

Global Business and Management Research

An International Journal

Vol. 2, No. 1

2010



GLOBAL BUSINESS AND MANAGEMENT RESEARCH

An International Journal

Volume 2, No. 1 • 2010



Universal-Publishers
Boca Raton

JOURNAL NAME: Global Business and Management Research: An International Journal
JOURNAL TYPE: Electronic Journal
PUBLISHER: Universal Publishers - Boca Raton, Florida, USA
FREQUENCY: Quarterly
PUBLICATION START YEAR: 2009
EDITORS-IN-CHIEF: Mehran Nejati, Mostafa Nejati
WEBSITE: <http://www.gbmr.ioksp.com>

Global Business and Management Research: An International Journal
Email: mehran@gbmr.ioksp.com

© 2010 by The Journal of Global Business and Management Research
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ISSN 1947-5667/ ISBN 978-1-59942-835-2
Published by Universal-Publishers.com, Boca Raton – 2010
www.universal-publishers.com

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Online vs. Offline Movie Rental: A Comparative Study of Carbon Footprints

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Abstract

Purpose - This paper focuses on comparing the Energy Consumption and Carbon Footprints of two major Movie Rental service models: Offline or traditional (brick and mortar) and Online or E-Commerce Movie Rental services.

Design/methodology/approach - For this study the Life Cycle Assessment (LCA) approach was selected, the functional unit of all deliveries is renting three Movie Discs at one time, which are high-density (HD) optical discs (with DVD or Blu-ray format). The research was conducted in Canada. We used data received from a major Movie Rental service company. In this study we exclude processes that are common to the two distribution channels (Offline and Online). We analyzed the portions of the logistics chains that differed between traditional Movie Rental service and E-Commerce version, such as Movie Disc delivery. We used the Economic Input Output Life Cycle Assessment (EIO-LCA) model to measure and compare the Offline and Online Movie Rental services and their environmental performances regarding Energy Consumption and Carbon Footprint.

Findings - Our analyses indicate that the Online Movie Rental Service has a lower Carbon Footprint and Energy Consumption regarding real estate, packaging, transportation and power consumption compared to the Offline version.

Practical implications - We provide future steps that policy makers, government, businesses and consumers should take in order to make informed decisions and thus reduce the environmental impact of Movie Rental services.

Originality/value- Our paper will thus contribute to the previous studies in this domain and enhance the understanding the Carbon Footprinting of Movie Rental services by employing data procured from major Offline and Online Movie Rental services in Canada. Moreover our study is robust compared to the previous studies because it exploited data directly from a major Movie Rental service company.

Keywords: Carbon footprinting, E-commerce, Eco-efficacy, Eco-efficiency, Innovation, Sustainability, Energy consumption

Paper type: Research Paper

Introduction

The increasingly cogent evidence that the environmental sustainability of our planet is rapidly deteriorating due to human actions has made the concept of Sustainability a key focus of humankind. Nonetheless, in order to assess the impact of various factors and complex underlying dynamics on Sustainability, we often need some quantitative and qualitative frameworks and models to make objective decisions (Velásquez, Ahmad and Bliemel, 2009; Velásquez, 2003). This paper employs quantitative approaches to compare the environmental impact of Online and Offline Movie Disc Rental services.

In order to achieve as much Eco-Efficiency and Eco-Efficacy as possible in the modern business environment, the companies must continuously employ innovative processes to bring positive changes in the “triple bottom line” (Velásquez, Ahmad and Bliemel, 2009). In the current information age, it is possible to create new business models, value propositions, and more efficient and competitive firms. Based on the available technology infrastructure, an organization is able to communicate with its internal and external stakeholders in a seamless flow of information, and the Internet plays a major role in this digital integration. Indeed, the Internet has become the infrastructure of choice for E-Commerce because it offers businesses an easier and low cost way to link with customers and other businesses. Moreover, it is the Internet that helps companies to reduce their transaction costs (Laudon and Laudon, 2007). Indeed, it has been argued by many researchers and practitioners that the Internet and E-Commerce can help in realizing a sustainable development for human beings and the environment (The Climate Group, 2008). However, such arguments lack scientific evidence in most cases.

Nevertheless, the trend is most certainly having shoppers move towards online shopping. Indeed, online retailing is growing tremendously worldwide. For instance, US online retail reached US\$175 billion in 2007 and is projected to grow to US\$335 billion by 2012 (Forrester, 2008). Similarly, Canadian online retail reached US\$12.9 billion in 2007 and is projected to grow to US\$22.2 billion by 2012 (eMarketer, 2008). Moreover, the online services in Canada are growing rapidly; the amount of US\$12 million was spent in online Movie Rental service in Canada in 2006. By 2011 the number is expected to surpass US\$285 million (Pricewaterhouse Coopers LLP, 2007).

There are various underlying causes for such a strong trend towards online retailing. For instance, it has been argued that the “Web channel has been relatively successful because it is a destination for consumers to find low prices and it is perceived to be more convenient than shopping in stores” (Forrester, 2008). Based on the USA experiences, the growth of online shopping and services is driven by two major factors: first, by the growing rate of fast Internet connections which allow more interaction and faster buying process for the Online customers; and second, for the extensive and effective marketing strategies used specially by some of the larger online corporations (Punkett Research, 2009).

In the worldwide ranking, Canada belongs to the top 15 in Internet usage (Computer Industry Almanac Inc., 2007). In 2008, Canada had 28 million Internet users, which is almost two-thirds of all Canadians (Internet World Stats, 2009). Considering the current economic crisis, the last three household items from the list of ten that Canadians would cut are the home Internet, Movie Rentals, and cell phone. However, the first seven that they will cut to their budget are big ticket events, Movie going, DVD buying, magazine subscription, cable/satellite TV extras, video game buying, and home phone. These results, from a survey conducted by Solutions Research Group in Canada and the USA, showed that during a recession households prioritize, almost like heating and water, the relative new services of home Internet, Movie Rentals and cell phone (Robertson, 2008). One of the reasons why people keep the Internet and cell phone is that our current society is getting into the connectivity era, where being connected with the world is a priority.

Also the Movie Rentals are linked to the Internet since they receive requests for orders Online. The Movie Rentals have for a long time been an effective alternative, based on price and quality, to the movie theater and a complement to the TV standard package. Although Movie Rental services are of a high priority in customers’ consumption basket, there is only one inquiry, which is found in the latest literature survey within the scope of E-Commerce and Carbon Footprinting (Velásquez, Ahmad and Bliemel, 2009). That study concentrated on a comparative assessment of energy, environmental, and economic impacts of Offline and Online DVD Rental services through using process-based and input-output life-cycle assessment (LCA) methods. The scenario of their analysis takes into account a specific customer situated in Ann Arbor,

Michigan, USA. The stages of their product life cycle analysis considered DVD production, DVD distribution, DVD usage, and DVD redistribution within comparison of the two major Movie Rental businesses in the USA. The functional unit was renting three DVDs at one time. The results illustrated that the E-Commerce option has a better performance in terms of energy, environmental, and economic standpoints than the traditional DVD Rental service (Sivaraman *et al.*, 2007).

Our paper differs from the study of Sivaraman *et al.* in several important ways. Firstly, in our analysis we excluded factors such as the usage of lights (incandescent lamps) and air conditioning/space heating, because they are not a necessity for renting movies Online. On the contrary, the analysis of Sivaraman and colleagues (2007) considered those unnecessary factors. Secondly, our examination put aside the aspect of actual watching a movie, which is rented, because it does not have an influence on energy consumption; in other words the energy consumption is the same for both Online and Offline movie rental businesses. Thirdly, the calculations of Sivaraman and colleagues (2007) are slightly restricted since they consider orders of only one, two, and three DVDs at once. On the contrary, our calculations take into account a possibility of ordering more than three DVDs and hence are not restricted to the number of orders a customer makes. Fourthly, the calculations of Sivaraman and colleagues (2007) used only one route between the customer's home and Movie Rental services (movie store, and distribution center) that they applied in their analysis. In their analysis, routes of other clients and Movie Rental stores were derived from that single route. In contrast to their theoretical model, our practical model includes all possible routes based on the distribution networks of the two major Movie Rental services. Fifthly, Sivaraman and colleagues (2007) included the manufacture stage of a Movie Disc, but we excluded it because this datum is unnecessary, since both Online and Offline major Movie Rental services use Movie Disc manufactured in the same way. Next, we used the term Movie Disc to identify a high-density (HD) optical disc with DVD and also Blu-ray format. Sivaraman and colleagues (2007) used the term DVD only, since at that time Blu-ray was not so common. Hence, our study is significant because it extends the previous body of literature with its updated information.

Lastly, our study, compared to that of Sivaraman and colleagues (2007), is more robust because it exploited data directly from a major Movie Rental service. Also, there is a difference in geography: our study takes place in Canada while Sivaraman and colleagues' study (2007) took place in the USA. To conclude, our paper is vital since it contributes with its findings to the community of researchers in this area.

In our analysis a sleeve of the Movie Disc is made of polypropylene while in the analysis of Sivaraman and colleagues (2007) it is made of paper. Consequently, the results of our study and Sivaraman and colleagues (2007) are different also due to packaging (different sleeve material). Moreover, in the E-Commerce distribution network the outcomes of the bodies of works differ because Sivaraman and colleagues (2007) measured the packaging weight of cases and sleeves for Movie Discs, while we measured the packaging weight only of sleeves. To conclude, this influenced the findings for the whole packaging transportation, and also this explains how our study differs from Sivaraman and colleagues (2007).

The rest of the paper is organized as follows: next section presents the study scope and boundary description; After that Carbon Footprinting comparison between the Online and Offline Movie Rental services will be reported with results and discussions; Later, some interesting and challenging future research directions will be provided; and finally the conclusion section concludes the paper.

Scope of the Research

The aim of this study is to assess and compare the Energy Consumption and Carbon Footprinting of two major Movie Rental services models: Online Movie Rental service and Offline or

traditional (brick and mortar) Movie Rental service. For this study, the functional unit of all deliveries is three high-density (HD) optical discs or Movie Discs (with DVD or Blu-ray format), and we will name it Value Package herein, due to the fact that a customer rents on average the amount of three Movie Discs per visit (Sivaraman *et al.*, 2007).

In this study we analyzed the segments of logistics chains that differed between traditional Movie Rental service and E-Commerce version. We will exclude processes that are the same for the two Movie Rental modes (Offline and Online). We assumed that all the transportation is done by first class post using truck freighting. We used the Economic Input Output Life Cycle Assessment model (EIO-LCA) to assess and compare the Carbon Footprinting and Energy Consumption of the Offline and Online Movie Rental services. The EIO-LCA will depict the environmental impacts of the process of renting Movie Discs. We excluded enjoyment which arises from going to the Movie Rental, browsing for the Movie Discs, and finally renting it, since we assumed that satisfaction of spectators is identical for both Online and Offline Movie Rental services. We set aside also the retail part of the Movie Rental store which is buying Movies, snacks, and beverages. We put aside also the replacement of Movie Disc cases and sleeves in case of damage.

We show a conceptualization of the Offline and Online Movie Rental services models in Figures 1 and 2.

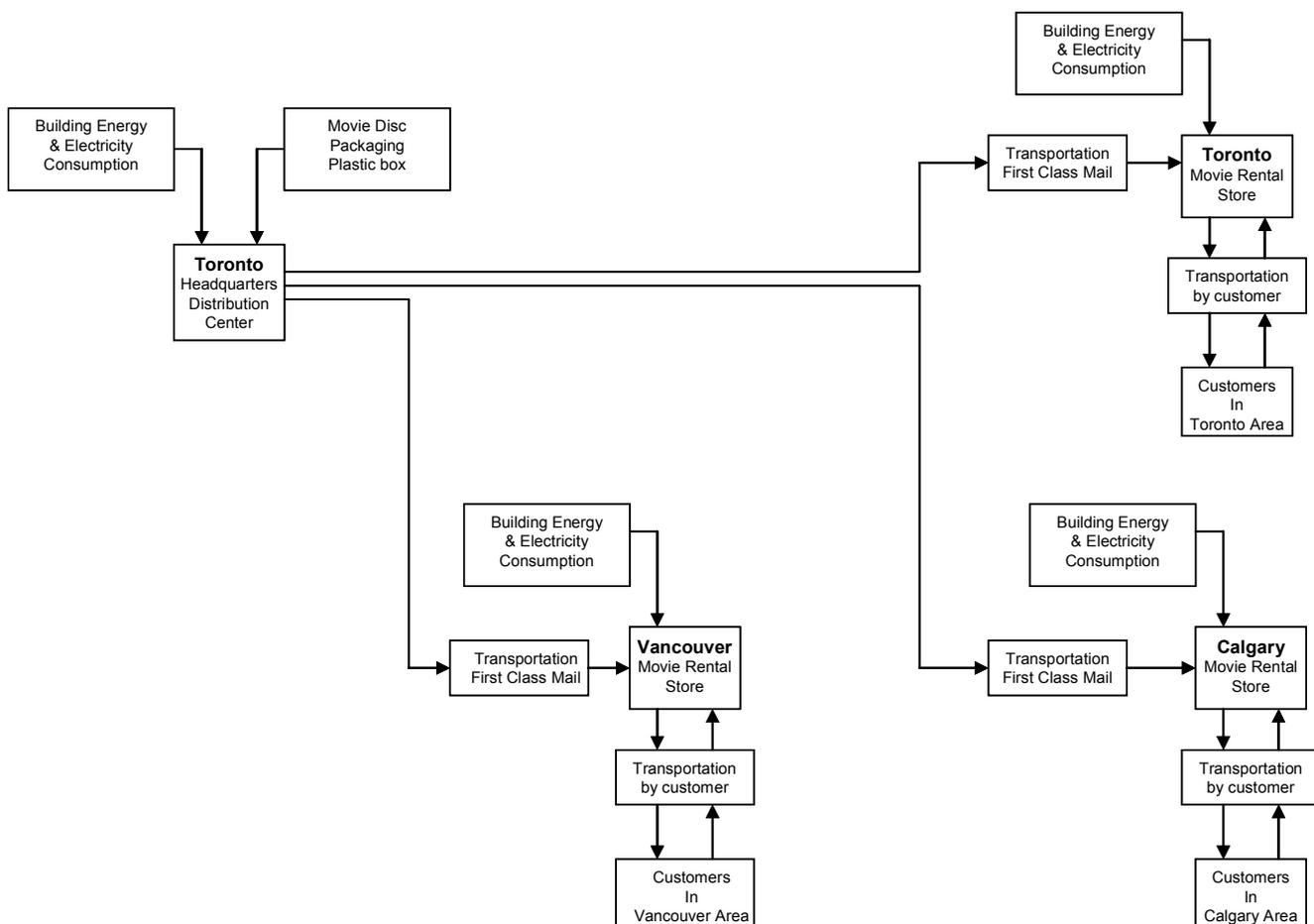


Figure 1: Offline Movie rental service flow diagram

Figure 1 visually illustrates the transportation chain containing the real estate transitions within the Offline Movie Rental service model. The Movie Discs begin at the Headquarters from where they are assumed to be shipped across Canada by first class mail to each Movie Rental store. The

Movie Discs sit in the Movie Rental store (for the sake of simplicity we assume that the Movie Discs are shipped directly to the Movie Rental store, without passing a distribution center). Later customers travel by car from their homes to the Movie Rental store to choose and pick up the Movies and then travel home. After watching the Movies the customers return the Value Package (three movies) to the Movie Rental store by car and then go home.

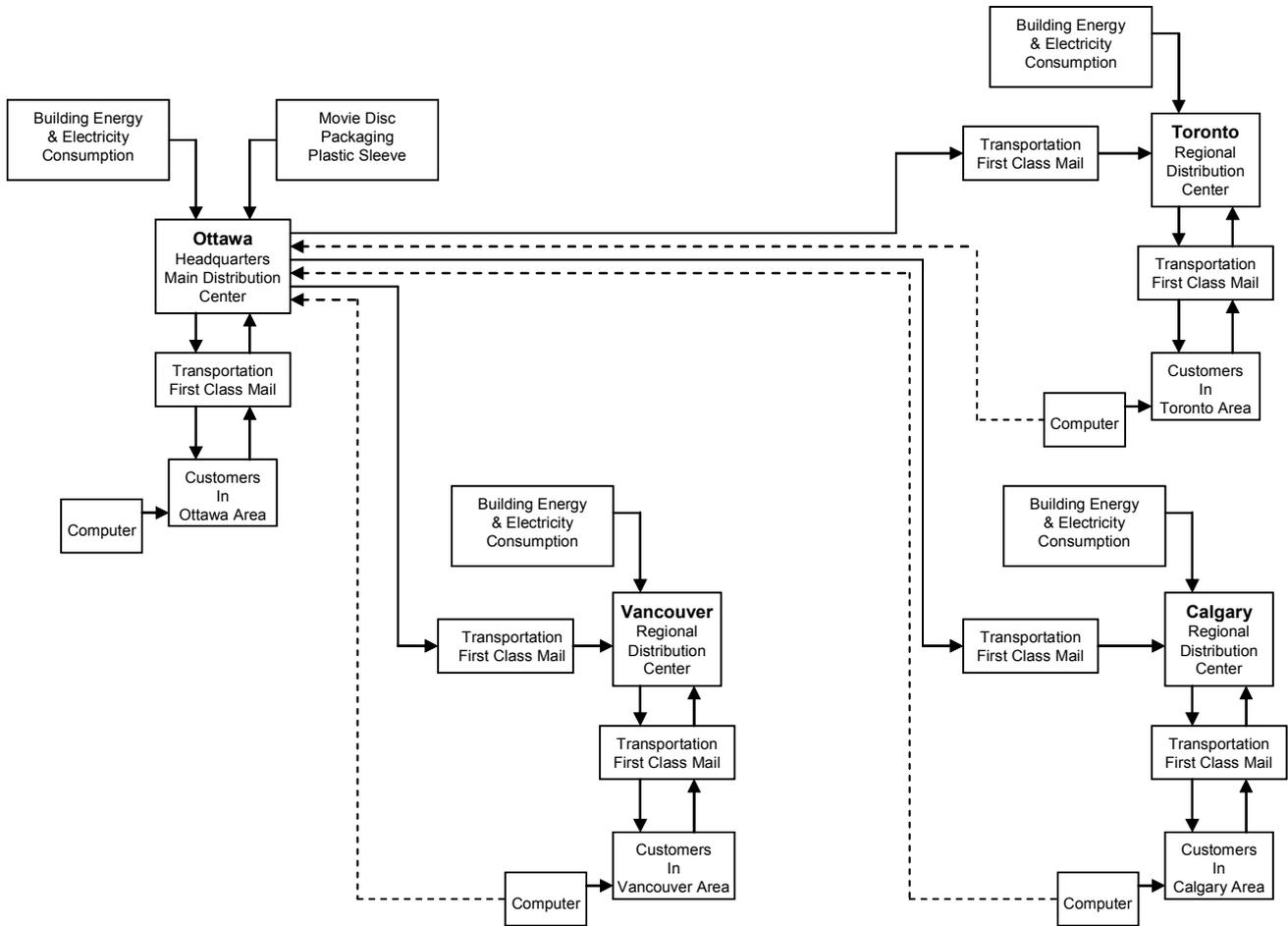


Figure 2: Online Movie rental service flow diagram

Figure 2 shows the diagram of the transportation chain for E-Commerce Movie Rental model. In the E-Commerce model, the Movie Discs start at the Headquarters/Main Distribution Center and are delivered to a Regional Distribution Center by first class mail. This figure demonstrates the process of renting the Movies and thus the link between Headquarters and consumer. The process starts when the customer browses for the Movies in the E-Commerce company website and sends the request (Online order) of the Movie Discs to the Online Company’s data center (Headquarters). It accepts an order and ships the Value Package via first class mail to the Regional Distribution which is the closest to the customer’s home address. The Value Package, along with other Value Packages, is then taken to the closest post office to the individual homes and the last mile (distance from Movie store/postal office to the customer) is completed on foot by a postman. The returning process starts when the postman picks up the Value Package from the household and walks the last mile to the closest post office. Later the Value Package is shipped by first class mail to the Regional Distribution Center. In the Regional Distribution Center, the Movie Discs are stocked until the next customer’s request occurs.

Analysis and Results

We compared two stages from the product life cycle: forward and reverse distributions (Hanafi, Kara and Kaebernick, 2008). Consequently, we can concentrate on the logistic of moving the Movie Discs from the Main Distribution Center/Headquarters to a customer's home. Since emissions from private vehicles were excluded from the EIO-LCA and these calculations were necessary for our analysis, we included them.

The EIO-LCA method is a linear model that must link monetary values with physical units, and that performs better for higher values. As a result, in our analysis we consider \$1.2 million of economic activity, or roughly 166,667 Value Packages, at an assumed production cost of \$2.4 per Movie Disc (Alibaba, 2009). For the traditional model we consider the shipping of 423 Value Packages to each Movie Rental store (approximately 394 Movie stores across Canada of the major Movie Rental company) (YellowPages, 2009) which are shown in Figure 1. For the E-Commerce model we consider the shipping to be 41,667 Value Packages to each of one of the three Regional Distribution Centers (YellowPages, 2009). The remaining 41,667 Value Packages stay at the Main Distribution Center, as can be seen in Figure 2. Moreover our analysis considers a total of 2,517 Movie Rental stores (including distribution centers) across Canada (YellowPages, 2009).

According to our finding from the measurement, each Movie Disc case made of polypropylene weighs 85g, a single Movie Disc weighs 18g, and each Movie Disc sleeve made of polypropylene weighs 2.8g. Furthermore, we use the addresses of the Movie stores listed in the phone book to measure the distances between Movie stores, Headquarters, and Distribution Centers (YellowPages, 2009). We used a geographic information system (GIS) software product to measure these distances.

Offline Movie Rental Logistics

The traditional method of Movie Rental service, where the Movie Discs are rented through Movie Rental stores, can be depicted as a series of transport segments among the firm and relevant facilities, which is illustrated in Figure 1.

Movie Discs are transported from the Headquarters in Toronto to the Movie Rental stores, and a customer rents a Movie Disc and takes it home. In addition there is a return link for returning a Movie Disc. In this study we assume that all transportation is performed by truck within the traditional distribution network. For our calculations we used the truck transportation price of \$0.19/ton*km (Bureau of Transportation Statistics, 2009). We used the distances between the Headquarters and the Movie Rental stores previously measured by GIS from the addresses collected from the phone book (YellowPages, 2009). For our analysis we consider only a round-trip distance of 8 kilometers according to a previous study by Hendrickson and colleagues (2006). This assumption takes into account that a customer's journey might have other visits on the way.

All these Movie Discs are transported through the logistic network shown in Figure 1. Each Movie Disc is transported into its Movie Disc case, which costs \$0.38 per unit (Blankmedia, 2009). Therefore the sum of the packaging in Offline Movie Rental services is \$190,805.56 (Table-2).

In additional to the EIO-LCA method, our analysis takes into account the environmental impacts of the automotive trips made by customers to Movie Rental stores to rent Movie Discs. We consider for an average passenger car the fuel economy to be 34.62 kmpg (energy to be 3.8 MJ/km), and Carbon Footprint Impact to be 258.3 g/km (U.S. Environmental Protection Agency, 2000). For an average light truck, we use the fuel economy to be 27.69 kmpg (energy to be 4.8 MJ/km), and Carbon Footprint Impact to be 324.29 g/km (U.S. Environmental Protection Agency, 2000).

In Canada, a weighted average of the environmental impacts caused by passenger cars and light trucks can be counted in the passenger fleet respectively 57% and 43% (Natural Resources Canada, 2007). The environmental impacts of an average trip to the Movie Rental store are shown in Table-1.

We ignore returns from the Movie Rental stores to the Headquarters, which means Movie Discs remain in a Movie Rental store, and hence wait for the next customer who rents them. All calculations are adjusted to 2002 US Dollar values because the EIO-LCA Canadian and USA model's database dates at that year.

Table 1: Energy and Carbon Footprinting Impacts of Round-trips to Movie Rental Stores in Passenger Vehicles

Type of environmental impact	Impact per km (passenger car)	Impact per km (light truck)	Impact for 8 km round trip (passenger car)	Impact for 8 km round trip (light truck)	Total impact for 166,667 trips (57% cars, 43% light trucks)
Energy use	3.8 MJ/km	4.8 MJ/km	30.50 MJ	38.14 MJ	5.63 TJ
Carbon Footprinting	258.30 g/km ^a	324.29 g/km ^a	2,066.40 g	2,594.32 g	382,234.27 Kg

Source: U.S. Environmental Protection Agency, 2000^a

Online Movie Rental Logistics

We supposed that the E-Commerce model of renting a Movie Disc (a Movie Disc is promoted and purchased Online) has fewer segments; however, it includes truck transportation from the E-Commerce Headquarters in Ottawa to the Regional Distribution Centers in Calgary, Toronto, and Vancouver (Figure 2). We assumed that the Movie Discs are shipped from the Headquarters to the company's Regional Distribution Centers via truck. We considered in our analysis the distances from the Headquarters to the Regional Distribution Centers and from them to the postal office nearest to the Movie Rental store. We further assumed that from the postal office a postman delivers the Movie Discs to the customer's home which is a round trip of 8 kilometers (the same distance done by car). Past studies have shown that an average mailman walked 35 Kilometers (22 miles) per day (Unknown, 1964), which is approximately three times more than a present-day mailman. Current source shows that a postman walks in average 10 Km per day (CCNMatthews, 2007).

All the Movie Discs in the E-Commerce model are transported by the logistics network of Figure 2. Each Movie Disc is transported into its Movie Disc sleeve whose cost per unit is \$0.1. Thus the total cost of packaging for the Online Movie Rental is \$47,701.39, which is shown in Table-2 (Sleevetown, 2009). Previous studies show that a person spends between 15 to 30 minutes ordering Online. We consider the extreme case, where it takes 30 minutes for a client to place an order in the website and 1MB data usage with an Energy Consumption estimated for 2 MJ and Carbon Footprint Impact of 3.02E-5 metric Ton (including desktop computer usage and manufacturing factor, Internet infrastructure, Headquarters' data center) (Weber *et al.*, 2008).

Comparative Costs of Online and Offline Movie Rental Logistics

We make the comparison of costs for the two logistics networks; a truck transportation price of \$0.19/ton*km was assumed for our calculations (Bureau of Transportation Statistics, 2009). The shipment of the 166,667 Value Packages in the traditional model is 51.5 metric tons, including 9 metric tons of Movie Discs and 42.5 metric tons of packaging. The shipment of the 166,667 Value Packages in the E-Commerce model represents the transportation of a total of 10.42 metric

tons, including 9 metric tons of Movie Discs and 1.42 metric tons of packaging. A comparison of these costs is shown in Table-2.

Table 2: Comparative Estimated Costs of Logistics for Offline versus Online Movie Rental Services

Item	Offline Movie Rental	Online Movie Rental
Plastic Packaging	\$190,805.56	\$47,701.39
Bulk truck shipments to Movie store or Regional Distribution Center	\$15,892.95	\$5,339.40
Total	\$206,698.51	\$53,040.79

Comparative Environmental Impacts

Regarding the environmental consequences, the traditional and the E-Commerce logistics systems involve truck freight. Table-3 shows supply chain environmental impacts from the shipment of the 166,667 Value Packages, which are trucking freight, real estate, fuel production, the Internet, and plastic packaging taken from the EIO-LCA model using Canadian industry accounts information from 2002.

Table 3: Energy and Carbon Footprinting Impacts of Economic Activity in the Movie Rental Service Industry

Impact	Trucking	Real Estate of Movie Rental Service Industry	Plastic packaging	Power generation and supply of Movie Rental Service Industry
Energy (TJ)	12	0.068	10.8	3.64
Carbon Footprinting (metric Ton)	845	0.9	629	286

Source: Carnegie Mellon University Green Design Institute

Combining the data from Tables 1, 2, and 3, Table-4 shows the use of Energy and Carbon Footprinting for trucking freight, real estate, and power generation and supply in the Movie Rental service industry, and plastic packaging for the Offline and Online Movie Rental models. These emissions data are combined with the cost estimates to ascertain the environmental impacts that are illustrated in Table-5.

Table 4: Comparative Energy and Carbon Footprinting Impacts in Offline and Online Movie Rental Services

Item	Energy (TJ)	Energy (%) contributions	Carbon Footprinting (metric Ton)	Carbon Footprinting (%) contributions	
Traditional Movie Rental	Trucking	0.16	1.97%	11.26	2.09%
	Real State	0.01	0.13%	0.14	0.03%
	Plastic case	1.73	21.34%	100.64	18.67%
	Power generation & supply	0.57	7.04%	44.77	8.31%
	Passenger trips	5.63	69.52%	382.23	70.91%
	Total	8.10	100%	539.05	100%

E-Commerce	Trucking	0.05	6.51%	3.78	10.99%
	Real State	1.08E-04	0.01%	1.43E-03	0.004%
	Plastic envelope	0.43	52.37%	25.16	73.07%
	Power generation & supply	0.01	0.70%	0.45	1.32%
	Online order	0.33	40.41%	5.03	14.61%
	Total	0.82	100%	34.43	100%

Table 5: Relative Energy and Carbon Footprinting Impacts of Traditional and E-Commerce Logistics per Movie Disc

Impact	Traditional	E-Commerce
Energy (MJ)	48.60	4.95
Carbon Footprinting (Kg)	3.23	0.21

Future Research Directions

In order to advance the research efforts in Carbon Footprinting, identification of some of the critical aspects of supply chains for appraisal and modeling would be essential. Clearly there are some aspects of supply chains that cannot be meaningfully identified as critical or non-critical based only on the available scientific data. Consequently, some qualitative approaches would be helpful in identifying those aspects of the supply chains that are critical to achieving the environmental Sustainability objective. Once critical aspects of both E-Commerce and traditional supply chains are identified, quantitative approaches would be required to model those aspects in form of reliable, reusable, and extendable mathematical models and formulae (Ahmad, 2009). More specifically, it would require extensive mathematical modeling of complex, non-linear, interdependent supply chain dynamics (Ahmad, 1997). Such a quantitative model would be beneficial in developing effective, interactive, and adaptive decision support systems for policymakers, business managers, and researchers (Ahmad, 2009).

The existing body of literature in this domain has largely emerged assessing Carbon Footprinting for such products as books, DVDs, groceries, electronics (computers), etc., as well as such services as printing, advertising, and DVD Rental. For future research, we suggest an increased focus on Carbon Footprinting of various services, for instance, pharmaceutical services and online education. In addition, there is a need to assess the cost of various potentially adverse social implications of E-Commerce, such as reduced social interaction, reduced physical work, etc. (Ahmad, 2009). Moreover, there is a need for extending the existing Carbon Footprinting calculators to create usable and effective Decision Support Systems (DSS). Various integrated decision models for E-Commerce supply chains will be vital in developing such DSS. Indeed, such DSS have been effective in various complex interdisciplinary problem solutions and the promise of using DSS in this complex domain cannot be overemphasized (Ahmad *et al.*, 2008).

Furthermore, the intricate interdependency of complementary and substitute products and services mean that no meaningful Carbon Footprinting assessment can be done by focusing on merely a single product or service in isolation. There is a need to take an integrative look at the supply chains of complementary and substitute products as well as product families, too. Naturally, there is a growing need for developing integrated quantitative decision models (Ahmad, 1997; Ben-Daya and Rahim, 1999, 2003).

We would like to emphasize that the extent and intricacy of these research directions would require major support of governments, businesses, regulatory bodies, and research institutions. Furthermore, it would require interdisciplinary research teams with skills in such diverse

domains as Operations Research, Management Sciences, Supply Chain Management, Marketing, Environmental Management, Social Sciences, Strategy and Policy, etc. (Ahmad *et al.*, 2008).

Conclusion

Our outcomes indicate significant differences between the Movie Rental service fulfillment modes more specifically (Tables 4 and 5). The Online or E-Commerce channel has fundamentally less adverse environmental impact in all the common categories compared to the traditional or Offline model (Tables 4 and 5).

In Table-4, we analyzed the common items of both distribution channels. The Offline channel values are higher compared to the Online on Real Estate usage, Power, and Transportation, which is reasonable based on the number of Movie Rental stores across Canada. Regarding the packaging item, Energy Consumption and Carbon Footprint are higher in the Offline because its packaging weighs more (85g) compared to the Online packaging (2.8g), which is a consequence of the packaging manufacturing process. About the non-common items in the Offline channel, they consume more Energy and produce more Carbon Footprint in comparison to the Online.

To conclude, the passenger vehicles trips, Real Estate usages, and Power followed by packaging, significantly contribute to energy consumption and an increase of the Carbon Footprint. By eliminating these trips and Movie Rental stores, energy consumption and emissions of greenhouse gases are importantly reduced in the E-Commerce model. Our base case analysis suggests that E-Commerce Movie Rental service has not only a cost advantage but also environmental benefits. Our study confirms the results of the past inquiries of several experts. Moreover, our outcomes are consistent with the findings of Sivaraman and colleagues (2007).

Lastly, for businesses we recommend that the Movie Rental industry should focus on smart buildings, green transportation, green energy suppliers, and smart supply chains to minimize congestion, consequently reducing energy consumption and Carbon Footprinting. Moreover, they should utilize the benefit from tax credits and let their customers recognize them as environmental friendly companies.

For policy makers, we recommend the reinforcement of ISO 14000 and environmental policies to reach Sustainability in the global business arena.

For government, we recommend creating a long term policy-framework for the Movie Rental Industry, providing targets, regulations and incentives.

For consumers, we recommend considering the environmentally friendly aspect of the Movie Rental businesses.

Acknowledgement: The authors would like to acknowledge the support provided for this research by the Faculty of Management and the Faculty of Computer Science, Dalhousie University, Canada, as well as by the Department of Systems Design Engineering, University of Waterloo, Canada.

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Organizational Justice and Organizational Citizenship Behavior in Higher Education Institution

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Abstract

Purpose - The objective of this study is to examine the effect of three types of organizational justice namely, distributive, procedural, and interactional justice upon two dimensions of organizational citizenship behaviors i.e., OCBI and OCBO in the Higher Education Institution context.

Design/methodology/approach - A survey was conducted upon 120 non-academic staffs of the National University of Malaysia. Pearson correlation coefficients, multiple linear regression and hierarchical regression have been used to measure the data.

Findings - No significant relationship found between distributive justice and OCBI and OCBO. However, it is found that as the education worker's perception of procedural and interactional justice in the workplace increase, they are more willing to practice positive behaviors toward their organization in term of OCBI and OCBO. In overall, as employee's perception of organizational justice increase in the workplace, their level of citizenship behaviors toward their organization, supervisor, and their colleague will increase positively.

Research limitations/implications - This study has employed convenience sampling in a public university of Malaysia, which limits the external validity of its results. Other limitations are also discussed.

Practical implications - The main application for the HEI is to focus on the importance of monitoring wide range of education worker behaviors and not to put emphasis upon the tasks those are related to the rule requirements only. Moreover, it is crucial for HEI is to encourage other behavior that goes beyond the role description to increase the organizational effectiveness. In addition, it is needed for the HEI to adopt fair environment across their organization.

Originality/value - This study contributes to the OCB literature and managerial practice in Higher Education Institution by providing empirical evidence for the effects of organizational justice on OCB.

Keywords: Organizational Citizenship Behavior, Organizational Justice, Higher Education Institution, Malaysia

Paper type: Research Paper

Introduction

In highly competitive environment, the organization effectiveness is a crucial factor for the organization's sustainability and profitability. Therefore, achieving the organizational effectiveness is the responsibility of each individual within the organization. Hence, it can be said that, organizational citizenship behavior (OCB) is the key factor for achieving the organizational effectiveness (Farh, *et al.* 1997). Bateman and Organ (1983) were the first in using this term "organizational citizenship" in order to define the worker

behavior which was not prescribed but occurred freely to help others in achieving the different task and mission.

According to Organ (1988a), OCB is the vital and important factor that can help the organization to survive. Therefore, it is crucial to understand the various variables that contribute significantly and positively in forming this favorable behavior within the organization (Organ, 1988b).

Greenberg (1990b) suggested that organizational justice researches may have the potential to explain many of the organizational outcome variables. It is concerned with the ways in which employees determine if they have been treated fairly in their jobs and the ways in which those determinations influence other work related variables (Moorman, 1991). It implies that when subordinates are treated fairly throughout the organization, they are likely to feel the need for a reciprocal social exchange relation with the organization (Giap *et al.*, 2005). However, little works have focused on the relation between organizational justice and extra role behavior (OCB). Furthermore, most of the researches have been conducted in the developed country settings and very few researches have studied this relationship in the developing countries (Liu *et al.*, 2004). Hence, taken this opportunity into account, current study aims to fill-up the gap by trying to explore the relationship among three types of organizational justice (distributive, procedural and interactional) with two dimensions of OCB behaviors (OCBO and OCBI) in a developing country context, like Malaysia. In addition, this study will focus upon the Higher Education Institution (HEI) context as research in the field of OCB has been neglected in education institutions (Erturk, 2007). Employees' voluntary behavior is quite important in education organizations as it is in where the extra role behavior is performed as well as the official works. Therefore, this study has tried to understand the nature of the relationship among organizational justice and OCB in the higher education context.

Objective of the Study

The main objective of this study is to investigate the effect of organizational justice upon the organizational citizenship behavior in the Higher Education Institution context; more specifically, to examine the effect of three types of organizational justice (distributive, procedural, and interactional justice) upon two dimensions of organizational citizenship behaviors (OCB), i.e., OCBI and OCBO in the Higher Education Institution context.

The following sections will be divided into five parts. First, a brief literature review has been discussed. Secondly, based on the literature, a conceptual model has been proposed followed by the methodology, discussion and findings, and managerial implications and limitations.

Theoretical Framework

Two theories have been used to support and consolidate the relationship between organizational justice and OCB. First, the equity theory (Adam, 1965), which states that people assign values for their input on a job and the output they receive from their job. These values are used to calculate ratio (input to output). This ratio then compared with input to output to referent (someone the employee see him has similar skills, tenure, experience, and so forth). According to equity theory, Adam (1965) proposed that condition of unfairness will create tension within a person, which he will try to reduce. Moreover, Organ (1988a) suggested that OCB could be considered as the input for one's equity ratio and that raising or lowering one's level of OCB could be a response for inequity.

Second theory that has been considered to be used to reinforce the relationship between the organizational justice and OCB is the social exchange theory. According to Greenberg and Scott (1996) and Masterson *et al.* (2000), social exchange theory often been used to explain the effect of justice perceptions on individual's behaviors. Social exchange theory suggests that through mutual exchanges, a pattern of reciprocal obligation is established between the parties (Blau, 1964). The receiving party becomes obligated to reciprocate with some voluntary service

(Gouldner, 1960). As a result, individuals develop a commitment to fulfill their obligations and the pattern of reciprocity is reinforced (Byrne and Cropanzano, 2000). Furthermore, fairness perceptions may influence OCB by prompting an employee to define his or her relation with the organization as one of social exchange (Organ, 1988b). Therefore, employees consider themselves in conditions of social exchange.

Literature Review

Organizational Citizenship Behavior (OCB)

Organizational citizenship behavior has been conceptualized in various ways. Furthermore, Begum (2005) stated that organizational citizenship behavior is referred to set of discretionary behaviors that exceed one's basic job requirement, whereas, Krishnan and Arora (2008) defined the OCB as discretionary behavior that increase the organizational effectiveness by helping coworker, supervisor, and the organization. According to Organ (1990), organizational citizenship behaviors are work-related behaviors that are discretionary, not related to the formal organizational reward system, and in the aggregate promote the effective functioning of the organization. This definition includes three main features of OCB. First, the behavior must be voluntary. Second the behavior benefit from the organization perspective. Third, organizational citizenship behavior have multidimensional nature (Bogler and Somech, 2005). Moreover, organizations citizenship behavior (OCB) is behavior that extends beyond that required by an organization in a formal job description and refer to actions performed by employee, which surpass the minimum role requirement expected by organization and promote the welfare of co-workers, work groups, or the organization (Lovell, 1999).

Williams and Anderson (1991) identified two broad dimensions of OCB as: (i) OCBO or general compliance behaviors that is directed toward the organization benefit in general (e.g., adhere to organization informal rules), and (ii) OCBI or altruistic behaviors that immediately benefit specific individuals within the organization and indirectly through this means contribute to the organization effectiveness (e.g., help other who have been absent).

Organizational Justice

The description and explanation of fairness in the workplace is known as organizational justice (Coetsee, 2004). Rawls (1971) stated that justice is the primary virtue of social organization. Colquitt *et al.*, (2001) defined organizational justice as the focus on antecedents and consequences of two types of subjective perceptions, namely the fairness of outcome distribution and allocation and the fairness of the procedures used to determine outcome distributions and allocations. Several studies have examined organizational justice (Greenberg, 1987, 1990a, b; Moorman, 1991; Tyler, 1989). These studies resulted in the emergence of several approaches to just. In general there are three dimensions of OJ, namely: distributive justice, procedural justice, and interactional justice (Bies and Moag, 1986; Tyler and Bies, 1990).

Distributive Justice

Distribute justice is the form of the organizational justice that focused on the people's beliefs that they have received fair amount of valued – work related outcome (Giap *et al.*, 2005). Moreover, Folger and Greenberg (1985) have defined the distributive justice as the fairness of the outcome the employee receive, while procedural justice as the fairness of the procedures used to determine those outcome. Furthermore, distributive justice is the people perception whether the gain they earned was distributed in such a fair manner (Folger and Cropanzano, 1998).

Procedural Justice

Much evidence proves that organizational justice perception not only includes judgment about the outcome fairness but also judgment about the way the allocation decision was made

(Greenberg, 1990b; Lind and Tyler, 1989). Procedural justice refers to the people's perception of the fairness of the outcome they receive (Giap, *et al.*, 2005). Moreover, Procedural justice deals with the procedures that the organization uses to reach a decision (Koopmann, 2001). According to Muchinsky (2000), a decision is considered procedurally just if it is consistent over people and time, without bias, holds accurate information, and with an outcome which can be modified.

Interactional Justice

Interactional justice referred to the quality of the relationships between individuals within the organization (Folger and Cropanzano, 1998). Moreover, Bies and Moag (1986) defined it as the perception of the fairness of interpersonal treatment received during the implementation of a procedure. According to Greenberg (1990a), in interactional justice, decision maker's treatment for those affected by the decision is crucial because persons identify attitudes as indicators of justice within the organization. Moreover, the decision maker's explanation for their decision is another important factor that will have its effect on the individual perception of the fairness of the decision. Individuals will consider the decision to be fair if enough explanation is made even if unfavorable results are expected (Greenberg, 1990a).

Higher Education Institutions in Malaysia

Malaysia aims to become the regional hub for educational excellence (Meh and Nasurdin, 2009). Ninth Malaysia Plan (2006 – 2010) is a big example of this vision as it relates to knowledge, innovation and values-which will be the key determinants of Malaysia's future success as a knowledge-based economy. The Ninth Malaysia Plan for the year 2006 up to 2010 has placed a lot of importance on education, training and also lifelong learning (Meh and Nasurdin, 2009). In line with the greater focus on human development under the Ninth Malaysia Plan, a total of RM40.3 billion will be allocated for the development expenditure for education and training (Ninth Malaysia Plan, 2006-2010, 2006).

Today, there are 44 public and private Universities and University-College in Malaysia (Fahmi, 2006). The establishment of Higher Education Institutions (HEIs) public and private with new education policies and strategies created met the access and other demands. Therefore, it is essential to examine the education workers' extra role behavior in relation to the satisfaction as it is being expected that, the nature of management and employee relationship may vary from the other traditional manufacturing company settings.

Organizational Justice and OCB

Research constantly shows that individual behavior in workplace is affected by perception of organizational justice (Colquitt *et al.*, 2001). For example, researchers have found that employees perform organizational citizenship behaviors to their supervisor and organization, and demonstrate higher levels of commitment to their organization and supervisor in exchange for fair treatment, procedures, and outcomes (Bobocel and Holmvall, 1999, 2001; Byrne and Cropanzano, 2000). Moreover, recent research has shown that employee perceptions of both distributive and procedural justice influence OCB (Farh *et al.*, 1990; Moorman, 1991; Organ, 1988a). That is, if employees perceive the outcomes of their evaluations to be fair or perceive the process by which outcome allocation decisions are made to be fair, they will be likely to reciprocate by performing behaviors to benefit their organization that go beyond the in-role performance of their jobs (Niehoff and Moorman, 1993). Furthermore, Williams *et al.* (2002) indicated that the likelihood of organizational citizenship behaviors increased when employee perceptions of fair treatment by supervisors became more positive.

Organ and Konovsky (1989) claimed that the fair treatment for the subordinate inside the organization will spur them and make them obligated for the reciprocal social exchange relation with the organization through various favorable behaviors, whereas, unfair treatment for the

employee will spoil their perception about their relation with the company. According to Organ and Konovsky (1989), it is more likely to be one of economic exchange, in which they will execute actions that guarantee compensation for them. Empirical research supports the relationship between overall fairness and OCB (Greenberg, 1993; Niehoff and Moorman, 1993; Organ and Konovsky, 1989). On the other hand, Tansky (1993) found that the overall fairness have no direct effect on OCB. In this study it has been assumed that the overall justice will be related to OCB.

Distributive Justice and OCB

When individual's outcomes are fair, it is signal that an individual's abilities are valued by the organization (Moon *et al.*, 2008). When one is perceived as a valued member of an organization, he is more likely to show behaviors that will help the organization to achieve its goals as a form of social exchange (Eisenberger *et al.*, 1990).

Organ (1988a, b; 1990) suggested a theoretical basis for the relationship between distributive justice and citizenship using equity theory and Blau's (1964) distinction between economic and social exchange. According to equity theory (Adams, 1965), perception of unfair distribution of work rewards relative to work inputs create tension within an individual, and the individual is motivated to resolve the tension. If OCB is considered a work input, then employee's response to underpayment could be decreased in OCB (Organ 1988a). Some researchers (Farh *et al.*, 1997; George, 1991) found that distributive justice is positively correlated with OCB, whereas, others found no relationship between distributive justice and OCB (Moorman, 1999; Niehoff and Moorman, 1993). But in this study it has been argued that there is a significant association between distributive justice and OCB's two dimensions (OCBO, OCBI).

Based on the above discussion it has been proposed that the fair distribution for the outcomes in term of pay, promotion, and incentives will enhance the education worker's motivation to reciprocate by displaying of OCB toward their supervisor, coworker and their organization. Based on this assumption the following hypotheses were formed:

H1a: distributive justice will be significantly and positively related to OCBI in higher educational institution

H1b distributive justice will be significantly positively related to OCBO in higher educational institution

Procedural Justice and OCB

Procedural justice is concerned with the fairness of the procedures used to determine the decision outcomes, this fairness is determined by factors such as whether individuals is given voice in procedures and the decision outcome (Thibaut and Walker, 1975), and whether the procedure is deemed to be consistent, ethical, free of bias, accurate, and correctable (Leventhal, 1980). When an organization offers members a voice in procedures, it implies that their ideas and thoughts are of concern to the organization. Similarly, a perception that procedures are consistent across the employee population, and that they are ethical and appropriate, suggests to employees that the organization cares about their welfare (Lind *et al.*, 1993).

According to Skarlicki and Folger (1997), the consequences of procedural justice can include a favorable behavior such as organizational commitment, trust in administration, satisfaction, and organizational citizenship behaviors. Furthermore, organizational citizenship behaviors have constantly been shown to be a consequence of procedural justice (Folger and Konovsky, 1989; Moorman, 1999; Organ and Moorman, 1993). Moreover, if employees believe that the procedures used in allocation organizational outcomes are fair and just, they will be satisfied and more likely to engage in OCB behavior (Brockner and Adsit, 1986; Konovsky and Pugh, 1994), whereas Schappe (1998) believed that procedural justice were not able to predict OCB. But in

this study it has been assumed that procedural justice will be positively associated with OCBI and OCBO.

Based on the above discussion it has been suggested that the procedural justice will have significant effect on education worker behaviors in term of OCB. When subordinate will perceive that their organization value them then they will find themselves obligated to reciprocate by performing OCB toward their organization, supervisor, and their coworker. Based on this assumption the following hypotheses were formed:

H2a: procedural justice will have a significant positive effect on employee OCBI in higher educational institution

H2b: procedural justice will have significant positive effect on employee OCBO in higher educational institution

Interactional Justice and OCB

Previous researches have proven that the level of organizational justice reflected in the management decisions about the employees is directly related to the quality of resulting social exchange relationship between the individuals and their organizations as well as between employees and their immediate managers (Cropanzano *et al.*, 2002; Maasterson *et al.*, 2000). The resulting social exchange relationship has proven to be related to favorable attitude and behaviors from the employee side like job satisfaction, organizational commitment, and OCB (Tekleab *et al.*, 2005).

Interactional justice is the fairness of the interpersonal treatment displayed during the enactment of the procedures underlying organizational justice (Bies and Moag, 1986). Fair treatment is assumed to produce open- end social exchange relationships, these types of relationship will result in obligations for the employee to repay the supervisor or organization, therefore, performance, OCB, and commitment are likely to result (Cropanzano *et al.*, 2001). Some studies have supported the relationship between interactional justice and citizenship behavior (Coyle-Shaprio *et al.*, 2003; Moorman *et al.*, 1993).

Based on the above discussion it has been proposed that interactional justice will have significant effect on education worker's OCB that is directed toward their coworker, supervisor and their organization. Based on this assumption the following hypothesis is being proposed:

H3a: the interactional justice will have significant positive effect on OCBI in higher educational institution

H3b: the interactional justice will have significant positive effect on OCBO in higher education

Theoretical framework

Figure 1 depicts the propose relationship between three dimension of organizational justice (distributive, procedural, and interactional justice) and the two types of organizational citizenship behaviors (OCBI and OCBO). As well as the direct relationship between the overall organizational justice and overall OCB, and serves as the theoretical framework for this study. It has been conceptualized that the distributive, procedural, and interactional justice influenced both OCBI and OCBO.

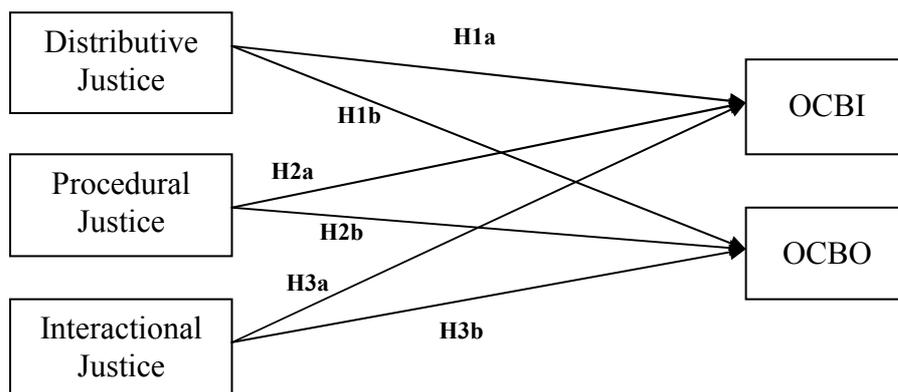


Figure 1: The proposed relationship among the variables

Methodology

Sample and Sampling Procedure

For the purpose of achieving the research objectives the convenience sampling has been used in this study. In convenience sampling, respondent are selected because they happen to be in the right place at the right time (Malhotra *et al.*, 2002). Furthermore, according to Sekaran (2003), it is the best way of getting some basic information quickly and efficiently. In addition, in the field of organization studies using convenience samples are very common and indeed are more prominent than are samples based on probability sampling (Bryman, 1989). After an exhaustive review of relevant literature, it has been found that most of the studies have used sample size between the ranges of 70 – 125 (see Farah *et al.*, 1997; Giap *et al.*, 2005; McMillan, 2005; Tansky, 1993; Williams *et al.*, 2002), while they have been employing convenience sampling. Therefore, on the basis of the past literature, this study considered a sample size of 120 respondents.

Only a handful of studies have examined OCB upon teachers in high school (Aydin and Kepenekci, 2007; Yilmaz and Tasdan, 2007). Nevertheless, little has been known regarding the non-academic staff's extra-role behavior. Hence taken this opportunity into account, this study has considered non-academic staff as the respondent and therefore, researchers have distributed 120 questionnaires among the non-academic staffs of the National University of Malaysia (Universiti Kebangsaan Malaysia). University Kebangsaan Malaysia (UKM) was formally established in 1970. Being the National university of Malaysia, UKM practices the typical Malaysian culture. Therefore, it is being assumed by the researchers that, UKM will represent the original Malaysian culture practiced by the HEIs.

Twenty questionnaires have been distributed among the library staffs, forty questionnaire among the employee of economic and business faculty, twenty for the admission and registration department, twenty for UKM's consultancy department, ten questionnaire for the academic advancement center, and the rest has been distributed among the employees of UKM's holding center. Of the 120 questionnaires that have been distributed sixty three were returned. All of them were useable for servicing the research objectives. (The response rate was 52.5%).

Data Collection

In this study, self administered questionnaires have been used. In the questionnaire the purpose of the study has been stated clearly for the understanding of the respondents. For the sake of respondents' convenience the questionnaire was prepared using bilingual mode, i.e., English and Malay version. Due to the low response rate the researcher has visited these different

departments two times to appeal them and promote them to fill up the questionnaire. Finally the researcher could collect back 63 questionnaires.

Measurement

Self administered questionnaire has been employed for completing the research objectives. The questionnaire was consisted of three parts: (i) demographic characteristics of the respondents, (ii) measuring the OCBO and OCBI, and (iii) measuring the distributive justice, procedural justice, and interactional justice. Full

Organizational Citizenship Behavior

For OCBO and OCBI behaviors, they have been measured by using 16 items based on Lee and Allen (2002). These items have been divided into two scales according to the intended target. Eight of these items were employed for assessing the OCBO (e.g., I take action to protect the organization from potential problems), in the present study Cronbach's Alpha for the subscale was 0.85. The other eight items have been employed for assessing the OCBI (e.g., I help other who have been absent). Cronbach's Alpha for the subscale was 0.91. The overall OCB has been measured by adding up OCBI and OCBO items together. Cronbach's Alpha for the scale was 0.92. Respondents have indicated their agreement for each statement by using 5 point Likert scale where, 1= never, 5= always.

Distributive Justice

Distributive justice was measured by using Price and Mueller's (1986) distributive justice index. This scale measures the extent to which rewards received by employees were perceived to be related to performance inputs. The six items ask for the degree to which the participants have been fairly rewarded with respect to six general factors: experience, effort, stress, good performance, responsibility and education. For example, "I have been fairly reward in view of the amount of education level I have". Responses were provided in accordance with five – point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Cronbach's alpha for instrument have been generally .90 (Moorman, 1991). In the current study Cronbach's Alphas for the subscale was 0.92.

Procedural Justice

Procedural justice was measured by using six items that was used by Niehoff and Moorman (1993). Respondent were asked the degree to which decision – making procedures promoted consistency, bias suppression, accuracy, correctability, representativeness, and ethicality. For example: "to make accurate decision the company collects accurate and complete information". A five point likert scale was used ranging from 1 (strongly disagree) to 5 (strongly agree). In this study Cronbach's Alpha for the subscale was 0.90.

Interactional Justice

Interactional justice was measured by using nine items measure that was used by Niehoff and Moorman (1993). Five items asked the degree to which participants were treated favorably by their supervisors, for example: "My supervisor treats me with truthful manner". And four items asked the degree to which adequate explanations regarding work related decision were given by their supervisor. For example: "my supervisor explains very clearly any decision made about my jobs". A five point likert scale was used ranging from 1 (strongly disagree) to 5 (strongly agree). In this study Cronbach's alphas for the subscale was 0.89. The overall fairness was measured by adding up the items of procedural, distributive and interactional justice. Cronbach's Alphas for the scale were 0.94.

Finding and Discussion

Profile of the Respondents

Among the 120 distributed questionnaires 63 were successfully completed (response rate was 52.5%) and used in this study. The sample comprised 44.4% males and 55.6% females. All of the respondents were Malay. About 33.3% of the respondents' age is greater than 40, and 30.2% of respondents were between the ages of 31 and 40, whereas respondent between the age 20 and 30 was 36.5 percent. Respondents that have the high school educational background comprised 46% percent, those who hold the diploma degree represented 23.6%, and other qualification groups have represented by less than 15 percent. In term of organizational age, 23.8% of the respondents are working at UKM more than 15 years, whereas 39.7% of the respondents are serving at UKM less than 5 years, and 22.2% of respondents are working at UKM from 6 to 10 years (see Table 1).

Table 1: Respondents' demographic profile

Demographic Variables		Frequency (n)	Percentage (%)
Gender	Male	28	44.4
	Female	35	55.6
	Total	63	100.0
Age	20-30	23	36.5
	31-40	19	30.2
	>40	21	33.3
	Total	63	100.0
Education Level	Below secondary	4	6.3
	Secondary school	29	46.0
	Upper secondary	4	6.3
	Diploma	15	23.8
	First degree	4	6.3
	Master	7	11.1
	Total	63	100.0
Tenure	<5 years	25	39.7
	6-10	14	22.2
	11-15	9	14.3
	>15	15	32.8
	Total	63	100.0

Table 2 is related to the employee's perceptions of organizational justice and organizational citizenship behaviors.

Table 2: Descriptive Statistics of employee's perception of organizational justice and OCB

	N	Minimum	Maximum	Mean	Std. Deviation
OCBIT	63	15.00	40.00	25.1746	4.84115
OCBOT	63	15.00	39.00	27.0952	5.58718
DJT	63	12.00	30.00	21.6508	3.95196
PJT	63	8.00	30.00	20.7302	3.93170
IJT	63	20.00	41.00	33.1111	4.55472

From the table it can be seen that the employee's perception of OCBI and OCBO is consider in moderate level (OCBI mean= 25.17, OCBO mean= 27.09). Accordingly it can be said that the