing errors or overreacting. Emotionally intelligence involves applying emotions to facilitate thinking and understanding (Salovey & Mayer, 1990). For the aforementioned reasons, it is predicted that emotional intelligent decision makers will find it easier to navigate the decision making process by utilizing emotional information to better understand the problem and weight alternatives.

**Hypothesis 2:** Emotional Intelligence will be negatively associated with decision making difficulty, so that those who are higher in emotional intelligence will find less difficult to make decisions.

Emotionally intelligent individuals tend to seek out situations where they are likely to succeed (Mayer & Salovey, 1997). They look for win-win situations as they navigate social interactions. As they make decisions, they will anticipate future emotional reactions associated with different alternatives, searching to optimize their overall well-being.

Anticipatory emotions have been defined as emotional responses to the possible outcomes of prospective events (Orton, Clore, & Collins, 1988). All decisions are inherently influenced by anticipated emotional states since people are calculating the amount of utility they will receive from various alternatives (March, 1978). Anticipatory emotions influence how people value various choices when making decisions (Davis, Love, & Maddox, 2009). For example, when grocery shoppers choose one product over another they are estimating that they will have a more positive experience using it compared to the alternative. However, decision makers are often not accurate in predicting how specific alternatives will influence their future emotional states, and hence frequently choose alternatives that are not maximizing their utility (Loewenstein & Schkade, 1999).

Since emotionally intelligent individuals are more apt to anticipate future emotional states when making decisions, they will search for options that maximize their expected utility. It is predicted that emotionally intelligent individuals will have higher standards when they make decisions.
Hypothesis 3: Emotional intelligence will be positively correlated with high standards in decision making, so that those who are more emotionally intelligent will have higher standards.

Results and Discussion

The current study utilizes the Schutte et al. (1998) emotional intelligence questionnaire because it has proven to be reliable and valid. It is also less expensive and more practical than the MSCEIT to administer and score. Maximizing vs. satisficing tendencies were measured using the Schwarz (2002) maximization scale identifying the dimensions of information search, decision making difficulty, and high standards in decision making.

A final usable sample of 124 students was obtained from a large university in the western United States. Participants were enrolled in junior and senior level business courses representing the areas of accounting, finance, management, marketing, and computer information systems. Approximately 10 percent of these students are other majors who are enrolled because of their majors’ requirements. Regression analysis was used to analyze the date. Gender was controlled for in the model as it has been associated with levels of emotional intelligence. Results, conclusions and implications for future research are discussed in relation to the current findings. Means, standard deviations, and zero-ordered correlations of focal variables can be found in the table below.

| Table 1: Means, Standard Deviations, and Zero-ordered Correlations |
|------------------|---------|---------|-------|-------|-------|-------|
|                  | Means   | St. Dev. | 1     | 2     | 3     | 4     | 5     |
| 1. Gender        | 1.36    | .48      | 1     |       |       |       |       |
| 2. Emotional Intelligence | 129.29 | 15.27   | .013  | 1     |       |       |       |
| 3. Information Search  | 10.02  | 2.82    | .065  | .242**| 1     |       |       |
| 4. Decision Difficulty | 7.99   | 2.92    | .048  | -.227*| .271**| 1     |       |
| 5. High Standards | 11.92   | 2.15    | -.058 | .377**| .301**| .043  | 1     |

N=124; *p < .05, **p < .01

Hypotheses 1 testing the relationship between emotional intelligence and information search was significant (α < .05), thus our hypothesis was supported. As predicted, emotionally intelligent individuals seek out more information when they make decisions. The second hypothesis analyzed the relationship between emotional intelligence and decision difficulty. Results suggest that emotionally intelligent individuals find it less difficult to make decisions (α < .05). As predicted, using emotional information to better understand the problem and weight alternatives may make it easier to identify the best solution. Finally, hypothesis 3 tested the relationship between emotional intelligence and high standards in decision making. The results showed a very strong positive relationship between emotional intelligence and high standards (α < .01), therefore suggesting strong support that emotionally intelligent decision makers have much higher standards when they make decisions.

This first investigation into the connection between emotional intelligence and decision making styles has some important practical and theoretical implication. It helps draw the connection between emotional competencies and decision making styles. Emotions provide vital cues for how we interpret information and make decisions. The results of this research suggest that emotionally intelligent decision makers are more likely to seek out more information, potentially gathering a more well-rounded perspective of all of the factors affecting the situation. Gathering more information may also help them to understand how their decision may impact various stakeholder groups. It also helps managers make more informed strategic decisions when they evaluate alternatives. Gathering different perspectives and points of view will allow them to weight the advantages and disadvantages of each option.

The ability to understand and integrate emotional information may enhance one’s efficacy in making decisions, as suggested by the results of hypotheses 2. This is in line with other psychology literature suggesting that emotional information allows people to get a better sense or inclination that one outcome might be better than another. Emotional information allows individuals to focus their attention on important aspects of the decision making process (Daniels, 1999). Thus, attending to what is important may make it easier for them pay attention to only relevant information, reducing the potential to become overwhelmed by a challenging decision. It may also help reduce the tendency to escalate commitments to failing courses of action as they better manage their emotions during the process (Soltwisch, 2015).

The very strong relationship between emotional intelligence and high standards in decision making has several practical implications. For one, it suggests that emotionally intelligent decision makers will be more likely to seek solutions that will maximize their future utility. Setting high standards for how they make decisions suggests that coming up with the right solution or option is of great importance, and they may put forth more effort overall into how they make decisions they see as critical to the success of their organization. This resembles other findings that emotionally intelligent individuals have higher career inspirational motivation (Gardner & Stough, 2002). A second important implication of hypotheses 3 is that it suggests that individuals will strive to make decisions that provide the best long-run benefits, thus they will weigh options in terms of how they impact both short and long-term outcomes. Taking a long-term perspective can enhance the sustainability of the company as managers and leaders think about how their current decisions will impact the viability of the company and its stakeholders in the long run. Sometimes this means making tough choices that do not have the best short-term outcomes, but leave the company in a better competitive position. This is especially true in dynamic markets that are rapidly transformed by new technologies that change the competitive landscape.

Future research could build on these findings in several ways. By investigating how emotionally intelligent people make decisions over time using a longitudinal study, it would provide a better understanding of how decision making styles may change over time. It would be interesting to see how managers may change decision making styles depending on the circumstances. For example, do managers maximize when they have enough time and satisfice when time is limited? A scale measuring decision making flexibility could be developed to measure flexibility in decision making styles.

**Conclusion**

This study provides an important first step in understanding the relationship between emotional competencies and decision making styles; however, we have just scratched the surface in terms of how these competencies and styles relate to various organizational outcomes and leadership effectiveness. As it is mentioned earlier, we live in a fast-paced, complex society where an old set of competencies are no longer adequate. We need to learn different kinds of competencies and learn different ways of learning and knowing. In the West, we value independence and individualism, and Capitalist economic models in which humans are seen as separate individuals. Connecting with and sensing others’ feelings and experiences, therefore, may not come natural to us. Instead of independence, which may inherently promote competition and fighting for resources, we might learn more cooperative and pro-social behavior, which will help us understand others better and anticipate the consequences of our decisions. Maximizing decision making with added mindfulness will also help us refrain from making quick, routinized decisions and reaching premature conclusions. Understanding emotional intelligence and decision making styles can give us some clues as to how we can lead more effectively.
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Corporate Social Responsibility as Social Capital

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Abstract

Although the issue may not be settled yet, there is growing evidence of a positive relationship between corporate social responsibility (CSR) and corporate financial performance (CFP). Increasingly, both theoretical and empirical research is focusing on identifying precisely what the link between CSR and CFP is. While CSR appears to be associated with evidence of good governance, it is not clear what and if any causality may link CSR and CFP. Lins, Servaes, and Tamayo (2016) suggest that CSR is one dimension of social capital that a firm builds through trustworthy behavior guided by cooperative norms. Their construct reconciles findings of previous research and their empirical research is consistent with observable financial behavior. We use a unique window of opportunity created by the SEC short-sale experiment of 2005 to 2007 to extend their idea, finding that firms respond in a rational way to changes in the value of information by increasing their investment in social capital.

Keywords: Corporate social responsibility, social capital, short selling

Introduction

The relationship between investments in Corporate Social Responsibility (CSR) and Corporate Financial Performance (CFP) has been studied extensively since the former term was coined in the mid 1960’s (De George, 2011). Whether CSR is associated with an inferior or a superior CFP is of significance for both business strategizing and public policy making. Griffin and Mahon (1997) survey 34 studies and find 22 of them unambiguously support a positive relationship between the two. Margolis and Elfenbein (2007) perform a meta-analysis on 167 studies and conclude that the evidence clearly supports a non-negative relationship. Moreover, they conclude that there is a mild positive relationship between CSR and CFP. More recent studies (Flammer, 2015) support their conclusion. Increasingly research on (CSR) and (CFP) is focusing on identifying the link between CSR and CFP.
There are a number of plausible links between CSR and CFP. It could be that companies that are managed well have the resources to engage in CSR (McGuire, Sundgren, and Schneeweis, 1988; Orlitzky, Schmidt and Rynes, 2003). Alternatively, there may be extrinsic benefits (Kitzmueller and Shimshach, 2012) to engaging in CSR. Such benefits would arise from CSR-induced innovation (Porter and Kramer, 2006; Hull and Rothenberg, 2008) or from better relationships with stakeholders (Hillman and Keim, 2001) such as shareholders (Eccles, Ioanou and Serafeim, 2014; Gao, Lisic and Zhang, 2014), customers (Servaes and Tamayo, 2013), and employees (Edmans, 2011). A third possibility is that CSR creates a reserve of goodwill that can become valuable in the wake of a publicly observed event of corporate social irresponsibility (CSI) (Godfrey, Merrill and Hansen, 2009; Hong and Liskovich, 2015). A fourth possibility is that firms engage in CSR to offset CSI ex-post (Heal, 2005; Kotchen and Moon, 2012). Observing a sample of 4,500 firms over 19 years, Kang, German and Grewal (2016) test all of these hypotheses simultaneously and could find little support for any one of the four mechanisms in particular. They conclude, “Some firms engage in CSR to offset their past [Corporate Social Instability]. Other firms engage in CSR because (we speculate) it is simply part of what they do. The latter firms can expect to see significant financial returns from their CSR investments. However, the former firms likely see little if any positive financial returns from their CSR investments.”

The framework of Lins, Servaes and Tamayo (“LST” 2016) is rooted in both the stakeholder management literature and the reserve-of-goodwill school. Their innovation is to focus on “social capital.” Scrivens and Smith (2013) define social capital in terms of (i) personal relationships; (ii) social network support; (iii) civic engagement; and, (iv) trust and cooperative norms. CSR is clearly civic engagement and is therefore an indicator of a firm that is building social capital in general. To establish the value of social capital LST appeal to the work of Guiso, Sapienza and Zingales (2008) who find that trust was value enhancing during the 2008 financial crisis.

LST reason that during periods of financial crisis social capital is more valuable to stakeholders. CSR is a component of social capital that can be more easily observed than other components. Their tests center on the financial panic period of August 2008 through March 2009 and the financial scandal period of October, 2001 through March 2003. They find that firms entering those periods with high CSR ratings had significantly higher stock returns but their superior performance disappeared when financial conditions became normal. They conclude that social capital can serve as an insurance policy for times when trust is scarce.

LST’s contribution to the literature is to recast CSR as a component of social capital and find evidence that, as such, it explains observable phenomena. Fang, Huang and Karpoff (2016), investigating the value of short-sales of stock, find behavior consistent with the social capital construct. Exploiting another window of opportunity, they find that when regulation of stock short sales is relaxed temporarily for some firms, the affected firms are less likely to engage in earnings management. Kim, Park and Wier (2012) find that in general, high CSR firms are less likely to engage in earnings management. If firms whose stock is under the threat of short-sale build social capital by releasing more reliable financial statements, they are also likely to do so through greater attention to CSR.

If firms invest in CSR as a component of social capital, then it is rational for firms to devote more resources to CSR under adverse financial conditions when risk is greater and information is more valuable than under favorable financial conditions where risk is less and social capital is less valuable. This study provides an empirical test based on the above argument.

We hypothesize that social capital is more valuable to a firm whose stock can be easily shorted and therefore that firm will increase its investment in it. The same force that drives firms to trustworthy financial reporting will also encourage them to engage in other trustworthy behavior including
investing in CSR. We test this hypothesis and find evidence to support it using the same window of opportunity of Fang, Huang and Karpoff (2016).

Methodology

Empirically, it is plausible that measures of the relationship between short sell pressure and CSR investments may suffer from endogeneity bias. For example, both short sell pressure and CSR investments may be affected by firm-specific unobservable variables. Also, firms with massive investments in CSR may attract short sellers.

To address these concerns, we follow Fang, Huang, and Karpoff, by exploiting one of the few controlled experiments in U.S. financial history.

“In July 2004, when the Securities and Exchange Commission (SEC) adopted a new regulation governing short selling activities in the U.S. equity markets—Regulation SHO. Regulation SHO contained a Rule 202T pilot program in which every third stock ranked by trading volume within each exchange was drawn from the Russell 3000 index and designated as a pilot stock. From May 2, 2005 to August 6, 2007, pilot stocks were exempted from short-sale price tests, thus decreasing the cost of short selling these stocks. The price tests, which include the tick test for exchange listed stocks and the bid test for Nasdaq National Market Stocks, were maintained for non-pilot stocks.” (Fang, Huang and Karpoff, 2016)

Short-term investors such as hedge funds regard the opportunity to short-sell stocks as a potential opportunity. Long term investors such as insurance companies, endowment funds, pension plans and mutual funds regard increased volatility as a threat. Stocks whose prices are more vulnerable to unexpected events or market manipulation can adversely affect the value of mark-to-market portfolios. Fang, Huang, Karpoff assert that short-sellers are able to detect earnings management more quickly than long term investors. Consistent with LST we argue that for the pilot stocks in the pilot period information is more valuable to investors than short-sale regulated stocks. During this period CSR would have been a valuable signal about the integrity of the firm’s financial statements. Indeed, Gao, Lisic and Zhang (2014) find that high CSR firms are less likely to engage in insider trading.

Our hypothesis is,

H₀: Short-sale regulation has no effect on CSR investment.

Hₐ: Firms whose stock could have been short-sold without restriction will have displayed more CSR investment than short-sale protected firms.

The pilot program creates an exogenous shock to short selling behaviors and allows us to use the difference-in-differences (DiD) approach to compare the changes in CSR investments between firms that were in pilot program (treatment group) and firms that were not in the program (non-pilot group) (see, e.g., Bertrand and Mullainathan, 1999, 2003). We create a dummy variable Pilot to separate the firm whose stock can be shorted (value 1) from the firms whose stock cannot (value 0). Similarly, another dummy variable Post is created to separate the sample period into before pilot program (value 0) and during program period (value 1). Therefore, the interaction term of the two dummy variables Pilot*Post will take a value 1 for the firm’s stock that is vulnerable to unregulated short-sales and the coefficient estimation of this interaction term will reveal the DiD and provide evidence to support or reject our hypothesis.
Table 1 illustrates the DiD framework using a pilot firm (A) and a non-pilot firm (B). The numbers in the table are hypothetical CSR scores.

<table>
<thead>
<tr>
<th>Time/Firm</th>
<th>A(Pilot)</th>
<th>B(Non-Pilot)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before pilot years</td>
<td>5</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Pilot years</td>
<td>15</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Difference</td>
<td>10</td>
<td>2</td>
<td>DiD=10-2=8</td>
</tr>
</tbody>
</table>

Both company A and B spent more on CSR during pilot years than before pilot years (15 vs. 5 and 9 vs. 7). On average, there has been a general trend for firms to increase CSR spending over time. Since we are exploring how pilot Regulation SHO affected CSR spending of A and B differently, the relevant estimate should be the difference in differences. In this case, pilot firm A increased CSR by 10 while non-pilot firm B increased CSR by 2. CSR spending of pilot firm A increased much more than that from non-pilot firm B, and the effect is net of the general trend of increasing CSR spending. The DiD framework eliminates both: a) the time-invariant differences between control and treatment group, and b) any common trend that affects both the treatment and control group.

**Data, Sample Construction, and Test Design**

The sample includes all firms that were included in the Russell 3000 index in every single year from 2001 to 2007. The Russell 3000 Index is a capitalization-weighted stock market index, maintained by the Russell Investment Group. The index covers the 3,000 largest publicly held companies incorporated in the U.S. based on market capitalization and represents approximately 98% of the US public equity market. Since the identity of the pilot and non-pilot stocks was made public in July 2004, there is a problem of classifying an observation in year 2004 to be pre- or during-pilot period. Following prior literature, we drop the observations from year 2004 in the primary tests. However, in un-tabulated analysis, (available upon request), we find that the results reported here are not substantially affected if we include the entire year of 2004 as pre-pilot period or post-pilot period. Firms, accounting data were obtained from COMPSTAT and then merged to the corporate social responsibility scores from Kinder, Lydenberg and Domini’s (KLD’s) database. The KLD database is the most widely used dataset in the CSR literature. Our final sample consists of 9,849 firm-year observations from 2,607 firms.

Following Bertrand and Mullainathan (2003), our test is in the form of,

$$CSR = \beta_0 + \beta_1 \times \text{Pilot} \times \text{Post} + \beta_2 \times \text{Pilot} + \beta_2 \times \text{Post} + \text{Control variables}$$

Where,

$$\text{Pilot} = 1 \text{ if the firm’s stock can be shorted and 0 if it is a control stock.}$$

$$\text{Post} = 1 \text{ if the observation is during the experimental period (2005-2007) and 0 otherwise (2001-2003).}$$

$$\text{Pilot} \times \text{Post} = 1 \text{ if the firm’s stock is vulnerable to unregulated short-sales and 0 otherwise.}$$
Following Gross and Roberts (2011) we construct our dependent variable by taking the sum of the rankings of seven of the 13 dimensions of CSR compiled by KLD. The list of the entire 13 items includes community, corporate governance, diversity, employee relations, environment, human rights, product, alcohol, gambling, firearms, military, tobacco and nuclear power. KLD ranks each dimension on a scale from +5 to -5 with positive numbers being a strength and negative being a concern. However, the latter six are purely exclusionary terms so we exclude them.

The variable of interest, Pilot*Post, identifies the firm-year observations which were vulnerable to unregulated short-sales due to the pilot program.

Following LST our control variables are constructed as:

1. \( \text{Ln (Total assets)} \): The natural logarithm of total assets. Larger firms enjoy economies of scale and we expect \( \text{Ln(Total assets)} \) to be positively associated with CSR.

2. \( \text{Tobin's Q} \): The ratio of market value of assets to book value of total assets. Tobin’s Q measures a company’s growth opportunity. To the extent that companies with good financial performance and growth opportunities focus more on future potential, we expect Tobin’s Q is positively related to CSR since the benefit of CSR activities is likely to materialize in the long-run (Ioannou and Serafeim, 2012).

3. \( \text{Book leverage} \): The ratio of book value of total debt to total assets. Firms with higher leverage rely more on debt-financing. Girerd-Potin et al. (2012) argue that socially responsible firms have a lower cost of equity and therefore more likely to issue equity rather than debt. As such, we expect a negative relationship between book leverage and CSR. The leverage also measures the discipline placed on corporate executives to satisfy their indentures with creditors (Nini, Smith, and Sufi, 2012). Because firms that are closer to indenture violation have less control over their investments we expect to see a negative correlation between this variable and CSR.

4. \( \text{ROA} \): The ratio of operating cash flow (“EBITDA”) to total assets. Firms with low profitability have fewer resources to invest in CSR activities (Ioannou and Serafeim, 2012). Therefore, we expect a positive relationship between book leverage and CSR.

5. \( \text{Cash & equivalents/Total assets} \): Firms with financial slacks rely less on financial markets, and therefore more likely to invest in CSR. Also, this ratio indicates the margin a firm has established for contingencies. We expect a positive relationship between Cash & equivalents/Total assets and CSR.

Table 2 presents the summary statistics of the main variables in our sample. This result is comparable to those documented in prior literature (e.g., Goss and Roberts, 2011; Lins, Servaes and Tamayo, 2013). The average CSR score is -0.37, with a standard deviation of 2.08. The average Tobin’s Q in our sample is 2.07. The book leverage ratio and ROA average 21% and 11% respectively. Cash as a percentage of total assets is 17% on average.
Table 2: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>25th</th>
<th>Median</th>
<th>75th</th>
</tr>
</thead>
<tbody>
<tr>
<td>KLD Score</td>
<td>9849</td>
<td>-0.37</td>
<td>2.08</td>
<td>-1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ln (Total asset)</td>
<td>9849</td>
<td>7.4</td>
<td>1.66</td>
<td>6.19</td>
<td>7.3</td>
<td>8.44</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>9849</td>
<td>2.07</td>
<td>1.45</td>
<td>1.15</td>
<td>1.57</td>
<td>2.39</td>
</tr>
<tr>
<td>Book leverage</td>
<td>9849</td>
<td>0.21</td>
<td>0.21</td>
<td>0.04</td>
<td>0.18</td>
<td>0.32</td>
</tr>
<tr>
<td>ROA</td>
<td>9849</td>
<td>0.11</td>
<td>0.13</td>
<td>0.05</td>
<td>0.11</td>
<td>0.17</td>
</tr>
<tr>
<td>Cash &amp; equivalents/Total assets</td>
<td>9849</td>
<td>0.17</td>
<td>0.21</td>
<td>0.03</td>
<td>0.08</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Results and Discussion

Three tests are undertaken (1) ordinary least squares, (2) industry fixed effects, and (3) both industry and time fixed effects. The first simple OLS regression regresses CSR on the variables of interest and the control variables. In the second regression we employ the fixed effects methodology to account of the fact that KLD data does not adjust for industry characteristics. For example, a company that, “. . .devises substantial revenues from innovative remediation products, environmental services or products . . .” will get a higher rating than a company whose revenues come from products or services that are environmentally neutral or degrade the environment. The fixed effects methodology uses dummy variables to control for industry differentials. The third regression controls for both industry effects and time effects. Our observations period (2001 to 2007) was an eventful period and it is possible that social values or awareness of corporate behavior changed over that time period. So the third regression controls both industry fixed effects and time fixed effects.

Table 3 presents the results of all three regressions. The coefficients on all of the variables except ROA (in the case of no fixed effects) are of the expected sign and consistent with prior research. All coefficients are significant at least at the ten percent level except the “errant ROA” coefficient. The significant and positive coefficients on total assets, Tobin’s Q, and cash suggest that there are economies of scale in CSR, that growth oriented firms are more likely to invest in CSR, and that the luxury of being less dependent on external financing increases the likelihood of investing in CSR. In contrast, companies that have higher debt either depend on external financing, or bear higher costs of equity, or are closer to a state of default and are less able to afford investing in CSR.
Table 3: Regression Results

<table>
<thead>
<tr>
<th>Dependent:</th>
<th>(1) KLD Score</th>
<th>(2) KLD Score</th>
<th>(3) KLD Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot</td>
<td>-0.219***</td>
<td>-0.169***</td>
<td>-0.170***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.009)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Post</td>
<td>-0.534***</td>
<td>-0.518***</td>
<td>-0.684***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Pilot * Post</td>
<td>0.217**</td>
<td>0.185**</td>
<td>0.189**</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.028)</td>
<td>(0.025)</td>
</tr>
<tr>
<td>Ln (Total assets)</td>
<td>0.116***</td>
<td>0.116***</td>
<td>0.104***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Tobin's Q</td>
<td>0.156***</td>
<td>0.154***</td>
<td>0.151***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Book leverage</td>
<td>-0.995***</td>
<td>-0.557***</td>
<td>-0.559***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>ROA</td>
<td>-0.139</td>
<td>0.656***</td>
<td>0.650***</td>
</tr>
<tr>
<td></td>
<td>(0.367)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Cash &amp; equivalents/Total assets</td>
<td>0.231*</td>
<td>0.235*</td>
<td>0.239*</td>
</tr>
<tr>
<td></td>
<td>(0.054)</td>
<td>(0.065)</td>
<td>(0.060)</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year fixed effect</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.000***</td>
<td>-1.199***</td>
<td>-0.920***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Observations</td>
<td>9,849</td>
<td>9,849</td>
<td>9,849</td>
</tr>
<tr>
<td>F stat</td>
<td>50.16***</td>
<td>42.99***</td>
<td>29.78***</td>
</tr>
</tbody>
</table>

***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. The dependent variable is the KLD score. Pilot is a dummy variable that equals one for treatment firms and zero for control firms. Post is a dummy variable that equals one if the observation is from 2005 to 2007 and equals zero if the observation is from 2001 to 2003. The positive coefficient on the cross product is consistent with an increase in a firm’s social investment when a firm’s stock can be short-sold without restriction. The variable of interest is the cross product, $Pilot*Post$. A positive coefficient is consistent with firms that are subject to unregulated short sales increasing their CSR investment. Pilot, taken alone, sorts out the firms whose stocks can be shorted from those still protected but ignores the window of opportunity. The negative coefficient indicates these firms, which were chosen randomly, tended to invest less in CSR. Post taken alone, identifies whether the observation is within the window of unregulated shorting or not. The negative coefficient indicates that all firms spent less on CSR during that period. The positive correlation on the cross term, $Pilot*Post$ indicates that the decline in CSR during the window of opportunity was less for the short-sale companies than for the protected companies. Therefore, the vulnerability to short-sale is associated with a higher investment in CSR.
The implication of all this is that companies can raise investor confidence through CSR investment. When the value of trust increases, firms respond by increasing social capital. The results are robust with respect to specification. Our test variable is significant and of the expected sign for both time and industry-fixed effects. These results are consistent with social capital work of Lins, Servaes, and Tamayo (2016) who hold that CSR, as a component of social capital provides information to investors that can be observed when the value of information increases. But our experiment differs from theirs in an important respect. While they consider CSR prior to an exogenous shock, we examine how CSR investment changes in response to an exogenous shock.

Casting CSR in the framework of social capital consolidates the findings of the earlier research cited at length before. Better relations with shareholders, less earnings management, less insider trading, better relations with employees, greater customer satisfaction, and a reserve against adverse news are all part of social capital. In this study we find evidence that when the value of trust increases, firms respond by increasing their social capital.

Conclusion

In this paper, we exploit a rare opportunity: a controlled experiment in the financial markets, to test the benefit of firms’ investments in Corporate Social Responsibility (CSR). From May 2005 to August 2007, randomly selected stocks from the Russell 3,000 were exempted from short-sale regulations leaving these stocks more vulnerable to short selling. Consistent with Lins, Servaes, and Tamayo (2016) we hypothesize that during this period information about the social capital of these firms would have a higher value than that of the firms in the control group. Utilizing KLD database, our empirical test reveals the following findings. Firms whose stocks could be easily short-sold during the test period invested significantly more in CSR in the test period than the firms whose stock were not under the same pressure. The results indicate that CSR is more valuable to firms under unfavorable conditions. Thus we conclude that the data are consistent with firms responding to the change in the value of information conveyed by CSR.

Our findings are valuable to academics investigating firm behavior, to practitioners seeking maximum shareholder wealth, and to policy makers pursuing social goals. Our results show that 'firms do well by doing good.' Corporate pursuit of activities that are valued by society but not expressed in the marketplace is consistent with good financial performance. Our findings join a body of literature that implies not all non-market goals require direct intervention by policy makers.
References


Examining the Extent to Which the 2015 Women’s World Cup Increased Tourism from the United States to Canada: Investigating the Role of Marketing, Media, and Special Events

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Abstract

The 2015 Women’s World Cup presented a remarkable opportunity for sports tourism in Canada and provided an opportunity for increased tourism from the United States into Canada. The tournament covered a time period of one month and attracted 1,353,506 spectators, many of whom came from the United States. The primary purpose of this descriptive study is to examine the extent to which fans from the United States (and to a lesser extent from other countries) traveled to Canada for the 2015 Women’s World Cup, the venues fans attended, the amount they spent, and their motivations for traveling to Canada for the event. A secondary purpose is to examine marketing strategies that were used to create interest in the event and attract tourists including television advertising, the use of other traditional media (e.g., newspaper ads, billboards, etc.) and social media marketing. This paper utilizes secondary data and published reports from the FIFA 2015 World Cup Host Committee and the Canadian Sports Tourism Council, interviews with Canadian sports tourism officials at each of the host cities, and reports from the mass media. The methodology consisted of content analysis of these sources to identify tourism trends. Results of the study show that tourism from the United States to Canada for the World Cup was influenced by the success of the American Women’s National Team, the marketing of the tournament in the United States by Fox TV and the growing interest in women’s sports by people in the USA. In addition, the analysis also reveals that host cities in Canada that are located near United States population centers (e.g., Vancouver, Montreal, Winnipeg) attracted more tourists than host cities that were more remote and distant from the USA (e.g., Edmonton, Moncton); the transportation infrastructure (e.g., access by airlines, highways, and railroads) also influenced tourism; host cities with better infrastructure attracted more tourists. The results also show that Americans in Canada at the time the World Cup was held were more aware of the tournament than people from other countries, and were more likely to be in Canada to attend World Cup matches than people from other nations. The implications for sports marketing and sports tourism are also discussed.

Introduction

The FIFA Women’s World Cup has been played since 1991, and the tournament has become increasingly popular over the years, in part because so many women are playing the sport; more than 30 million women throughout the world now play soccer (Williams, 2015). The 2015 Women’s
World Cup was especially popular in the United States. More than 61.4 million fans watched some part of the tournament on television in their homes; this is an increase of 64 percent of the number of people who viewed the 2011 tournament that was hosted by Germany. The final match of the tournament, in which the United States defeated Japan, was viewed by 26.7 million viewers in their homes (25.4 million viewers on Fox television and by another 1.3 viewers on Spanish language network Telemundo) making it the most-watched televised soccer game in American history (Sandomir, 2015). Once the out-of-home viewing audience is factored in (e.g., people viewing in bars, public places and stadiums), the total American TV viewership totaled more than 31 million individuals (Nielsen, 2015). This viewership broke the previous record set by the American men in the 2014 men’s World Cup which attracted a television audience in the United States of 26.5 million. The 2015 Women’s World Cup doubled the number of Americans who tuned in to the previous tournament, when 13.5 million people in the United States tuned in to the 2011 final (Nielsen, 2011). The Women’s World Cup was played at six venues across Canada (Winnipeg, Ottawa, Edmonton, Montreal, Vancouver, Moncton (New Brunswick). Tournament matches began June 6 and concluded on July 5. The tournament drew a total of more than 1.35 million fans, many of whom came from the United States. After the tournament concluded (Baker, 2015; Brijbassi, 2015). Canada Soccer reported that the tournament set a new total attendance record (1,353,506) for any FIFA competition other than the FIFA World Cup, including thousands of out-of-town spectators.

Examining the experiences at each of these venues provides insights about international tourism at the tournament. Anecdotal evidence suggests that large numbers of fans from the United Kingdom, Japan, China, Germany, South Korea and France (among other nations) traveled to Canada for the tournament. The purpose of this paper is to discuss the extent to which the Women’s World Cup generated tourism, especially from people in the United States.

Douglas (2015) described how the success of the English national team is making women’s football more popular in the United Kingdom, where a recent match of the women’s national team drew more than 45,000 fans. Japan, the defending champion, was well-represented as thousands of their fans came to support the team; the passion was great in Vancouver which has a large Asian population. Large numbers of fans of the China and United Kingdom national teams greeted both teams when they arrived at the airport after the tournament. A summary of media reports about tourism at each venue is shown below.

**Purpose of the Study**

The primary purpose of this descriptive study is to examine the extent to which fans from the United States traveled to Canada for the 2015 Women’s World Cup, the venues they attended and their motivations for traveling to Canada for the event. A secondary purpose is to investigate tourism trends from other countries associated with this event.

**Descriptive Data about Tourism and Attendance at each World Cup Host City**

**Vancouver** was the site of nine matches, including the final and attracted a total 356,899 fans (an average of 39,635 fans per match); these were the highest attendance figures for any host city. The tournament generated $118.9 million in revenues for the province of British Columbia and $82.9 million for the City of Vancouver. The two matches in which the United States played each drew more than 50,000 fans; the only matches in Vancouver that drew more fans featured the host Canadian side. During the tournament, hotels in Vancouver were 99 percent full, due in large part to all the fans in the region for the tournament. Many of the fans in Vancouver were Americans who came for the Final (Lee, 2015) including large numbers of members of the American Outlaws supporters group (Fletcher, 2015). The tourism numbers in Vancouver were bolstered by the fact that British Columbia is a hot spot for Asian tourists and by Japan advancing to the title game (Lam, 2016).
Edmonton hosted 11 matches including the tournament opener between Canada and China which drew 53,058 spectators, the largest crowd to watch any national team in any sport in Canada. Surprisingly, the only game played by the United States in Edmonton (against Colombia) drew a paltry crowd of only 19,412 spectators perhaps because Edmonton is some distance away from the US-Canada border and is difficult to get to (Theobald, 2015). The tournament generated more than $78.3 million for the province of Alberta and $56.4 million for the City of Edmonton (Ramsay, 2015; Baker, 2015).

Winnipeg was the site of 7 matches and drew a total of 194,562 fans (an average of 27,805 fans per match). Winnipeg benefited by hosting games featuring Team USA in the opening rounds; 35 percent of the fans at matches in Winnipeg came from the United States and 73 percent of the out-of-town visitors who stayed at least one night were from the United States (Trunzo, personal correspondence). Accounts in the news media suggest that many American fans made the short drive across the border from the United States to Canada to watch opening-round matches (Cuciz, 2015). The match between the United States and Sweden drew 32,716 spectators, and it was estimated that at least 10,000 American fans were in Winnipeg throughout the tournament, and so many fans were present hotels in the city were sold out and fans had to reserve rooms far away from the site (Kives, 2015). So many fans from the United States were driving to Winnipeg that the line at the border crossing lasted 3 hours. The tournament helped spur $42.4 million in revenues for the province of Manitoba and $35.9 million for the city of Winnipeg.

Ottawa was the site of 9 matches and a total of 189,460 fans attended matches there (an average of 21,051 fans per match). The match between the United States and China drew the most fans to this site, with a crowd of 24,141 fans; many other matches attracted more than 20,000 fans. To promote attendance, more than 85 special events were developed to let fans engage in activities to create more interest. Ottawa was especially popular among fans from Norway, Mexico and South Korea were especially well-represented (Kallan, 2015). Post-event analysis suggests that hosting World Cup events generated more than $148 million in tourism related revenues for the province of Ontario and more than $28 million in tourist-related revenues for Ottawa and gave the city worldwide exposure as a tourist destination; matches played in Ottawa were nearly sold out (Laucius, 2015).

Montreal was the host site for 9 matches, including the semifinal between the United States and Germany. The matches at the Olympic Stadium in Montreal drew a total of 228,431 fans (an average of 25,831 fans per match). Those attendance numbers increased greatly for the thrilling semi-final between Team USA and Germany that lured in 51,196 fans; the media said the venue and the match were both thrilling (Gelevan and Bennett, 2015). The match between Canada and New Zealand attracted more than 45,000 spectators. Montreal’s success as a tourism venue was based in part on the efforts of the city to create fan zones that reflected the unique culture of the teams that participated in the event, and as a result during the tournament compared to the previous year. The tournament generated more than $71.3 million in tourism revenue for the province of Quebec and $47.6 million for the city of Montreal.

Moncton, New Brunswick (population 70,000) hosted 7 matches and attracted at total of 78,392 fans (an average of only 11,199 per match). The matches drawing the most fans featured the national teams of England and France and attracted more than 13,000 spectators. Moncton was hurt by several factors; the town is small, its stadium only seats, and the region is isolated in the Canadian maritime provinces. Still, fans came from throughout eastern Canada and the northeast United States to see the tournament (CBC, 2015).
1. Research Questions

RQ1: How many tourists from the United States and other countries attended the tournament?

RQ2: To what extent were there variations in the numbers of American tourists at different World Cup sites?

RQ3: To what extent did matches featuring the American national team and the Canadian national team draw more fans than matches featuring other teams?

RQ4: What were the motivations for Americans to travel to Canada for tourism at the time the World Cup was taking place?

RQ5: What was the economic impact of American tourists on Canada during the tournament?

2. Methodology

This study relies on secondary data provided by the 2015 Women’s World Cup and the Canadian Sports Tourism Council as well as information from published news accounts. Whenever possible the secondary data were analyzed to establish tourism trends related to the tournament. Information from the mass media and trade media were studied using methods associated with content analysis and were incorporated into the presentation.

3. Results - Answering the Research Questions

**RQ1: How many tourists from the United States attended the tournament?**

According to the Canadian Sports Tourism Association (2016), 95,645 fans from the United States visited Canada during the World Cup and stayed at least one night, more than triple the number of USA fans who returned home on the same day (Figure 1). This may be due to the fact that sites in Canada were some distance away from the United States.

**Figure 1: American Stayover and Excursionist Tourists at the Women’s World Cup**

<table>
<thead>
<tr>
<th>Venues</th>
<th>Excursionists</th>
<th>Stayovers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>12,746</td>
<td>33,908</td>
<td>45,654</td>
</tr>
<tr>
<td>Edmonton</td>
<td>857</td>
<td>12,624</td>
<td>13,481</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>2,382</td>
<td>17,429</td>
<td>19,811</td>
</tr>
<tr>
<td>Ottawa</td>
<td>1,313</td>
<td>10,301</td>
<td>11,614</td>
</tr>
<tr>
<td>Montreal</td>
<td>6,821</td>
<td>20,184</td>
<td>27,005</td>
</tr>
<tr>
<td>Moncton</td>
<td>1,030</td>
<td>2,200</td>
<td>3,230</td>
</tr>
</tbody>
</table>

Data from the Canada Sports Tourism Council.
Because this was a global sports event, tourists also came to the World Cup from many other countries. According to data from the Canadian Sports Tourism Council, 23,512 individuals from countries other than the United States came to Canada for the tournament and stayed at least one night. The nations that brought the most tourists to the World Cup include Japan (6,170 individuals), Germany (2,596), Ecuador (2,584), Switzerland (2,256) Brazil (1,7570, and Australia (1,720). The distribution of international stayover tourists is shown in Figure 2.

**Figure 2: Numbers of International Stayover Tourists at the World Cup (by Country)**

![Data provided by the Canada Sport Tourism Council.](image)

**RQ2: To what extent were there variations in the numbers of American tourists at different World Cup sites?**

The total number of spectators attending matches at the various World Cup venues are shown in Table 1. Anecdotal evidence (see Table 2) suggests that more Americans were likely to attend matches at cities closest to the American border (e.g., Vancouver, Winnipeg, and Montreal) and less prone to attend matches at more distant sites (e.g., Edmonton, Ottawa, and Moncton). Thus the data in Table 3 suggest significantly more fans attended matches at sites nearest the USA-Canada border, and the data analysis and anecdotal evidence from media sources suggests that American fans attended matches in those cities in large numbers. Vancouver was by far and away the most visited Cup site for American tourists; the reasons are obvious, Vancouver is easily accessible and is directly across the border from the soccer hotbed of Seattle and Vancouver hosted the championship match creating a perfect storm for American tourism. Montreal drew second-most American fans because it hosted the United States semi-final match and because it is relatively close to the American border; similarly, Winnipeg attracted a lot of American fans due to its proximity to Chicago and Minneapolis. In contrast, Edmonton and Moncton did not see significant numbers of American tourists because these destinations are distant from the USA border and more difficult to access, and because only qualifying round matches were held at these sites.
Table 1: Venues and Attendance at Women’s World Cup Venues

<table>
<thead>
<tr>
<th>Host City</th>
<th>Total Attendance</th>
<th>Average Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>356,899</td>
<td>39,655</td>
</tr>
<tr>
<td>Edmonton</td>
<td>305,692</td>
<td>27,790</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>194,632</td>
<td>27,805</td>
</tr>
<tr>
<td>Ottawa</td>
<td>189,460</td>
<td>21,051</td>
</tr>
<tr>
<td>Montreal</td>
<td>228,431</td>
<td>25,381</td>
</tr>
<tr>
<td>Moncton</td>
<td>78,392</td>
<td>11,199</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,353,506</strong></td>
<td><strong>26,037</strong></td>
</tr>
</tbody>
</table>

Data from the 2015 Women’s World Cup Organizing Committee (2015)

Table 2: Number of Tourists Who Attended Matches Closest to the USA Border

<table>
<thead>
<tr>
<th>Host Cities</th>
<th>Total Attendance</th>
<th>Average Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance at Host Cities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closest to the USA-Canada border(^1)</td>
<td>779,962</td>
<td>30,947</td>
</tr>
<tr>
<td>Attendance at Host Cities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distant from the USA-Canada border(^2)</td>
<td>573,544</td>
<td>20,013</td>
</tr>
</tbody>
</table>

\(^1\)Attendance at World Cup matches at Vancouver, Winnipeg, and Montreal
\(^2\)Attendance at World Cup matches at Edmonton, Ottawa, and Moncton

RQ3: To what extent did matches featuring the American national team and the Canadian national team draw more fans than matches featuring other teams?

The author wanted to ask the extent to which attendance at World Cup matches featuring the American national team might have been significantly greater than other games; the principle was that one might expect more American tourists would be likely to attend matches in which Team USA played. We also wanted to compare matches featuring the host team (Canada) versus other matches in the tournament. Table 4 shows the total attendance at each venue featuring matches involving Team USA, Team Canada and teams from other countries, while Table 5 displays the average attendance for Team USA and Team Canada at each site. The data show that matches featuring Team USA averaged 29,814 fans; more than the average number of spectators at other matches (average of 20,744 fans) but less than the average number of individuals who attended matches featuring Team Canada (47,887 fans). As it relates to the hypothesis, the average number of fans at matches in which Team USA played was higher in sites closest to the border than at remote sites; an average of 45,511 fans per match at games played at Vancouver, Winnipeg and Montreal compared to an average of 21,176 fans per match at games in Edmonton, Ottawa, and Moncton.
Table 3: Total Attendance at World Cup Matches Featuring Team USA and Team Canada

<table>
<thead>
<tr>
<th>Host City</th>
<th>Attendance for Team USA matches</th>
<th>Attendance for Team Canada matches</th>
<th>Attendance for Other Matches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>105,535</td>
<td>107,882</td>
<td>143,483</td>
</tr>
<tr>
<td>Edmonton</td>
<td>19,412</td>
<td>88,602</td>
<td>142,320</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>63,864</td>
<td>0</td>
<td>130,768</td>
</tr>
<tr>
<td>Montreal</td>
<td>51,176</td>
<td>45,420</td>
<td>131,475</td>
</tr>
<tr>
<td>Ottawa</td>
<td>24,141</td>
<td>0</td>
<td>146,332</td>
</tr>
<tr>
<td>Moncton</td>
<td>0</td>
<td>0</td>
<td>65,254</td>
</tr>
<tr>
<td>Totals</td>
<td>264,128</td>
<td>241,904</td>
<td>641,632</td>
</tr>
</tbody>
</table>

Table 4: Average Attendance at World Cup Matches Featuring Team USA and Team Canada

<table>
<thead>
<tr>
<th>Host City</th>
<th>Average Attendance for Team USA Matches*</th>
<th>Average Attendance for Team Canada matches*</th>
<th>Average Attendance for Other matches*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>52,767 (2 matches)</td>
<td>53,941 (2 matches)</td>
<td>28,696 (5 matches)</td>
</tr>
<tr>
<td>Edmonton</td>
<td>19,412 (1 match)</td>
<td>44,301 (2 matches)</td>
<td>23,720 (6 matches)</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>31,392 (2 matches)</td>
<td>0 (0 matches)</td>
<td>21,437 (5 matches)</td>
</tr>
<tr>
<td>Montreal</td>
<td>51,176 (1 match)</td>
<td>45,420 (1 match)</td>
<td>18,833 (7 matches)</td>
</tr>
<tr>
<td>Ottawa</td>
<td>24,141 (1 match)</td>
<td>0 (0 matches)</td>
<td>20,904 (7 matches)</td>
</tr>
<tr>
<td>Moncton</td>
<td>0 (0 matches)</td>
<td>0 (0 matches)</td>
<td>10,875 (6 matches)</td>
</tr>
<tr>
<td>Average Attendance (all venues)</td>
<td>29,814 (7 matches)</td>
<td>47,887 (5 matches)</td>
<td>20,744 (36 matches)</td>
</tr>
</tbody>
</table>

*The number of matches are in parenthesis

RQ4: What were the motivations for Americans to travel to Canada for tourism at the time the World Cup was taking place?

Survey data from the Canadian Sports Tourism Council sought to understand the motivations of people to travel to Canada during the time the World Cup was taking place. The surveys asked visitors in Canada at the time if they were aware that the World Cup was taking place and if it was the primary reason they were traveling to Canada (Fisher, 2016). Nearly all the respondents from the United States (94 percent) said they were aware of the tournament, but fewer visitors from other countries in Canada at the time said they were aware of the World Cup (79 percent). Similarly, more fans from the USA said they were in Canada primarily to see the World Cup (86 percent of Americans reported they traveling just for the tournament) compared to only 69 percent of tourists from other countries who reported they were in Canada specifically for the tournament. These data suggest that Americans were more aware of the tournament than people from other nations and were more motivated to want to travel for the World Cup.

RQ5: What was the economic impact of American tourists on Canada during the tournament?

The Canadian Sports Tourism Council reported that the tournament generated $493.6 million in economic activity for Canada, contributed $249.1 million to the gross domestic product, and resulted
in tax revenues of $97 million; (Brijbassi, 2015). At least part of the economic growth generated by the World Cup stemmed from the 3,100 jobs that were supported by the event. The tournament generated millions of dollars in gross domestic product for each of the host cities, led by Vancouver (see Table 5). Estimates from the Canadian Sports Tourism Council show that same-day tourists (excursionists) spent an average of $162 per day, while stayovers (who stayed overnight) spent an average of $547 per trip, and that total tourism revenues related to the tournament totaled more than $93 million.

Table 5: Economic Impact of Hosting the World Cup. (Dollar amounts are in millions)

<table>
<thead>
<tr>
<th>Venue</th>
<th>Vancouver</th>
<th>Edmonton</th>
<th>Winnipeg</th>
<th>Ottawa</th>
<th>Montreal</th>
<th>Moncton</th>
<th>Spillover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Expenditure</td>
<td>$53.1</td>
<td>$32.2</td>
<td>$20.0</td>
<td>$18.1</td>
<td>$29.2</td>
<td>$14.7</td>
<td>$0</td>
</tr>
<tr>
<td>GDP</td>
<td>$38.3</td>
<td>$26.3</td>
<td>$16.9</td>
<td>$12.1</td>
<td>$20.6</td>
<td>$9.2</td>
<td>$89.3</td>
</tr>
<tr>
<td>Wages</td>
<td>$28.7</td>
<td>$18.5</td>
<td>$12.1</td>
<td>$9.0</td>
<td>$15.8</td>
<td>$7.3</td>
<td>$46.4</td>
</tr>
<tr>
<td>FT Jobs</td>
<td>692</td>
<td>405</td>
<td>278</td>
<td>188</td>
<td>368</td>
<td>155</td>
<td>745</td>
</tr>
<tr>
<td>Industry Output</td>
<td>$82.9</td>
<td>$56.4</td>
<td>$35.9</td>
<td>$28.6</td>
<td>$47.6</td>
<td>$22.5</td>
<td>$144.1</td>
</tr>
<tr>
<td>Taxes</td>
<td>$20.1</td>
<td>$9.8</td>
<td>$7.7</td>
<td>$5.8</td>
<td>$10.3</td>
<td>$3.8</td>
<td>$28.2</td>
</tr>
</tbody>
</table>

Data are from the Canadian Sports Tourism Council

Figure 3: Economic Impact of Hosting the World Cup (Dollar amounts are in millions)

4. Conclusion

This exploratory study sought to investigate to which the 2015 Women’s World Cup in Canada attracted tourists from the United States and other countries. The results suggest that significant numbers of Americans traveled to Canada for the tournament, and that the matches closest to the USA-Canada border attracted more American tourists. The results also show that matches featuring Team USA and the hosts (Team Canada) attracted more spectators that matches featuring other
nations, thus showing the impact of American fans on overall attendance. The results suggest that Americans were more aware of the tournament than tourists from other countries and that Americans were more likely to have traveled to Canada specifically because of the tournament. Finally, the data show that the tournament generated significant economic impacts with tourism-related revenue being one of the most important factors.

Several lessons about sports tourism can be learned from this case study. Data suggests that fans from the United States were more likely than people from other nations to travel to Canada for the tournament. Certainly, such factors as geographic proximity, ease of travel, familiarity with the destination country, and the success of the American team all played a factor in tourist decisions. The data suggest that the culture of local host cities affected tourism (e.g., Vancouver has a large Asian population and is closer to Japan than other sites). Geographic proximity and the history of success of national teams also seems to have played a role in influencing tourist trends. A valuable lesson to be learned is that tourism often benefits from visitors from nearby nations, especially when people in those countries have the power to spend and are passionate about the events that are hosted.

This study suffers from a number of limitations. There was a lack of primary data and thus this study is limited to secondary data analysis. More thorough investigations need to be done that include primary data collection and analysis. Future research should focus on quantifying the impacts of sports-related tourism including how people learn about sports events, motivations to attend, and how fans spread word-of-mouth. Another promising research area focuses on the growing popularity of women’s sports.
References


Trunzo, A 2016, May 12, Personal correspondence.
Analysis of a French Railway Vigilance Monitoring Device: A Description of a Method to Evaluate the Level of Vigilance and the Relationship with Motility Performance

Michel Sauvignon
University of La Rochelle, France

Keywords: Rail accident investigation, Accident prevention, Awareness, Vigilance, Brainwave activity, Electrophysiology, Electrooculography, Monotony, Arousal Monitoring device, Secondary motor task, Security

Abstract

Operator deficiencies have been found to be responsible for about 75% of train collisions and derailments. The practical nature of these deficiencies is not yet elucidated but it is reasonably considered as mainly due to lack of vigilance. It is generally admitted that driver-vigilance declines with sleepiness, tiredness or monotony. The French vigilance monitoring (VACMA-system) is expected to follow the train driver reactions. A scoring method to test this system, analyzing the correlation between vigilance’s parameters as a function of the driver’s actions was developed and validated. It made it possible to study the ability of the security system to indirectly detect decreases in vigilance. The current technology used to assess and prevent vigilance decline was based on particular devices such as eye tracker or steering wheel movements. The analysis of the activation of the VACMA-system used the safety deadman circuit. We checked for a relationship between motility behavior (regular activation of a command), variations in vigilance (with non-invasive methods) and responses to screen signals. A simplified monotonous driving task was used to study the physiological and behavioral parameters which are discussed in this paper. Such a system opens new perspective for detection of decreases of vigilance in other forms of driving such as cars, buses, lorries, airplanes and ships.

Introduction

A safe driving behavior is necessary for all public vehicles and particularly for trains. A greater knowledge of electrophysiological aspects of drowsiness might have implications for professional situations in which people have to be fully awake to perform competently, particularly by establishing reliable application of ElectroEncephaloGraphy (EEG) in these areas. Transport operations frequently involve irregular work hours and monotonous stimulations. Sleep and sleep-related factors – such as variations of vigilance - are involved in widely disparate types of accidents and even some disasters. The recorded consistent temporal pattern of physiological events and performance-related incidents suggest that such critical human errors are due to brain mechanisms. They control sleep and many other oscillatory processes underlying human physiology and behavior. In fact, a large number of accidents are attributed to human error in air, sea, road and
railway transports. It appears that the important accidents depend on inadequate human response. Which are the origins of this problem: lowered alertness, lack of attention or delayed reaction due to active sleep-related processes? However, the increased automation in the operator's cabin as well as the long travelled distances are factors likely to provoke a lowered vigilance during critical periods.

The studies on sleep and its controlling biological clocks have led to significant discoveries. A major one reported that neural processes controlling alertness and sleep produce an increased sleep tendency and diminished functional capacity. This occurs during some early morning hours circa 2 am to 7 am and, to a lesser degree, during a period in midafternoon - circa 2 pm to 5 pm, Carskadon et al. (1986). This was reinforced by observations showing that human errors, poor performance and catastrophes have a greater risk to occur during the primary period from 2 to 7 am. This also occurs in a lesser manner in the afternoon from 2 pm to about 5 pm, Mackworth (1948), (Mitler et al. 1988).

Driver tiredness depends mainly on monotonous environment and lack of stimulation. To elucidate this problem, we tried to establish a behavioral model related to the vigilance criteria. In this paper, we report the importance of the relationship between lack of vigilance and perturbation of motor behavior. The results demonstrate that errors are related to two automatism factors implied in information processing which may result from repetition. The absence of attention to the signals may be facilitated by redundancy of action and the automatism of the activation of the device, Edkins and Pollock (1997).

Presently, only a one-man-service is employed on modern high-capacity tractive units in French railways as well as in German railways (Peter 1983 et al. a et b). Based on preliminary investigations by Coblentz et al. (1985, 1986), we designed an experiment to simulate the system named “Veille Automatique par Contrôle du Maintien de l’Appui” (VACMA) functioning under laboratory conditions. Although VACMA was sometimes called a vigilance monitoring device, (VMD) it was previously demonstrated that correct operation of VACMA manoeuvres did not coincide with low alertness phases. Human errors cause improper perceptions, inappropriate decisions, or inadequate execution (Sharp Grant, 1971, Yamauchi, 1981). The fact that the crew often consists in a single driver increases the probability of making errors like missing signal or sleeping during work.

Two sorts of vigilance device prototypes were presently proposed. First, the classical type was composed of commonly used command functions following the “all-or-nothing” law which needs to be manipulated regularly. The second type was an amelioration of the first, consisting of a more comfortable angle for the driver’s foot position. The first aim of the present study was to find extreme states of drowsiness and mainly to establish a rule between computerized vigilance studies and biomechanical behavior. Until now, the difficulty was determining the threshold of drowsiness, and the modification of behavior with classical methods. These studies were based on a method proposed by Rechtschaffen and Kales (1968), which was relatively reliable, simple, and suitable for automatic detection after adaptation by Värri and al. (1990). The data gathered from observations corroborated information obtained by interviews when the Vigilance Monitoring Device (VMD) was satisfactorily operated - even by untrained subjects - in laboratory tests. As a result, we designed and optimized an experimental set-up which would induce a marked decline in vigilance, allowing psychological and electrophysiological measurements. This concerned Reaction Time (RT), Electro-EncephaloGram (EEG), Electro-OculoGram (EOG), Biomechanical Measures (BM) of pressure (BMp) and angle of the drivers’ foot (BMa) and the time of activation of the device. This raised the problem of adaptation to the experimental conditions. The task of the train driver was much more difficult if attention had to be maintained on some source of information for the occurrence of infrequent, unpredictable events over long periods of time. The ability to maintain vigilance for such events typically decreases with time, a phenomenon known as the “vigilance decrement". Already in 1926, Head used the term "vigilance" to refer to maximal physiological efficiency of the central nervous system. Arousal is a general state that affects a person's ability to

Method

In this paper, we conducted a series of preliminary studies to help to elucidate the monotony problems and drowsiness. All the subjects who participated in the experiments tried to explain the difficulties encountered. They were controlled for sleep quality, drowsiness periods on well-known parts of the trip and were expertised on fatigue and error frequency, adaptation to night work. All the obtained data underlived the fact that adaptation to night work was the main problem. The studies constituted a research project where the first and second steps consisted in laboratory studies both conducted on a static experimental cabin and on a reconstructed vibrating one. The present paper reports the first stage which was based on the same type of measurements during the travels but performed under static working conditions. We took into account human factors and, more particularly, vigilance research, (Dorrian et al. 2006, 2007a&b).

1. Rational

In the present studies, we used the VACMA system which represents a paced secondary motor task expected to monitor French railways train drivers. The modern VACMA is a sophisticated system following the traditional “safety-deadman circuit.”

The main part of the apparatus was a life-sized model of an engineer's console in an electric locomotive additionally equipped for the experimental task with the final design presented on Figures 1 A & B. The control elements were composed of right and left foot pedals, several levers, buttons in various parts of the driver's cabin, and the deadman handle in monotonous situation. Whereas the traditional dead-man handle had to remain constantly weighted to carry out the appropriate function, the VACMA handles had to be released at least every 60 seconds.

Figure 1-A
Figure 1 - Driving Task

A- Attention-task for train driver in real work environment.
B- Final experimental set-up. The subject operated a VACMA simulator with a real VACMA-horn in an isolated chamber. Bioelectric signals (EEG, EOG) and parameters (angle, pressure) were registered simultaneously and stored on analogue tape. A small monitor screen allowed the visualisation of synthetic images and coloured spots in the upper right corner of the screen. Data reproduction was possible by means of a strip-chart-printer, oscilloscope, polygraph or via data processor.

2. EEG/EMs and Biomechanical Evaluations

The system for EEG evaluation (Jasper, Radmussen, (1958) and Kleitman, (1963) consisted in two modules: a)- before automatic analysis started, all curves were subjected to a thorough visual inspection as checked for possible artefacts. b)- a conventional FFT-based-method with the spectral analysis Pa. The subject's EEG frequency patterns were calculated sequentially by means of Fast-Fourier-Transform Analysis (FFTA) in a range from 0 to 32 Hertz and using a window of 20 seconds. One should note that very important EEG changes can occur during the single drowsiness. The monitoring of Eye Movements (EMs) was also an essential part in studies of day-time vigilance, especially in drowsy states under working conditions (Fruhstorfer et al. 1977; Santamaria and Chiappa 1987; Torsvall and Åkerstedt 1988). However, in vigilance studies EMs should be recorded and controlled manually. Right trace n° 2: FP2-F8 & left trace n° 5: FP1-F7. Only to confirm the presence of alpha rhythms on binary form 0 or 1 only to attest the binary situation.

3. Biomechanical

The VACMA functions (temporisation of alarm mechanism and emergency stopping) are detailed on Figure 2. The train driver had to maintain pressure on a pedal or a steering wheel and to
periodically release this pressure. If the driver either maintained this pressure for a too long period or released it for a too long period, a bell rang during 1.5 second and the train stopped. We agreed on 240-minute experiments.

**Figure 2:** Diagram of VACMA Cycles: Analogic Traduction of the VMD Function and the Driver Biomechanical Behavior

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The security tool has to be manipulated regularly to attest the operator presence and to stop the train by braking the engine and emergency stopping in two cases: a) injury of the driver, b) when the driver did not activate the VACMA system after 5 seconds. When the train was stopped or when the speed did not exceed 3.15 km/h, the VMD did not operate. The numbers on the curves correspond to: 1) activation of the VACMA system, *i.e.* first voluntary movement of the driver's foot, 2) duration of the pressure: a pressure duration superior to sixty seconds triggered an acoustical signal (sound RA). No response five seconds after the sound RA led to stop the train, 3) VACMA activation, 4) phase of release, maintain and stop: a pressure superior to 2.5 seconds triggered an acoustic signal (sound RA). No response after 2.5 seconds led to stop the train.

In the present studies, we used the VACMA system which represents a paced secondary motor task expected to monitor French railway conductors. The modern VACMA is a sophisticated approach of the traditional “safety-deadman circuit.” Biomechanical data was recorded via electrical contacts, force and angle transducers with characteristics: (ELF-25, M-520) fixed under the pedals to determine foot pressure and foot angle. The VACMA functions (temporisation of alarm mechanism and emergency stopping) are detailed on Figure 3.
Figure 3: General Procedure and Details of Computerised Command for Quantification of Analogical Records

![Diagram of the procedure](image)

1. ANGLE VARIATION
2. FORCE VARIATION
3. VOLUNTARY MOVEMENT CONTROL

**Statistical Analysis**

We performed analysis including mean values and standard deviations. The results were compared with those obtained under two other conditions of assays taking into account Pα measured every 15 minutes (16 sessions of 15 minutes). Within group vigilance studies and biomechanical behavior, data were collected across sessions and analyzed using the Pearson product-moment correlation (Glass and Stanley, 1970). These data - biomechanical and vigilance parameters - were then computer-adjusted with a polynomial equation.
Figure 4

A

39'

15 mm/s

1s

FP₁ FP₂

F₇ ⊥ F₈

T₅ P₃ P₄ T₆

O₁ O₂

β rhythm : 12-25 Hz

20 μV

B

1h52

β ↓ α ↓

1s

15 mm/s

1 50 μV

α rhythm : 08-12 Hz

100 μV
Figure 4: Different EEG rhythms obtained with the final experimental set-up.
The electrode positions were presented in A, each electrode referring to the vertex electrode ("Cz electrode"). Eight standard 10/20 derivations were used for EEG recording (Jasper 1958). The EEG signals were recorded using together the right electrode: n° 1: FP1-FP2; n° 2: FP2-F8; n° 3: F8-T6; n° 4: P4-O2 and the left one: n° 5: FP1-F7; n° 6: F7-T5; n° 7: P3-O1; n° 8: O1-O2.

The curves corresponded to:

A: Awaken state: measurement of β rhythm at 12-25 Hz and 20 mV. 20 mV represented maximum amplitude for quantification. E.M. = Eyes Movements.
B: Alteration of vigilance: measurement of α rhythm at 8-12 Hz and 100 mV. 100 mV represented minimum amplitude for quantification.
C: Drowsiness: measurement of Θ rhythm at 4-8 Hz at 150 mV. 150 mV represents minimum amplitude for quantification.

Results

1. Final Design

These laboratories study used a simplified monotonous driving task where the subject sat in an experimental cabin in which the real environment of a train cabin was recreated. Images of animated rail tracks unraveling of rails and catenaries were shown on a front monitor located in front of the human driver.

The task of the subject concerned monotonous driving. He only had to activate the security system ("deadman system") and to watch for signals on the screen: (1) green round signals which meant that the train could run, (2) yellow signals which meant that the conductor had to pay attention and
reduce the speed and (3) red signals which meant that the conductor had to stop the train. In the latter case, the driver had to react by pushing a button and the transduction is represented on Figure 5.

Figure 5: Evolution of the Response Time to One Color Presented on the Screen for Two Experiments

![Graph showing response times for two subjects.](image)

A - □: response-time of the subject 17, (characterized high α power at the EEG),
 ▲: omission of the signal

B - ■: response-time of the subject 18, (characterized low alpha EEG),
Continuous black line represents profile of response to the subjects:
RT_a = 1973.91 ± 502.41 ms (n=37),
RT_b = 1219.04 ± 486.50 ms (n=21).
The projection rail track on a screen positioned at 2.5 meters from the console was synchronized with the departure signals of the VACMA device. Each coloured signal (30 mm of diameter) appeared on the top right corner of the screen for 3 seconds and subjects were instructed to press a vigilance key. The signal appeared randomly and particularly when the driver became drowsy. For the yellow and red signals, the subject was supposed to very rapidly push a vigilance button to attest he had seen the signal, which is similar to the French railways code, (Figure 6). The recovering of data consisted in monitoring brain activity, eye movements and all the physical parameters which were involved in the security system. Sample recordings showed important modifications in the VACMA protocol during phases of low vigilance.

2. Comparison of Estimation Physiological Methods, Visual Scoring and Automatic Analysis Quantified Electro-Encephalogram (EEG) and Electro-Oculogram (EOG)

In a first step, we only studied the fluctuations of alpha waves of the EEG. After the EEG analysis of the sleep data were to classify 20 seconds EEG epochs (one page of paper) into one of the four vigilance stages, reflecting progressively lower states of wakefulness. Groups of subject were characterized by high EEG index mean values following a theta increase (Daniel, 1967), Mackie, and Wylie, (1991).

It was obvious that such an increase cannot be interpreted as a lower vigilance level when some subjects presented or not alpha waves (Etévenon, 1983). The system used for EEG quantification has been described in detail: EEG data were acquired, digitized, and divided into 1s or 2s epochs. Frequency spectra were computed for epochs using the FFTA algorithm. Various spectral features (e.g. peach frequency and power in bands) were used to label each period. Consequently delta waves activity also increased, even though it was not found in all drivers.

3. Evaluation of Sample Registrations

Correct VACMA operation was possible in spite of reduced vigilance as indicated in Figure 7. The total experimental time was shared into 16 segments of 15 minutes. The resulting power spectra were automatically plotted one above the other, and juxtaposed to the intervals of VACMA operation cycle which were represented along the same time axis. This allowed an immediate comparison between the two phenomena. The results confirm previous findings about vigilance but added an additional parameter of biomechanical behavior Coblentz, Ignazi, Mollard, Sauvignon, (1986). They also reinforced the evidence described in the literature for variability of the behavior modification Coblentz, Mollard, Proux, Sauvignon (1985). Such differences in our findings could be due to either state-dependent factors associated with medication withdrawal and / or subject pool differences. These comparisons demonstrated that the two methods gave a better data analysis, particularly of $\alpha$-power (Pa) corresponding to the integration of the signal area.
**Figure 7**: Example of variations of level of vigilance (evolution of alpha rhythms, PA and Foot strength for a period of 16 segments of 15 minutes, experiment of 04 hours, The arrows A & B the hole of modifications, brain functions & motor behavior.

4. **Biomechanical**

The description of the prototype of VACMA system allowed: a)- the conductor to be able to choose the pressure-angle on the pedal, b)- to reduce the effort on the pedal, c)- the system to continuously measure biomechanical parameters (average pressure on the pedal, duration of period of activation, duration of release of the pedal) in order to detect and prevent variations in vigilance (Figure 3). Force and angle data were sampled at 2 Hz beginning 30 m second prior to stimulus onset and for 2 minutes 30 seconds stimulus onset. The automatic detection was based on the convergence of few biomechanical parameters: average pressure on the pedal, duration of the period of activation, duration of release of the pedal. In the course of the second phase, the experimental environment consisted in a vibrating platform which created vibrations identical to those recorded in a real cabin. Ten experiments on a static site and ten experiments on a dynamic site were conducted together on ten subjects. Each experiment lasted no less than four hours, and was carried out at the same period in the afternoon starting at 1 PM, ending at 5 PM.
5. Physical Parameters quantified Electro-Encephalogram (EEG), and Electro-OculoGram (EOG)

Spectral analysis, which decomposes a signal into its constituent frequency components, is an important method to investigate brain physiology. EEG data were acquired, digitized, and divided into 20s epochs. (In that configuration, one page of paper, corresponding to visual analysis).

From these spectra, we only conserved physiological frequency components under 32Hz with elimination continue composante. The system used for EEG quantification has been described in detail: Various spectral features (e.g. peach frequency and power in bands) were used to label each period. Power spectrum was fivefold subdivided corresponding to sleep state: Delta = 0.5-4Hz; Thêta = 4-8Hz; Alpha = 8-12Hz ; Sigma = 12-16Hz ; Bêta = 16-32Hz, respectively. For each band, we calculated relative spectral power (rsp) which is the ratio spectral power of the band by total spectral power (pst). In a first step, we only studied the fluctuations of alpha waves of the EEG on O1-P3 channel. Some brain waves such as “alpha activity” (encompassing frequencies between 8 and 12 Hz) in the resting EEG during relaxed wakefulness and sleep spindles in the nonREM sleep EEG are rhythmic. The focus of this studies on theory and application of spectral analysis on the micro-sleep EEG. Vigilance stages and sleep structure will be briefly introduced in order to provide the background for the analysis that follows. (into one of the four vigilance stages, reflecting progressively lower states of wakefulness), In the same spirit as for the approach of the sleep Aboalayon et al. (2015).

The power spectra were computed for epoch using FFTA algorithm and expressed in square microvolts by second (µvolt²/s). The frequency resolution is given by the opposite of the length of the segment in time. For example, with a segment length of 4 s the frequency resolution is 0.25 Hz ; average of 5 segments will then provide a power density spectrum for a 20 second-period, which commonly used time interval like for scoring sleep stages. The units of power density values were expressed either in V2/Hz or V2/Hz. When looking at broad bands (e.g. theta band; 4 - 8 Hz; Figure 4B), one must integrate (sum) over the appropriate frequency range. By consequence delta waves activity also increased, even though it was not found in all drivers. In a first step, we only studied the fluctuations of alpha waves of the EEG on O1-P3 channel. Figure 4 A B and C, Jasper, (1958).

Discussion

In the present research, we studied the relationship between motor behavior and psychophysiological measures in view to design a device able to detect decreases in vigilance before the driver becomes sleepy. The drivers were informed about the general purpose of the study and no sleep disturbance or drug consumption was reported. The most important alterations of the drivers behavior at the human machine-interface were found for the alpha index confirming those described by Torsvall and Åkerstedt (1987, 1988). The higher level of slow rhythm waves, both at the end of the day and at the end of the night, (equivalent to a high heart rate) corresponded to a physiological cost which increased in order to maintain a certain level of efficiency.

In a monotonous environment during classical vigilance tasks inducing bad performances (Beatty and al. 1974; Hórváth et al. 1976), a theta increase was observed. More, during tests requiring visual, auditive or kinesthetic imagination a theta increase was also found. Likewise, during reaction tests, the best responses were found to be preceded by a theta increase (Daniel, 1967).

The interviews of the drivers showed that effects of monotony constituted a real problem that must be solved to maintain safety. In this study we presumed that adequate operation of the device did not necessarily correspond to sustained attention of the driver. Consequently, it is of importance to detect by anticipation vigilance decrement during driving tasks. All the VMD systems in railway
transport have to be reconsidered under this point of view and it may be more efficient to consider prevention aspects rather than to control the consequences of lack of vigilance. However, only a few pieces of information about key criteria for the determination of low vigilance were published.

Hence, an important effort may be engaged to reduce the cumulative effects of night work and chronobiological desynchronizations due to irregular work schedules, Ingre, et al (2004). These points should be discussed with the railways administration. Another point concerned the definition of the position of the human operator acting with, and sometimes against, the automated system. It is important that the choice of automation should take into account the relatively poor efficiency of the human being in monotonous conditions even if he can deliver the adapted decision and produce a correct action when a dysfunction of the system occurs in most cases.

Before an optimization attempt to the human operator position, further investigations were necessary both in laboratory and in the field to better understand human behavior. We obtained good control of the driver behavior with continuous results during the first stage of the studies. The results of these experiments provided complementary data to recent experimental results, Picot, and al. (2009). However, from the present data we would conclude that the analysis of alpha waves enhancement (in a frequency range from 8.0 to 12 Hz) was difficult indeed. Concerning hypovigilance characteristics, this state may produce EEG alpha waves of lower frequency, higher amplitude with burst of theta waves presenting an alert or deeply relaxed state.

The basic idea of the experiments assumed that a redundancy occurred between EEG signals and the mechanical signals. This means that the reduction of vigilance can be used to predict the occurrence of biomechanical signals. In this case, the first group signals corresponded to control variables in the second group. Further studies are thus needed to exactly determine the roles of variation of vigilance and automation in human behavior in different situations. The effect of training cardiovascular, and intra and inter individual differences with regard to the operation of VACMA were not investigated in this study. A systematic approach conducted with a cohort of experienced drivers using the facilities of the experimental design described here, is reported in a parallel paper (Sauvignon, 1992, 1995, and 2011). This quantified analysis substantiated our suggestion that the correct operation of VACMA device did not guarantee long-term attention of the driver, but rather constituted an additional occupational stressor.

It has been shown in numerous studies that in extreme state of vigilance or when death of the driver occurred this kind of system was operational but was unable to partially prevent decrease in vigilance or very short naps. This was probably due to the increasingly automatic activation of the system by the driver. We report here that under laboratory conditions, it was possible to "fake" a "real life" task which corresponded to that of the train drivers. As a result, we can reasonably think that the drivers acted normally on the VMD because they had a long practical trial session on the mechanism. The experimental set-up developed in the laboratory succeeded in controlling the subjects ‘vigilance with results gained from observations, preliminary studies, under laboratory conditions and real life conditions. In the field of transport, drowsy driving is a major cause of accidents but the fundamental problem, is the definition of hypovigilance? In this work, the focus is on developing a system that can detect hypovigilance, which includes both drowsiness and inattention, using Electroencephalogram (EEG) and Electrooculogramgram (EOG) signals. Drowsiness has been triggered by allowing the driver to drive monotonously at a limited speed for long hours and inattention. Previous studies used neuroimaging based approaches such as analysis of electroencephalogram (EEG) activities to understand the brain dynamics of different cortical regions during drowsy driving. However, the coupling between brain regions responding to this vigilance change is still unclear. In order to have a comprehensive understanding of neural mechanisms underlying drowsy driving, in this study we use transfer entropy, a model-free measure of effective connectivity based on information theory. Some researchers investigate the pattern of information transfer between brain regions when the vigilance level, which is derived from the
driving performance, changes from alertness to drowsiness. Results show that the couplings between pairs of frontal, central, and parietal areas increased at the intermediate level of vigilance, which suggests that an enhancement of the cortico-cortical interaction is necessary to maintain the task performance and prevent behavioral lapses. Additionally, the occipital-related connectivity magnitudes monotonically decrease as the vigilance level declines, which further supports the cortical gating of sensory stimuli during drowsiness.

Recent years have seen a surge of interest in using neural oscillations to characterize the mechanisms supporting cognition and emotion, and vigilance appreciation. News orientations have been developed with news approaches (mathematical models), automated detection, without forget classical methods. Neurophysiological evidence of mutual relationships between brain regions measured by transfer entropy might enhance the understanding of cortico-cortical communication during drowsy driving, Lin et al. (2005), Sigari (2009).

Let us add some new approaches like measures hemodynamics in the surface of the brain, Jai and al. (2014) or decoding vigilance with NIRS, (2014) and Bogler and al. (2014). Oftentimes, oscillatory activity is indexed by mean power density in predefined frequency bands. Some investigators use broad bands originally defined by prominent surface features of the spectrum. Others rely on narrower bands originally defined by Spectral Factor Analysis (SFA), (Shackman and all 2010). When measuring alpha power, it is necessary to beware of artefacts, when we use threshold-based artifact rejection or independent component analysis (ICA).

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In the Declaration of Independence, Thomas Jefferson described humankind’s “unalienable rights,” by changing John Locke’s “life, liberty, and estate” to “life, liberty, and the pursuit of happiness.” Behavioral psychologists have found that happiness is found in the pleasures of human connection and experience. Slaughter draws on her extensive experience in foreign policies and as the first female director of policy planning in the U.S. State Department on how we can renew America, in line with the best of our history and ourselves. Making a revolutionary change in our country that values work and family equally and enables its citizens to live full and happy lives.

Slaughter builds off of the 1960’s women’s liberation movement from the social injustice of inequality under law. She explains throughout the book that with a coalition of care, women can continue to strive for quality, fairness, peace, and justice dating back to the early feminist movement expanding and shaping it into a much broader human coalition. Unfortunately, in our modern society, women continue to experience the impact of discrimination and inequality against caregiving. The author highlights her focus on work life balance primarily speaking to women with professional careers. She states “balance” is a luxury and equality is a necessity. In order to see change, we need to start talking differently. Instead of talking about work-life balance, we need to start talking about discrimination against care and caregiving. The author gives an example of inequality when a woman comes back from maternity leave and gets less interesting assignments due to the misconception she is not as committed to her work. Many employers follow the the longstanding belief that it is impossible to be both a committed caregiver and a good worker. The author tells us the least we can do is force employers to justify that assumption. We need to judge workers on their results not our assumptions.

As a tenured professor, Slaughter met with thousands of students and the single most frequently asked question was, “how to balance work and family?” She suggests there are three standard mantras that are only true in part that our generation has fell into to answer this question (1) you can have it all if you are committed enough to your career, (2) you can have it all if you marry the right person, (3) you can have it all if you sequence it right. Through her experiences she tells the truth of how couples need to talk much more frankly and directly about choices and trade-offs before they commit to each other. In order to get past the barriers that get in the way to true equality, we must raise awareness to obstacles that need to be overcome.

The author shines light on the reality of the sacrifices that need to be made to advance in your career. The majority of top leaders would say that they had to give up a lot to rise to their jobs. Many having the belief if you are prepared to do whatever it takes to advance in your career, including rarely seeing your children you can. The truth is the men who have made this trade off over the
decades have almost always been supported in that decision by wives as lead caregivers. While he is providing financially, she is providing physically and emotionally. This is why it has been more of an obstacle for woman to advance in their careers because rarely the husband agrees to stay home or be lead caregiver. If we can value care more as a society, we will see how care and competition complement each other leading to a more equal measure. If both men and women traded off caring and competition at home and in the workplace, then it would become much easier for women to allow time for both caregiving and their career.

Modern women know that ambition and commitment are essential to move up within their job, but they struggle to create room for family at the same time. Slaughter explains that Americans want to believe that the fate of their careers and families is within their control. Although there are obstacles of unpredictable life circumstances and inflexibilities of our workplaces that can lead to career suicide as soon as we step out of our workplace. We learn that this is due to the lack of public infrastructure of care and cultural mentality that devalue women. The author goes on to explain how women need to speak up and take their place at the table for structural changes in the workplace going far beyond feminism. We can make things better for the society as a whole by adopting policies and practices that support and advance women at every level.

An interesting part of the book is the personal penalties workers face when they take advantage of company policies to adjust their work schedules to accommodate caregiving responsibilities. Although they are offered to employees, taking advantage of them often leads to wage penalties, lower performance evaluations, and fewer promotions. The author explains the importance to understand that a worker’s choice to put family alongside or even ahead of career advancement may reduce quantity but not necessarily affect the quality of their work. Slaughter asks, why is the parent track opposite of the leadership track, and why should it not just slow the progress down rather than take you off the track completely? Another common American assumption in the workplace is that the fast track is the only track. The author brings to light that thinking of careers as a single race in which everyone starts at the same point and competes over the same time period is a choice. It becomes a disadvantage to the workers who have caregiving responsibilities in comparison to those who have none. As a society with this mindset, we lose massive amounts of talent.

Slaughter discusses tackling this issue from a different angle. In an interview the question to ask an employer is not what family-friendly policies they have, but how many employees both men and women take advantage of these policies and advance in the firm? The problems are not necessarily with the worker, primarily woman, but with work. The United States is one of the only industrialized countries that does not require paid sick leave, time off during the week, or vacation days. Many Americans are stressed out and desperate for a solution from their high pace work setting. We learn through this book the reality that we are all striving for a “work-life balance,” not just the cultural view that it’s a women’s problem.

Slaughter discusses how redefining the women’s problem as a care problem allows us to focus more on the real issue: the undervaluing of care, no matter who does it. She also discusses how companies view caregiving issues as a women’s problem and not a company problem. The culture of over-work has led to high turnover rates for both men and women. Slaughter views these issues as the failure of American companies insisting workers conform to outdated ideas of when and where work should be done, rather than adapting to the realities of the twenty-first century. We are still living in a work culture in which your career is supposed to mean you never think about anything else or it is a lack of commitment. Interestingly enough, in interviews companies tend to discuss “family-friendly policies,” with only the women candidates. We have made some progress with maternity leave but many women tend to not even ask due to fear of career disadvantages.

In reading this book you learn that valuing care offers a compass to a new set of workplace and national policies. By challenging employers to explain why it is more important and valuable to
compete with one another than to care for one another, forces the realization of what they say but do not do and what they assume but won’t admit. The author tells us we should value breadwinning and caregiving equally over the course of a lifetime. If we raise our estimation of the value and importance of caregiving and the skills we need to do it well, it will have a huge impact on our society. Slaughter goes on to explain it in economic terms, caregiving is an investment in human capital, our most precious asset in society. We need to build a new infrastructure of care for the twenty-first century, one that meets the demands of our society and our economy. She offers some possible elements of such a valuable infrastructure, drawing on policies of the United State and other countries.

Overall, this book is not just for women and managers, but for every individual that believes in the importance of equality in the workplace. Equality for caregivers is essential for aiding in the growth of our next generation of citizens. We must ensure that they have an equal opportunity to fulfilling their individual potential leading to the talent, creativity, and resilience we need as a nation. This book stresses that caregiving is essential to the dignity and the well-being of the elderly and the sick and to the very brain formation and growth of the young. It also benefits caregivers with a new way of thought that would be individually valuable and desirable. We can only change and build a new infrastructure of care if we are willing to educate ourselves on this topic, and can genuinely open our minds to new thoughts and possibilities for everyone.

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