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CONTENTS

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GENDER PAY GAP AND DISCRIMINATION IN TAIWANESE AUDITING INDUSTRY

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ABSTRACT

This study investigates the salary differentials between male and female employees of audit firms in Taiwan. We employ the transcendental logarithmic (translog) revenue function to estimate the productivities of employees and then compare them with compensations of employees. Total samples are divided into national, regional and local audit firms in terms of market segmentation. This study confirms that gender salary gap exists in the auditing industry and compensations of male employees are higher than that of female ones. Specifically, male employees are over-compensated in the national firms but female employees are over-compensated in both regional and local audit firms. Consequently, this study argues that sex discrimination against female employees exists in the national firms but sex discrimination against male employees exists in the regional and local. With the brand new findings, this study contributes knowledge to the literature of gender and salary.

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KEYWORDS: Audit Firms, Market Segmentation, Gender Salary Differentials, Productivities, Sex Discrimination

INTRODUCTION

A multitude of prior researchers investigate the critical and engaging issue, gender salary differentials. Due primarily to data unavailability, limited prior studies relate to the investigation of gender salary gap with mixed results (Hunton, Neidermeyer and Wier, 1996; Schaefer and Zimmer, 1995; Trapp, Hermanson and Turner, 1989; Whiting and Wright, 2001). Also, the surveys of differentials in salaries reveal different perceptions by male and female employees in audit firms (Hunton et al., 1996; Trapp et al., 1989). Following and extending this line of research, this study examines the male-female salary differentials for Taiwanese audit firms in different market segments. Gender salary differentials do not imply sex discrimination. It is the difference in human capital that determines the male-female salary gap (Green and Ferber, 2005). From the perspective of labour demand theory, employees' productivities depend on their contributions to an organization.

Audit firms are typically a professional service organization and provide services by auditors with expertise (Gibbins and Wright, 1999; Morris and Empson, 1998). Prior studies state that market segmentation exists in the auditing industry (Chen, Chang and Lee, 2008; DeFond, Francis and Wong, 2000; Ghosh and Lustgarten, 2006). Audit firms in the same market segments have similar groups of clients and are more homogeneous than the entire firms of the industry. As a result, this study divides total samples into three categories, national, regional and local audit firms. This classification better reflects the practices observed and provides more stable and determinate evidences related to the male-female salary differentials. Practically, employees of audit firms include managers, auditor-in-charges (senior auditors), and audit staffs (Arens, Elder and Beasley, 2012). In investigating the gender salary gap, most prior studies focus their subjects on a single industry or economy and report a significant salary gap favouring men. To the best of our knowledge, few examine this issue under market segmentation. This

motivates us to divide audit firms into three sub-samples and then compare the productivities and compensations of employees to address the question.

Based on the 2004-2009 Survey Report of Audit Firms in Taiwan, we document that gender salary gap exists in the auditing industry and salaries of male employees are higher than that of females in the three sub-samples. When productivities are compared with compensations, male employees are over-compensated and female employees are under-compensated in national firms. In contrast, the males are under-compensated but the females are over-compensated in both regional and local audit firms. This study argues that sex discrimination against females exists in the national firms while sex discrimination against males in both regional and local firms. With results, this paper contributes knowledge to the literature by providing evidence on male-female salary gaps. The remainder of this study is organized as follows. Section 2 reviews the literatures and develops the hypotheses. Research design appears in Section 3. Section 4 presents and discusses our empirical results. We conclude in Section 5.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Market Segmentation: Notions of market segmentation come from the incomplete competition market theory by economic scholars in the 1930's. They assume that consumers are heterogeneous and possess different preferences in a market. Firms thus seek consumers with homogeneous preferences and group them into a smaller unit with which to market their products. Hence, concept of market segmentation originates from the demand side of market (Kotler, 2003). In the auditing literature, Ghosh and Lustgarten (2006) hypothesize and confirm that there are separate segments within the U.S. auditing industry in which different levels of rivalry and fee-setting practices prevail. In terms of market segment, Chen et al. (2008) investigate the continuing professional education of Taiwanese audit firms by categorizing audit firms into big-sized, medium-sized, and small-sized firms. Yang, Yang and Chen (2012) classify audit firms into big, large, medium, and small firms to examine the competition level and merger in Taiwanese auditing industry. DeFond et al. (2000) also document the existence of market segmentation in Hong Kong auditing industry.

Gender Salary Gap and Sex Discrimination: Several prior researches study the relationship between compensations, productivities and gender. Some report no evidence of gender compensation discrimination (Hægeland and Klette, 1999; Ilmakunnas and Maliranta, 2005) but some find gender pay gap (Hellerstein, Neumark and Troske, 1999; Kawaguchi, 2007; McDevitt, Irwin and Inwood, 2009). Marini (1989) classifies the sources of gender salary gap into either the demand and supply factors of labour market or merely sex discrimination. From the perspective of demand for labour, women tend to be disproportionately concentrated on the relatively lower pay jobs due to economy, industry, and workplace (Fields and Wolff, 1995). In contrast, some researches explain the salary gap in terms of supply-side factors of labour market. Women work fewer hours, complete fewer years of on-the-job training and have less work experience (Blau and Ferber, 1986). Further, women spend fewer years with the same employers and are more likely to work part-time and have more interrupted careers caused by child-rearing and family responsibilities (Tomaskovic-Devey and Skaggs, 1999).

Lower pay for women is presumably attributed to their relatively inferior productivities. Hence, differences in labourer productivity account for part of the gender salary gap (Green and Ferber, 2005). However, significant gender salary gap still persists after controlling for the above factors (Dreher and Cox, 1996; Graddy and Pistaferri, 2000; Stroh, Brett and Reilly, 1992; Wood, Corcoran and Courant, 1993). In other words, empirical results substantiate that women's lower salaries relate to their work, lower positions and lower human capital. Using the 1997 Social Change Survey of Taiwan, Chen (2002) finds gender salary differences. Chen and Kuan (2006) examine the relationship between gender wag discrimination and wage distribution. They show that gender wage discrimination changes with wage level, while low skilled female workers suffer the most. Based on the 1978-2003 Manpower Utilization Survey data in Taiwan, Hsu, Chen and Fang (2006) report that industrial structure change, resulting from economic growth, narrows the female-male wage differentials. In addition, the reduction in sex discrimination leads to smaller female-male wage differentials.

Gender Salary Gap in Accounting and Hypothesis Development

Some prior researches on gender salary gap in audit firms note significant differences in salaries between men and women. For example, Schaefer and Zimmer (1995) report a 52.75% gender salary gap but 29.5% of the gap is left unexplained. Olson and Frieze (1986) indicate that no salary differentials exist in the initial employment of 205 accountants. A few years later, they report significant salary gap favouring men even after controlling human capital-related variables. Although females are much senior than males, Hunton et al. (1996) indicate that average salaries of males are significantly higher than that of females at all hierarchical levels. However, some researchers find no significant pay differences. Whiting and Wright (2001) indicate that females are found to hold lower job status and are remunerated less than their male counterparts primarily due to fewer years of work experience and lower future career aspirations. They indicate no evidence of sex discrimination on salary. Cao and Buchanan (1987) investigate salary disparity among management accountants through a questionnaire survey and conclude nonexistence of serious sex discrimination on salaries.

In addition, Trapp et al. (1989) indicate that women perceive salary disparity against them but men perceive no such gender salary differentials. Stedham, Yamamura and Satoh (2006) support the existence of salary gap in Japan but both men and women are equally satisfied with their salaries. Pierce-Brown (1998) argue that salary differentials between male and female accountants can be explained by intermittent employment. He reports that about one third of the observed differentials arise from female career breaks and that the wage discrimination observed in the accountancy profession is more likely to be a sociological than an economic phenomenon. In sum, the community has a prevailing perception that women are less valuable in the workplace than men due to the supply-side factors in labour market, inappropriate sex discrimination and gender social role. Such a negative stereotype against women affects their compensations, resulting in gender salary gap. Few prior studies probe the gender salary differentials under market segmentation, especially in the auditing industry. Whether the gender salary gap favoring men still prevails in the three sub-samples, national, regional, and local firms? Because no prior studies or related literatures address this issue, this study does not predict the differences in salaries between male and female employees of audit firms and establishes the following non-directional hypotheses to acquire further evidences.

Hypothesis 1: Gender salary differentials exist in national audit firms.

Hypothesis 2: Gender salary differentials exist in regional audit firms.

Hypothesis 3: Gender salary differentials exist in local audit firms.

Research Design

Data

Empirical data of this study are from the 2004-2009 Survey Report of Audit Firms in Taiwan, published by the Financia1 Supervisory Commission (FSC). Contents of the survey include detailed information about actual annual compensations for male and female partners, managers, auditor-in-charges, and audit staffs, respectively. This study divides total audit firms into three categories in terms of market segmentation: national, regional and local firms. Partnership firms that offer audit services to public companies are national firms and that do not provide such services are referred to as regional firms. Local firms are defined as the proprietorship firms. Final number of observations is 1,793, including 294 national firms, 621 regional firms and 878 local firms. To account for inflation, we deflate all monetary variables by the yearly Consumer Price Index (CPI).

Model Specification

Following Christensen, Jorgenson and Lau (1973), this study specifies the following translog revenue

function to estimate the productivities of male and female employees in each sub-sample.

$$lnREVENUE = \beta_0 + \beta_1 lnMALE + \beta_2 lnFEMALE + \frac{1}{2}\left[\beta_{11}(lnMALE)^2 + \beta_{22}(lnFEMALE)^2\right] + \beta_{12} lnMALE \times lnFEMALE + \varphi_1 lnCAPITAL + \varphi_2 lnEDUCATION + \varphi_3 lnEXPERIENCE + \varphi_4 lnTRAINING + \varphi_5 lnAGE + \varepsilon \quad (1)$$

where *lnREVENUE* denotes the revenues of audit firms, *MALE* and *FEMALE* is the number of male and female employees, and ε is the error term. In addition, other factors affecting the revenues of audit firms are incorporated into the function as control variables. Based on Hicks (1946), total amount of fixed assets, *CAPITAL*, is included. Human capital theory states that education level, work experience and training of employees are important determinants in generating revenues of a company. *EDUCATION* is an education level of employees and associates with revenues of audit firms positively (Bröcheler, Maijoor and van Witteloostuijn, 2004; Fasci and Valdez, 1998; Pennings, Lee and van Witteloostuijn, 1998). It is defined as the average number of years which employees take to have the academic degree. *EXPERIENCE* represents the work experience of employees, measured as number of ages of employees (Bröcheler et al., 2004; Fasci and Valdez, 1998; Pennings et al., 1998). *TRAINING* denotes professional training and is defined as mean training expenses per employees (Chen et al., 2008; Guerrero and Barraud-Didier, 2004; Ling and Jaw, 2006). *AGE* is the accumulated years since establishment of audit firms (Bröcheler et al., 2004; Fasci and Valdez, 1998). This study estimates the revenue equation (1) by ordinary least squares (OLS) method. With results obtained, this study calculates the marginal revenue product for male employees (MRP_M) and female employees (MRP_F) to measure the contributions of male and female employees to the revenues of audit firms. According to the envelope theorem, marginal rate of substitution between inputs is related to the ratio of their marginal revenue product. If input prices are determined in market exogenous to the firms and under the cost minimization requirement, the relationship between the marginal revenue product and input price should be as follows:

$$\frac{MRP_M}{MRP_F} = \frac{W_M}{W_F} \quad (2)$$

where W_M and W_F represent the compensations (salaries) of male and female employees, respectively. To justify higher compensations for male employees relative to the female employees, the MRP_M should be proportionately higher than the MRP_F. If the ratio of marginal revenue product is higher than the ratio of compensation level, male employees are under-compensated and the female employees over-compensated.

EMPIRICAL RESULTS AND DISCUSSIONS

Estimates of Revenue Function

Table 1 reports the parameter estimates of equation (1) for national, regional and local audit firms. As shown for national firms, the logarithmic number of the male professionals (*lnMALE*) and the logarithmic professional training (*lnTRAINING*) are significantly positive (t=4.37 and 6.36), while the logarithmic working experience of professionals (*lnEXPERIENCE*) is significantly negative (t=-2.72). The quadratic term of the number of the female professionals $(lnFEMALE)^2$ is significantly positive (t=4.34), while the interaction term of the number of the male professionals and the number of the female professionals (*lnMALE* × *lnFEMALE*) is significantly negative (t=-2.92). For the regional audit firms, the logarithmic number of the male professionals (*lnMALE*), the logarithmic number of the female professionals (*lnFEMALE*), the logarithmic total amount of fixed assets (*lnCAPITAL*) and the logarithmic professional training (*lnTRAINING*) are significantly positive (t=5.90, 5.61, 4.59 and 8.50), while the logarithmic working experience of professionals (*lnEXPERIENCE*) is significantly negative (t=-4.18). The quadratic

term of the number of the female professionals $(lnFEMALE)^2$ is significantly positive (t=2.54), while the interaction term of the number of the male professionals and the number of the female professionals ($lnMALE \times lnFEMALE$) is significantly negative (t=-3.43).

Finally, in the local audit firms, the logarithmic number of the male professionals (*lnMALE*), the logarithmic number of the female professionals (*lnFEMALE*), the logarithmic total amount of fixed assets (*lnCAPITAL*), the logarithmic professional training (*lnTRAINING*) and the logarithmic accumulated years of establishment of the audit firm (*lnAGE*) are significantly positive (t=3.35, 9.05, 5.09, 7.66 and 3.16). The interaction term of the number of the male professionals and the number of the female professionals ($lnMALE \times lnFEMALE$) is significantly negative (t=-3.65). The remaining quadratic terms, interaction terms and control variables are insignificant. Further, this study also obtain the results of rejecting the condition that all coefficients of the quadratic terms and interaction terms are zero. The test results show that chi-square statistic for national, regional and local audit firms are 36.03 ($p<0.00$), 16.30 ($p<0.00$) and 26.06 ($p<0.00$), respectively. That is, the translog function form is better than the Cobb-Douglas (log-linear) function form. The explanatory power of regression models in Table 1 (adjusted R^2) falls 0.95, 0.78 and 0.57 ($p<0.00$) for national, regional and local audit firms, implying that the models are well specified.

Table 1: Estimates of Parameters on the Revenue Function

Variables	National Firms		Regional Firms		Local Firms	
	Coefficient	T-Statistics	Coefficient	T-Statistics	Coefficient	T-Statistics
Intercept	5.77	5.05***	5.87	52.28***	5.20	47.05***
lnMALE	0.66	4.37***	0.68	5.90***	0.96	3.35***
lnFEMALE	-0.16	-0.79	0.62	5.61***	1.22	9.05***
$(lnMALE)^2$	0.20	1.33	0.24	1.03	-0.08	-0.13
$(lnFEMALE)^2$	0.89	4.34***	0.28	2.54***	-0.24	-1.29
lnMALE× lnFEMALE	-0.42	-2.92***	-0.41	-3.43***	-0.78	-3.65***
lnCAPITAL	0.00	0.00	0.04	4.59***	0.04	5.09***
lnEDUCATION	0.82	0.91	0.03	0.45	0.07	1.17
lnEXPERIENCE	-0.25	-2.72***	-0.18	-4.18***	0.01	0.27
lnTRAINING	0.06	6.36***	0.04	8.50***	0.03	7.66***
lnAGE	0.04	1.16	0.00	0.06	0.08	3.16***
Adjusted-R^2	0.95		0.78		0.57	
Test of Log-Linear Specification (βij=0, i=1,2，j=1,2)						
F-statistics	12.01		5.43		8.69	
Chi-square	36.03***		16.30***		26.06***	
Number of Observations	294		621		878	

*Table 1 represents the empirical results of translog revenue function for data pooled over 2004-2009. Empirical results for national firms, regional and local firms demonstrate that the interaction term of the number of the male professionals and the number of the female professionals are significantly negative. It explores the salary differentials between male and female employees in national, regional and local audit firms .This table also represents the chi-square statistic for national, regional and local audit firms. The test results show that the translog function form is better than the Cobb-Douglas function form. *, **, *** Denote two-tailed significance at the 10 %, 5 % and 1 % levels.*

Comparisons of Compensations and Productivities

Table 2 displays the average compensations and productivities of male and female employees. For the national audit firms, the average compensations of male employees (W_M) ($632,492) are significantly higher than that of female employees (W_F) ($531,201) (p = 0.0042). The differences in average compensations are $101,291 and the ratio of compensation level (W_M/W_F) equals 1.19. Next, the average productivities of male employees (MRP_M) are $1,230,406 and that of females (MRP_F) are $1,391,255. Although MRP_M is lower than MRP_F, the differences (-160,849) are insignificant (p = 0.3073). The ratio of productivities between male and female employees (MRP_M/MRP_F) is 0.88. When the ratios of productivities and compensation level are compared, the former (0.88) is less than the latter one (1.19). This indicates that male employees are over-compensated and female employees are under-compensated.

That is, male employees are paid more than equally-productive female employees in the national audit firms.

Table 2: Estimation of Compensations and Productivities

Variables	National Firms	Regional Firms	Local Firms
Panel A Compensations and Productivities (Standard Error in Parentheses)			
W_M	632,492	486,213	430,216
	(359,234)	(219,468)	(248,165)
W_F	531,201	438,669	405,691
	(486,529)	(153,016)	(160,488)
MRP_M	1,230,406	1,323,902	1,289,123
	(2,530,176)	(1,232,022)	(975,482)
MRP_F	1,391,255	930,321	1,043,466
	(940,490)	(405,026)	(833,960)
W_M-W_F	101,291	47,544	24,525
W_M / W_F	1.19	1.11	1.06
MRP_M-MRP_F	-160,849	393,581	245,656
MRP_M / MRP_F	0.88	1.42	1.24
Panel B Test of Equality of Gender Compensations and Productivities			
Significance Level of t-Test			
W_M=W_F	0.0042***	0.0001***	0.0140***
MRP_M=MRP_F	0.3073	0.0001***	0.0001***
Number of Observations	294	621	878

*Table 2 shows the average compensations and productivities of male and female employees. W_M is the compensations of male employees and W_F is the compensations of female employees. MRP_M denotes productivities of male employees and MRP_F is the productivities of female employees. *, **, *** Denote two-tailed significance at the 10 %, 5 % and 1 % levels.*

In the regional audit firms, the average compensations of male employees (W_M) are $486,213, which is significantly higher than that of female employees (W_F), $438,669 (p = 0.0001). The differences in average compensations are $47,544 and the ratios of compensation level (W_M/W_F) equal 1.11. Next, the average productivities of male employees (MRP_M) are $1,323,902 and that of female employees (MRP_F) are $930,321. MRP_M is significantly higher than MRP_F (p = 0.0001). The ratios of productivities between male and female employees (MRP_M/MRP_F) are 1.42. Because the ratios of productivities (1.42) are greater than the compensation level (1.11), male employees are under-compensated and female employees are over-compensated. That is, male employees are paid less than equally-productive female employees in the regional audit firms. Local audit firms have similar results to regional firms. Average compensations of male employees (W_M) are $430,216 and that of female employees (W_F) are $405,691. The differences in average compensations ($24,525) are significant (p = 0.0140). The ratios of compensation level (W_M/W_F) equal 1.06. Next, the average productivities of male employees (MRP_M) are $1,289,123 and that of female employees (MRP_F) are $1,043,466. MRP_M is significantly higher than MRP_F (p = 0.0001). The ratios of productivities between male and female employees (MRP_M/MRP_F) are 1.24. As the ratios of productivities are greater than that of compensations, male employees are under-compensated and female employees are over-compensated. That is, male employees are paid less than their equally-productive counterparts in the local audit firms.

Discussions

Consistent with prior studies, this study confirms that gender salary gap exists in the auditing industry and compensations of male employees are higher than that of female employees. Further, our empirical results indicate that male employees are over-compensated in the national firms but female employees are over-compensated in both regional and local audit firms. This study documents that different situations of gender salary gaps exist in market segments of an industry, an extension of prior studies and a new finding. In this study, national firms refer to audit firms rendering services to public companies. They account for 8.73% of the number of observations, but earn 71.80% of the total revenues. National firms

dominate the auditing industry and are the first choice of employers by graduates of accounting department in Taiwanese universities. Practically, Taiwanese audit firms recruit new employees by a series of on-and-off-campus events and have priority in selecting the most suitable students they desire. Most of the employees are from outstanding universities or graduate schools or from other universities with distinguished academic achievement. They are highly homogeneous in professional expertise and intellectual capabilities and are paid equally in the initial employment. However, subsequent promotion depends on their contributions to the audit firms. Accordingly, this study addresses our findings in terms of the positions held by and work experience of employees in the auditing industry.

Table 3 displays the position distribution of male and female employees in national, regional, and local firms. In practice, employees of audit firms include managers, auditor-in-charges, and audit staffs. As shown in Panel A, national firms are composed of 30% male and 70% female employees. Male and female employees account for 38% and 62% of managers. The ratio of male auditor-in-charges is 30% and that of female employees is 70%. Among the audit staffs, 26% are male employees and 74% are females. Both managers and auditor-in-charges are the upper-level employees and are defined as supervisors, while audit staffs are the entry-level employees and are referred to as assistants. Panel B shows that 49% of male employees hold the upper-level positions and receive higher compensations. In contrast, only 39% of female employees are in the upper-level positions. Employees in the upper-level positions are paid much more than those in the lower level ones. Hence, salaries of male employees are higher than that of female employees. Given the insignificant differences in productivities between male and female employees shown in Table 2, male employees are over-compensated in the national firms. Namely, more male employees in the upper level positions account for the results that male employees are over compensated in the national audit firms. This study argues that sex discrimination favouring men exists in the national firm subsample.

Next, Panel A shows that 83% and 77% employees of regional and local firms are females, representing more female employees are hired compared to national firms. Dataset of this study indicates that work experience of employees (EXPERIENCE) in the regional firms (11.81) and local firms (14.09) is higher than that of in the national firms (9.22). This further indicates that females spend longer years with the same employers. Regional and local firms are smaller in size and hire fewer employees compared to national firms. Most practices are offered to small and medium-sized enterprises and are relatively simpler, such as tax matters and accounting and bookkeeping services. Rendering of these practices needs employees with the attributes of gentle, tender (yielding), affectionate and compassionate. Female employees possess these attributes (Williams and Best, 1982). Although the productivities of male employees are higher than that of female ones, female employees are over-compensated due to their personal attributes. As a result, sex discrimination favouring women exists in the regional and local firms.

Table 3: Position Distribution of Male and Female Employees

	National Firms					**Regional Firms**					**Local Firms**				
	Males		**Females**		**Total No.**	**Males**		**Females**		**Total No.**	**Males**		**Females**		**Total No.**
	No.	**(%)**	**No.**	**(%)**		**No.**	**(%)**	**No.**	**(%)**		**No.**	**(%)**	**No.**	**(%)**	
Panel A															
Managers	733	(38)	1,172	(62)	1,905	82	(34)	163	(66)	245	58	(44)	74	(56)	132
Auditor-in-charges	516	(30)	1,194	(70)	1,710	44	(14)	283	(86)	327	33	(19)	142	(81)	175
Audit staffs	1,320	(26)	3,763	(74)	5,083	186	(14)	1,094	(86)	1,280	150	(20)	611	(80)	761
Total	2,569	(30)	6,129	(70)	8,698	312	(17)	1,540	(83)	1,852	241	(23)	827	(77)	1,068
Panel B															
Supervisors	1,249	(49)	2,366	(39)	3,615	126	(40)	446	(29)	572	91	(38)	216	(26)	307
Assistants	1,320	(51)	3,763	(61)	5,083	186	(60)	1,094	(71)	1,280	150	(62)	611	(74)	761
Total	2,569	(100)	6,129	(100)	8,698	312	(100)	1,540	(100)	1,852	241	(100)	827	(100)	1,068

Table 3 shows the position distribution of male and female employees in national, regional, and local firms. No. is equal to number of employees

CONCLUSIONS AND SUGGESTIONS

This study explores the salary differentials between male and female employees in Taiwanese audit firms, including national, regional and local audit firms. Empirical data are from the 2004-2009 Survey Report of Audit Firms in Taiwan, published by the Financial Supervisory Commission (FSC). Following Christensen et al. (1973), we conduct translog revenue functions of audit firms to acquire gender's marginal revenue productivity, to compare gender compensation premium for national, regional and local audit firms. Empirical results indicate that gender salary gap exists in the auditing industry and compensations of male employees are higher than that of female employees, agreeing with prior researches. Furthermore, male employees are over-compensated in the national firms but female employees are over-compensated in both regional and local audit firms. Given the productivities of employees, this study attributes our results to sex discrimination in the three sub-samples. In contrast with prior researches, this study possesses two unique features.

First, prior studies examine the gender salary differentials for an industry or economy. Instead, this study investigates this issue in terms of market segments. Audit firms in the same business area have similar production technology level and are more homogeneous than the entire firms of the industry. Consequently, the association between gender compensations and productivities is more stable and determinate, especially in the auditing industry. Second, most prior studies investigate the gender salary gap in audit firms through questionnaire survey but we test it using an official data base. Empirical results obtained reflect real practice better. This study focuses on the effects of gender on productivities (marginal revenue product). Limitation of the study is the absence of individual gender employee-level data, which includes the level of education, number of years in the current firm, years of previous experience and marital status for male and female professionals. Because final effects of productivities appear in the form of financial performance, future studies may extend to examine the impacts of gender on accounting net income or profit ratios.

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OIL PRICE SHOCKS AND INDUSTRY LEVEL PRODUCTION USING VECTOR AUTOREGRESSION: EMPIRICAL EVIDENCE FROM PAKISTAN

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ABSTRACT

Industrial production is one of the leading indicators of gross domestic product and economic growth of the country. These factors exhibit the holistic enactment of any economy. Alternatively, the fluctuations in the industrial production level lead to contraction or expansion within the economy. Therefore, changes in prices of oil are the crucial inputs to the overall industrial production. This study examines the effects of oil prices shocks on the industrial production in Pakistan during the period July 2000-June 2015 by using VAR model. This research has shown that oil price shocks had a negative impact on industrial production in Pakistan to some extent. It is recommended to forecast oil prices for future that can help take precautionary steps to be flexible enough to control the impact on an industrial production level.

JEL: E30

KEYWORDS: Prices, Industrial Level Production, Granger Causality, Variance Decomposition

INTRODUCTION

Oil Price is seen as one of the major factors in the world in determining the economic activity as there is no such substitute for crude oil till date which can be crucial for most of the nation's especially those with underdeveloped economies. There are many factors that lead to an increase in oil prices such as the portion of the cost of oil, how much a country is dependent on the usage of oil which determines total value of import oil, how much oil is consumed domestically, and are there any alternatives to oil as fuel to be used in the economy. In previous studies, it was projected that by 2015 the oil demand is expected to increase to 98 million barrels per day and by 2030 it will rise to 118 million barrels per day. Therefore the price of oil will keep increasing as well until there is no proper alternative which requires allocating huge resources into R&D (Research and Development). Explanation to this in Pakistan is given by Oil and Gas Regulatory Authority (OGRA) on many ground levels. Government shifts the burden of oil price on to the customer and households as Pakistani government is already facing severe losses. Also, the consumption of kerosene oil, diesel oil and petroleum products have increased in the past decade in Pakistan due to industrialisation.

The research main purpose is to find the interdependencies between variables that are oil prices Shocks, textile, automobile, petroleum, iron & steel and paper & board industrial production level. Major reasons for taking these industries are that these industries are the Pakistan's growing industries and it contributes to GDP growth of Pakistan. These industries have high crude oil usage in their production houses. Paper & board industry is an essential industry contributing to Pakistan's domestic market highly. It implicates steady innovation and improvement because of the highly competitive market; therefore they have to keep improving their technologies in product generation ideas and its manufacturing. It accounts for almost

two-thirds of its sale to the common market. In the engineering sector, iron and steel industry is the main industry that holds the key to the better infrastructure of the country. The petroleum industry in Pakistan has a direct impact of oil prices shocks in Pakistan, and it is also one of the major leading industries in Pakistan. Lastly, the automobile industry is taken into consideration in this research, since oil is used as a fuel and there is no substitute for the automobile industry. The basic motivation of carrying out this study is to gauge the impact of Oil prices on industrial production level in Pakistan, as this will give us deeper insight about the industries in Pakistan and also will be helpful for future further studies. The drastic changes have been observed in the oil prices in Pakistan, the overall industrial production level in Pakistan varies as well with these changes. The main issues of the studies are that the topic is interesting and it can benefit the industries by predicting their production levels on the basis of changes in oil prices. The limitations of the study includes, budget to do this project as longitudinal study and availability of the data of all sectors. This study aims to find out how the fluctuations in the oil prices affect the industries that produce consumer goods. The main objective or goal of the research is to find out the impact of the oil price shocks on industrial production level in Pakistan. Specifically, the following sectors of Pakistan: textile, petroleum, automobile, iron and steel and paper and board. The remainder of the paper is organized as follows. Section two provides literature review. Sections three and four explain research methodology and results respectively. Conclusion of the study and future research directions has been discussed in section five.

LITERATURE REVIEW

The literature review section of the study explains the previous studies. Previous studies on the effects of changes in oil price shocks have been materialized as of 1973 and 1979 oil shocks. Hamilton (1983) and Hooker (1996) were the first to research in this field of study. Most of the early studies mainly were based upon the relationship between economic growth/stock market performances and oil prices. These studies mainly implemented VAR (Vector Autoregression) to find out the effects of oil and natural gas prices on the macroeconomic variables focused on US and OECD countries. However, there has been limited research in this area in Pakistan. Most of the studies such as Lee and Ni (2002), Cobo Reyes and Quirós (2005), Jiménez-Rodríguez (2007), Lippi and Nobili (2008), Bredin et al. (2008), Kumar (2009) and Tang et al. (2010) found that there was a negative relationship between industrial production and oil prices. The detailed literature studied and reviewed is given below:

Comparing all the above previous studies with my research topic, it is safe to say that Pakistan is an agricultural country with vast industrial production does not necessarily be affected due to the changes in oil prices. As there can be many other determinants as well in Pakistan which contributed to the economic growth of Pakistan such as political stability, foreign investments, inflation rate and other indirect variables. As per this research literature review, it can be said that most of the previous researches were mainly focused on the impact of oil price fluctuations on overall economy or GDP of the country. This research mainly focuses on effects of oil price shocks on the sub-industrial level in Pakistan through supply side and demand side channels. Oil as a major factor of production in most of the industries specifically those which are selected in this research. An increase in the oil prices leads to an increase in production cost, which further leads to a reduction in output *(Jimenez-Rodriguez and Sanchez 2005)*. The increase in the oil prices leads to an increase in the production cost of a commodity. Therefore the final price of the commodity for sale is high in the market. Higher prices of these products result in a decrease in demand of these of products, therefore shrinking aggregate output. *(Hunt, Isard and Laxton 2001)*.

Table 1: Review of Literature

Author & Year	Economies & Sample Period	Technique /Models	Verdicts
Hamilton (1983)	United States (US) (different periods during the 1948-1980)	Correlation, Granger causality test and regression analysis	He found that there was a negative relationship between changes in oil price and economic growth.
Hooker (1996)	US (1948-1994)	Wald test and VAR estimation	He found that oil prices were Granger cause of various US macroeconomic such as GDP growth, unemployment up to 1973, but this relationship was not robust the period following 1973. The results of their study showed that there is wald effect or ganger effect among variables (i.e GDP growth and unemployment)
Lippi and Nobili (2008)	US (1973-2007)	SVAR model	They found that industrial production decreased after negative oil-supply shocks, while industrial production increased after oil demand shocks
Mehrara and Sarem (2009)	Iran, Saudi Arabia and Indonesia (1970-2005)	Gregory and Hansen cointegration and Granger causality test	They found that there was a unidirectional causality from oil price shocks to economic growth in Iran and Saudi Arabia
Kumar (2009)	India (1975-2004)	VAR model	He found that oil price shocks had negative effect on the industrial production growth
Fakunaga et al., (2010)	US and Japan (1973-2008)	VAR model	They concluded that Japanese industrial production in response to the changes in oil supply was insignificant whereas, in response to the global demand shock of oil was significant in comparison to the US
Harrera, Gupta and Wada (2011)	US (different periods from Pre and Post 1973)	Regression analysis	They concluded that there is a non-linear relationship between oil prices and industrial production
Jiménez-Rodríguez (2007)	OECD countries (1975-1998)	VAR model	The results of the study cnculded that there is inverse relationship between oil prices and manufacturing output (aggregate)
Kilian and Vigfusson (2009)	US (1973-2007)	VAR model	They concluded that changes in oil prices lead to having an asymmetric impact on overall industrial production
Aaron Gonzalez (2009)	Us and Sweden (1980-2006)	Simple regression	He concluded that there was a strong negative correlation between the oil prices and economic growth in us than Sweden
Yilmaz buyer (2013)	18 European countries (1970-2010)	VAR model	He found that there was a negative relationship between changes in oil price and industrial production
Sidra and Abdul (2014)	Pakistan (1980-2012)	Multivariate analysis	They concluded that changes in oil prices have a significant impact on Pakistan's economy and balance of payment
Sultan and Waqas (2014)	Pakistan (1980-2012)	Granger causality test and error correction model	They concluded that there was a minimal impact in the short term and significant impact in the long term of oil prices on economic growth
Nazir and Qayyum (2014)	Pakistan (1972-2011)	Multivariate causality analysis	She concluded that oil price has positive impact on real GDP in short term and negative impact on real GDP in long term in context of Pakistan
Malik (2008)	Pakistan (1990-2008)	Linear regression model	She concluded that balance of payment will continue to be in deficit due to increasing oil imports and it will burden the economy of Pakistan with inflation and rise in debt from IMF (International monetary fund)
Chughtai and Kazmi (2014)	Pakistan (1971 to 2013)	Linear regression model	They concluded that oil demand, oil supply, oil price, public sector investment, private sector investment have significant impact on economic growth of Pakistan except for trade balance

This table shows the detailed review of the literature in tabular form related to the area of the current study.

DATA AND RESEARCH METHODOLOGY

The research is based on financial secondary data, therefore it follows positivist theory. The conclusions made are based on monthly time series data. Vector Auto regression model has been applied to check the shocks through impulse response function and variance decomposition. The vector autoregression (VAR)

model is widely used when the variables are interdependent. The sample period is from July 2005 to June 2015 as per the available data from Pakistan beaureau of Statistics and State Bank of Pakistan. Furthermore, to see the shocks, the interdependent response of variables estimated from the impulse response function are identified and then to see the percentage shock, variance decomposition is applied. The time series equation is given below:

$$Yi,t(OPIi,t) = \beta(TXTi,t) + \beta(AUTOi,t) + \beta(INSi,t) + \beta(PETROi,t) + \beta(PNBi,t) + \beta(CPIi,t) + e \quad (1)$$

Where *OP* is oil prices, *TXT* is textile industrial production, *AUTO* is automobile industrial production, *INS* is iron and steel industrial production, *PETRO* is petroleum industrial production, *PNB* is paper and board industrial production, *CPI* is consumer price index and *e* is denoted by error term (Residuals).

RESULTS AND DISCUSSIONS

In Table 2, descriptive statistics show the summary of the quantitative data taken under the study as shown in the above-given Table. It gives us an idea about the Mean, Mode, Median as well as the variation in the data. By analyzing Figure 1.1, we can tell that consumer price index means is 102.46 for the last ten years, whereas its Jarque-Bera P-value is 0.005, therefore the data is not normally distributed since its less than 0.05. Figure 1.2 shows us the industrial production if Iron and Steel industry in Pakistan which was 70.75 on average and the data is not normal due to its P-value less than 0.05. Figure 1.3 shows us the production level of Textile industry in Pakistan which was 112.36 on average for the last ten years and it has the lowest standard deviation of 5.22, which means there is very less variation in the production level for the past ten years in Textile industry and the data is not normally distributed since its p-value is less than 0.05. Moving onwards to Figure 1.4, this shows the descriptive analysis of Paper and Board Industry production level in Pakistan for the past ten years. The average production was 111.12 and data is not normal since the p-value is less than 0.05. Figure 1.5 shows the petroleum industrial production in Pakistan or the past ten years, the average production level was 93.48 and the p-value is 0.430, which is higher than 0.05, therefore the data is normal. Figure 1.6 shows the Oil prices descriptive analysis, the average price was 7038.78 for the past ten years and the p-value for which is 0.005, which is again less than 0.05, therefore the data is not normally distributed. Lastly, Figure1.7 shows the production level of the Automobile industry in Pakistan for the past ten years, the average production level was 98.86 and the p-value for which is 0.887, therefore we can say the data is normal since the p-value is higher than 0.05. \

Table 2: Descriptive Statistics

Variable	Mean	Median	Max	Min	SD	Skewness	Kurtosis	JB P-Value
CPI	102.4	98.84	200.8	55.80	35.90	0.71	3.26	0.005
INS	70.75	62.56	125.9	32.59	26.53	0.64	2.05	0.002
TXT	112.3	113.3	118.1	93.01	5.22	-1.73	5.65	0.000
PNB	111.1	100.6	168.4	79.73	24.30	0.94	2.62	0.000
PETRO	93.48	93.87	116.5	64.76	10.70	-0.27	2.80	0.430
OP	7038	6514	11473	3252	2619	0.05	1.56	0.005
AUTO	98.86	99.72	138.5	53.46	17.01	-0.10	2.93	0.887

This table shows the descriptive statistics of CPI, the industrial production level of Iron & Steel (INS), textile (TXT), paper and board (PNB), petroleum products (PETRO), automobile (AUTO) and oil prices (OP).

Table 3 shows, Consumer Price index at zero difference the data is not stationary since the p-value is greater than 5% level of Significance, but it becomes stationary at first difference level. Same is the case with other variables like Iron and Steel, Petroleum, Oil prices which were non-stationary at zero difference level and stationary at first difference level. On the other hand, textile and paper and board

production level were found to be stationary at zero and first difference level. Lastly, analyzing automobile production the data was found to be stationary at zero level as well as at first difference level.

Table 3: Unit Root Test – Augmented Dickey Fuller (ADF) Test

Variables	Order of Integration	ADF Test	Hypothesis
CPI	I(0)	0.99	Null hypothesis is not rejected
	I(1)	0.00	Null hypothesis is rejected
INS	I(0)	0.34	Null hypothesis is not rejected
	I(1)	0.00	Null hypothesis is rejected
TXT	I(0)	0.003	Null hypotheses is rejected
PNB	I(0)	0.02	Null hypotheses is rejected
PETRO	I(0)	0.07	Null hypothesis is not rejected
	I(1)	0.00	Null hypothesis is rejected
OP	I(0)	0.28	Null hypothesis is not rejected
	I(1)	0.00	Null hypothesis is rejected
AUTO	I(0)	0.00	Null hypothesis is rejected

This table shows the results of a stationary test that includes augmented Dickey Fuller (ADF) test.

Figure 1 below shows the impact of oil prices shocks on petroleum industry production level, by analyzing this Figure we can tell that there is a slight impact in short term until 3-4 years, and there is a negative impact in long term. Figure 2 shows the impact of oil prices shocks on Automobile industrial production level is explained, from which we can analyze that there is not much impact in the short term. In long term as the graph is almost parallel to the x-axis, which shows that there is not much impact of Oil Prices on Automobile industrial production level. Figure 3 shows the impact of oil prices on Iron and Steel industrial production level. By studying the Figure it can be said that there is a steady negative impact of oil prices shocks on iron and steel production level in short and long term. In Figure 4, the graphs show the relationship between oil prices shocks on paper and board industrial production level. From the graph, it can be said that there is a slight negative impact in short term and the impact increases slightly in long term of oil prices shock on paper and board industrial level production. Lastly, in Figure 5, we can see the impact of oil prices shocks on a textile industrial production level. From the Figure, it can be analysed that there is a continuous steady positive impact along the period of ten years. Apart from that, the impact is very little of oil prices shocks on the industrial production level of textile industry.

Figure 1: Response of PETRO to Cholesky One S.D. DOP Innovation

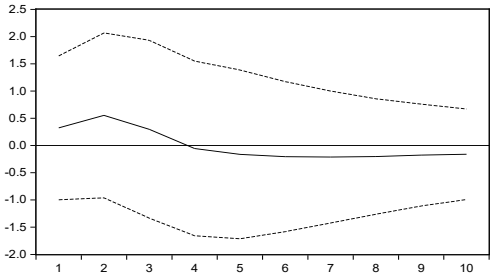


Figure 2: Response of AUTO to Cholesky One S.D. DOP Innovation

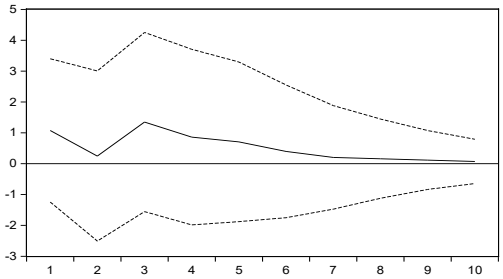


Figure 3: Response of DINS to Cholesky One S.D. DOP Innovation

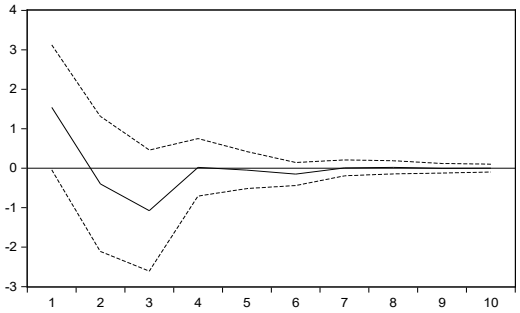


Figure 4: Responses of PNB to Cholesky One S.D. DOP Innovation

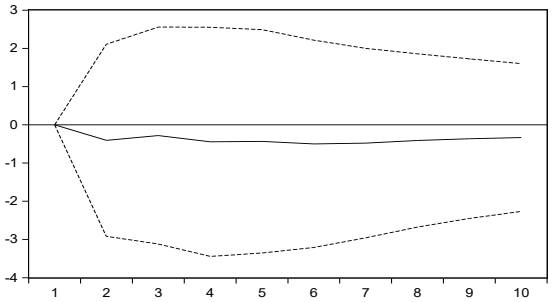
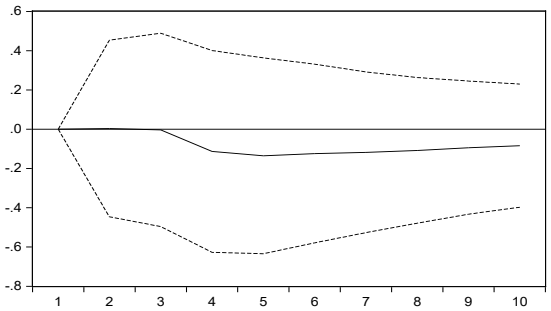


Figure 5: Response of TXT to Cholesky One S.D. DOP Innovation



Figures 6 to 9 below shows that there is an increasing trend in consumer price index in percentage variance over the long term due to oil prices shocks. In Figures 10 to 13 below, there is hardly any percentage change in iron and steel production level due to oil prices shocks in short term but with time in long term the percentage variance increases. In Figures 14 to 17 below, there is minimal percentage

change in the paper and board industrial production level due to oil prices shocks, whereas, in long term, the graph shows that there is a greater percentage variance in the overall production of paper and board industry due to oil prices shocks. In Figures 18 to 21 below, we can analyze that the percentage change in the textile industrial production level is minimal due to oil prices shocks in the short term and even in the long term the percentage change is negligible, we can conclude that textile industry is hardly affected by changes in the oil prices in Pakistan. In Figures 22 to 25 below, Petroleum industry production level is compared with oil prices shocks. In this Figure, it is safe to say that there is no percentage variance in the petroleum industry production level due to oil prices shocks in short and long term. Figures 26 to 29 below show us the comparison between oil prices shocks and automobile industrial production level. In the Figure, we can analyze that there is no impact of oil prices shocks, whereas in the long-term there is a slight impact of oil prices shocks on automobile industrial production level.

Figure 6: Var. Decomp: Pct. OP Var. due to OP

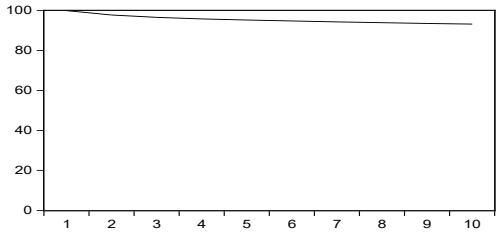


Figure 7: Var. Decomp: Pct. OP Var. due to CPI

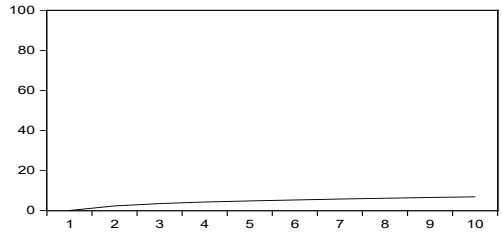


Figure 8: Var. Decomp: Pct. CPI Var. due to OP

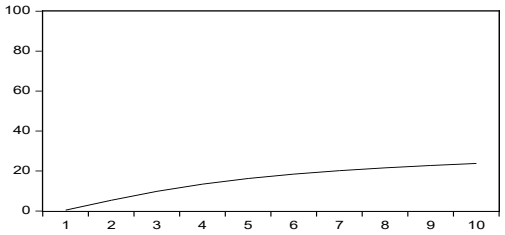


Figure 9: Var. Decomp. Pct. CPI Var. due to CPI

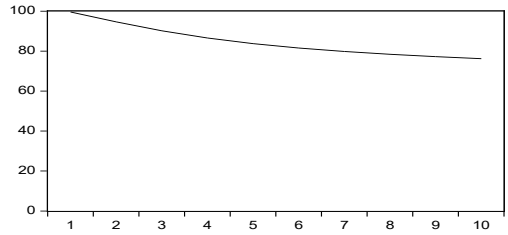


Figure 10: Var. Decomp: Pct. OP Var. due to OP

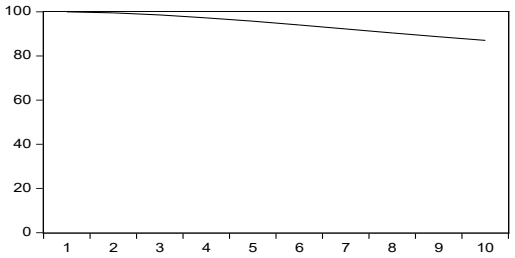


Figure 11: Var. Decomp: Pct. OP Var. due to INS

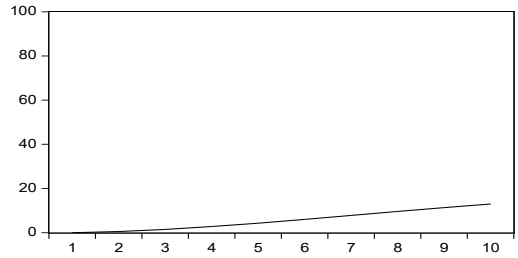


Figure 12: Var. Decomp: Pct. INS Var. due to OP

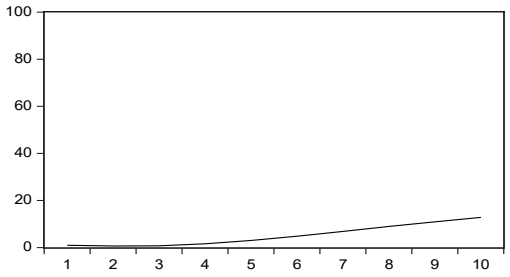


Figure 13: Var. Decomp. Pct. INS Var. due to INS

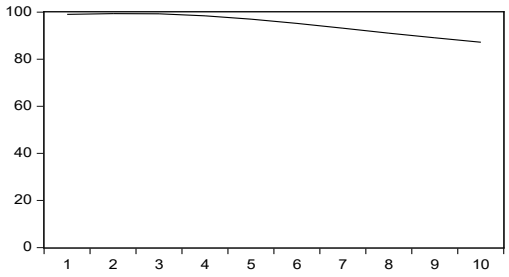


Figure 14: Var. Decomp. Pct. OP Var. due to OP

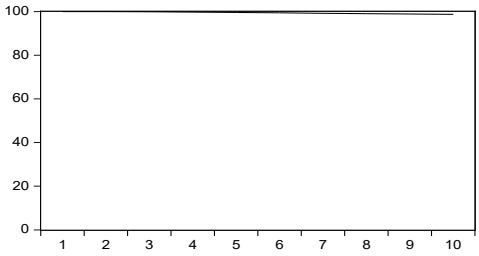


Figure 15: Var. Decomp: Pct. INS Var. due to PBN

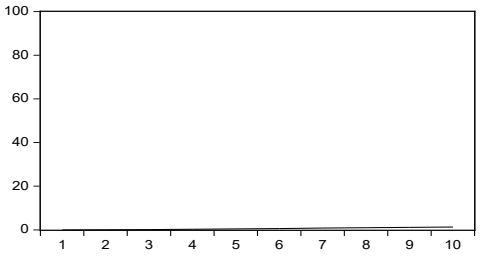


Figure 16: Var. Decomp. Pct. PBN Var. due to OP

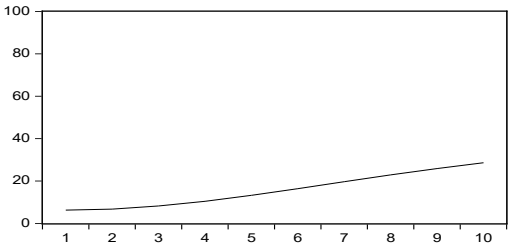


Figure 17: Var. Decomp: Pct. PBN Var. due to PBN

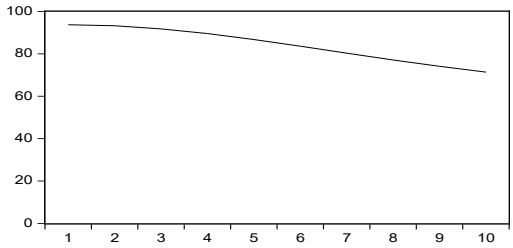


Figure 18: Var. Decomp. Pct. OP Var. due to OP

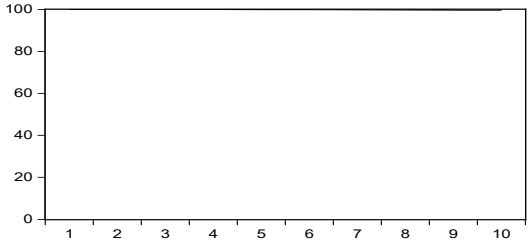


Figure 19: Var. Decomp: Pct. PBN Var. due to TXT

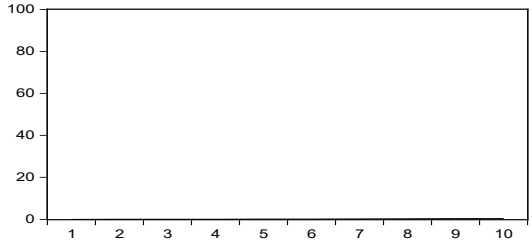


Figure 20: Var. Decomp. Pct. TXT Var. due to OP

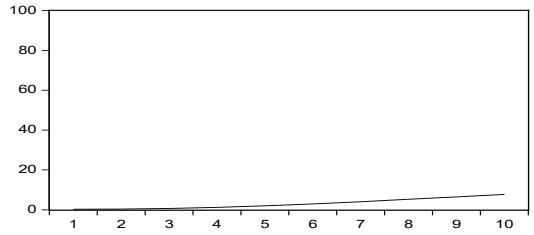


Figure 21: Var. Decomp: Pct. TXT Var. due to TXT

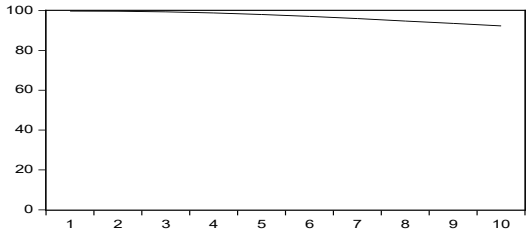


Figure 22: Var. Decomp. Pct. OP Var. due to OP

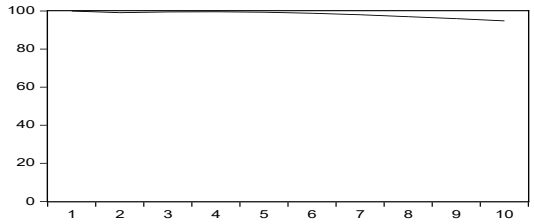


Figure 23: Var. Decomp: Pct. OP Var. due to PETRO

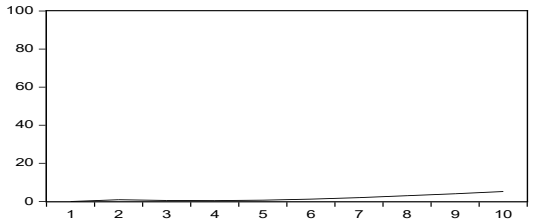


Figure 24: Var. Decomp. Pct. OP Var. due to OP

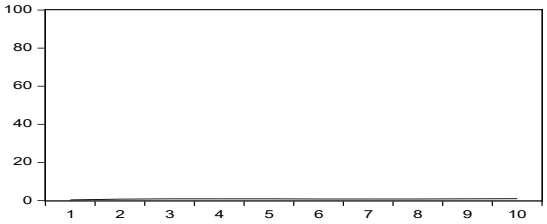


Figure 25: Var. Decomp: Pct. OP Var. due to PETRO

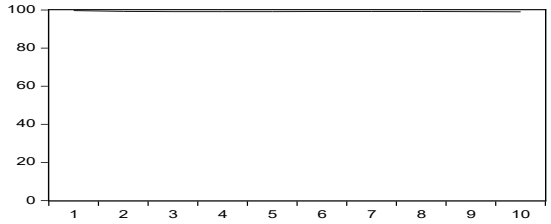


Figure 26: Var. Decomp. Pct. OP Var. due to OP

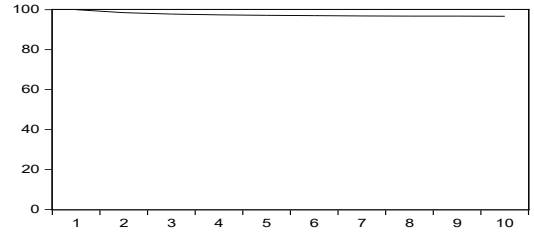


Figure 27: Var. Decomp: Pct. OP Var. due to AUTO

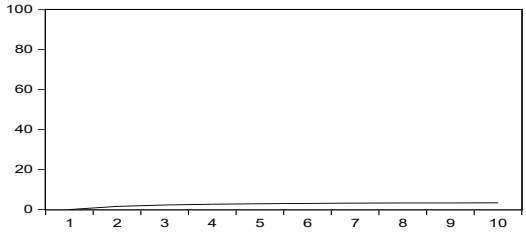


Figure 28: Var. Dec. Pct. AUTO Var. due to OP

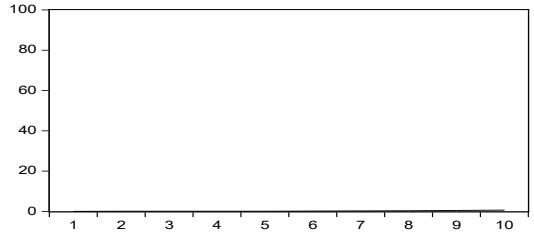


Figure 29: Var. Dec.: Pct. AUTO Var. due to AUTO

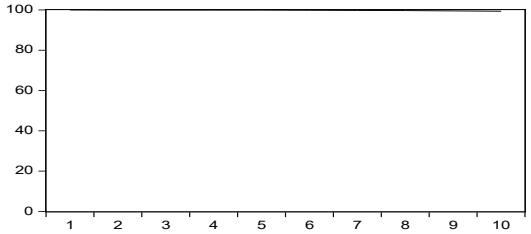


Table 4 below shows the Granger Casualty test with each variable as a dependent. Considering above hypothesis, only textile, paper and board and petroleum industrial production p-values are 0.44, 0.81 and 0.057 respectively, which are all above the 5% significance level. Therefore, we can say null hypothesis is not rejected as there is no significant relationship between textile, paper and board and petroleum industrial production level and oil prices shocks. Looking at the above hypothesis, the p-values of iron and steel, Consumer Price Index and automobile industrial production level are 0.039, 0.025 and 0.024 respectively, these p-values are all below 5% significance level, therefore null hypothesis must be rejected at this level of significance and it can be concluded that there is significant relationship between iron and steel, Consumer Price Index and automobile industrial production level and oil prices shocks. As the industries taken under this research are the major industries of Pakistan that show the overall production level of Pakistan. That is why the above hypothesis is developed to show the impact and significant relationship between the industries and oil prices shocks. As the p-value of the whole model is 0.003, which is much less than 5% level of significance, therefore, we can conclude that there is a significant relationship between textile, paper and board, petroleum, iron and steel, Consumer Price Index and automobile industrial production level and oil prices shocks.

Table 4: Granger Causality Test

Variable	Chi-Sq	Prob.
Paper & Board (Pnb)		
Txt	2.079	0.353
Petro	1.424	0.49
Op	1.897	0.387
Ins	0.109	0.946
Cpi	2.014	0.365
Auto	0.212	0.899
All	15.82	0.199
Iron & Steel (Ins)		
Txt	3.217	0.2
Pnb	1.506	0.47
Petro	5.57	0.061
Op	7.348	0.025
Cpi	4.593	0.1
Auto	3.464	0.176
All	20.67	0.055
Petroleum (Petro)		
Txt	7.982	0.0185
Pnb	1.812	0.4040
Op	1.802	0.4061
Ins	18.66	0.0001
Cpi	15.25	0.0005
Auto	2.867	0.2384
All	38.98	0.0001
Consumer Price Index (Cpi)		
Txt	0.695	0.706
Pnb	8.463	0.014
Petro	1.672	0.433
Op	4.813	0.09
Ins	2.944	0.229
Auto	0.769	0.68
All	21.55	0.042
Oil Prices (Op)		
Txt	1.602	0.4488
Pnb	0.404	0.8167
Petro	5.732	0.0569
Ins	6.462	0.0395
Cpi	7.32	0.0257
Auto	7.43	0.0244
All	28.99	0.0019
Automobile (AUTO)		
Txt	7.042	0.0296
Pnb	1.000	0.6062
Petro	0.342	0.8428
Op	0.444	0.8
Ins	1.383	0.5
Cpi	6.53	0.038
All	14.62	0.262

This table shows the Granger causality results of all the time-series variables.

CONCLUSION

As per the literature review of the past relevant studies in this area, it was found that the effects of oil prices shocks can vary geographically. In a country like Japan, this was an exception to other countries as due to the rise in oil prices, Japanese industrial production rose. Pakistan's major industries were taken under consideration to project the overall industrial production level like Automobile industry, Iron and Steel industry, Petroleum industry, Paper & Board industry and textile industry. As per the research, it was found out that Textile, Paper and Board and Petroleum industry had no impact on their industrial production level due to oil price shocks in Pakistan from mid-2000 to mid-2015. This is a positive sign for Pakistan as these industries are efficient in their production. Having no impact on their industrial production level because of oil prices shocks can be due to reasons like efficiency in utilising resources, preplanning of the management, stocking up oil barrels, minimal oil requirement in their production plant and encouragement through subsidies by the government. On the other hand, considering other major industries in Pakistan like automobile and Iron and steel industry had a greater negative impact on their total output level due to the oil price shocks. As the oil prices rose, the production fell and it shows the indirect relationship in long-term between oil prices and production of iron and steel and automobile industry in Pakistan. Although there can be many other factors as well that lead to the decrease in the production level of mismanagement, the inefficiency of the production plant, rise in factory overheads. Iron and steel industry used to be the back born of Pakistan and the industry has drastically declined due to factors like political instability and other foreign entity's interference. The rise in the oil prices effect the industrial production of iron and steel and automobile industry negatively, which further leads having a greater impact on the economy of Pakistan. Slow growth in infrastructure and instability in industrial production can be unfortunate for the future of Pakistan until serious measures are taken and implemented. Consumer Price Index (CPI) also had a significant relationship with the oil price shocks. Due to the rise in the oil prices, the household goods became harder to afford.

This causes inflation when the consumer cannot afford to buy the necessary goods for living at a lower income. In order to control and stabilize the oil prices so that the industrial production level is not affected, following Government can take strong initiatives to regulate the oil prices. Oil importing treaty can be signed with the oil exporting countries such as Iran and Saudi Arabia to promote trade and to stabilize the oil prices; this will benefit both countries mutually. More researches can be carried out by the industries that are heavily involved in oil consumption for their production to create awareness among the management and financial analysts. Precautionary steps can also be taken by industries by stocking up oil in barrels for future production. A competitive market can be developed for the economic growth so that production along with product quality is not compromised. The efficiency of utilising the resources can be applied so that the productivity is maximised in minimum time. Furthermore, Forecasting oil prices for future can help take precautionary steps to be flexible enough to control the industrial production level. In continuation of the above, oil and natural gas reserves can be explored and utilised efficiently whenever there is disequilibrium in demand and supply of oil prices in order to regulate and stabilize the oil prices.

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PUBLIC KNOWLEDGE OF GENETICALLY MODIFIED ORGANISMS IN FOOD AND THE IMPACT ON BUSINESSES: EVIDENCE FROM THE U.S.

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ABSTRACT

This study explores the public's knowledge on Genetically Modified Organisms, or GMOs, in the daily foods we consume. A survey was utilized to collect a random sample. This survey is designed to measure the participant's knowledge on GMOs and the participant's diet and lifestyle. Our hypothesis is that individuals who exhibit knowledge of GMOs will have better diets and lifestyle habits. These individuals will be more likely to avoid foods with GMOs by opting for healthier alternatives, such as organic foods and fresh produce. Additionally, individuals who are less knowledge of GMOs will portray more unhealthy habits in their lifestyles. Our expectation is that the group less knowledgeable about GMO's will be more likely to purchase foods containing GMOs. By gaining a better understanding of the connection between knowledge and lifestyle choices, or lack thereof, we can learn more about how one's knowledge of GMOs affects his/her lifestyle and purchasing habits.

JEL: Q18

KEYWORDS: Genetically Modified Organisms, Lifestyle Habits

INTRODUCTION

The myriad risks of consuming GMOs, or genetically modified organisms, are becoming more widely known and discussed. "GMOs are organisms whose genetic make-ups have been changed by mutating, inserting, or deleting genes, by using genetic engineering techniques or biotechnology" (Klein, Wolf, Wu, & Sanford, 1987; as cited in Goldbas, 2014, p. 20). GMOs are considered threatening to the environment and human health, and these two topics seem to be the most emphasized and studied when discussing GMOs and their potential risks. There are various health concerns associated with the consumption of GMOs, and some of the specific issues that may stem from the consumption of GMOs include: food allergies, increased toxicity, decreased nutritional value, and antibiotic resistance (GMO: Harmful Effects, n.d.). Studies have been conducted on animals to try to better understand the damaging effects that GMOs may pose to humans. Animals in the study exhibited multiple problems, including accelerated aging, organ damage, immune and gastrointestinal system disorders, and infertility (Smith, 2011). Studies on humans supported the notion that GMOs have potential long-term effects due to residual material from the GMOs being left in the body (Smith, 2011). After the introduction of GMOs into the market in 1996, associated health problems rose drastically (Bawa & Anilakumar, 2012). Since that time, the percentage of chronic illnesses among humans has greatly increased, disorders such as, autism and digestive problems have also increased, and food allergies have become more common. (Smith, 2011). The term "genetically modified foods" otherwise known as GMFs, indicates that the food includes or was

derived from a genetically modified organism (Ardekani, 2014). Proper labeling of foods may help consumers better understand how the foods they consume affect their allergies (Landrigan & Benbrook, 2015). The AAEM group, also known as the "American Academy of Emergency Medicine," urges individuals to educate themselves about GMOs, and it encourages individuals to opt for a diet that excludes GMOs (Smith, 2011). As a result, the American Academy of Environmental Medicine, otherwise known as the "AAEM," has pushed doctors to encourage their patients to opt for non-GMO diets (Smith, 2011).

The purpose of this study is to determine if there is a correlation between knowledge of GMOs and exhibiting a healthy lifestyle. Our hypothesis is that individuals who are knowledgeable about GMOs are more likely to embrace healthy lifestyle habits. Furthermore, those who are not knowledgeable about GMOs are more likely to exhibit unhealthy lifestyle habits. This study will discuss label reading and its impact on lifestyle choices, and the effect that GMOs have on both human health and the environment.

LITERATURE REVIEW

Individuals who are motivated to lead a healthy lifestyle are likely to monitor the foods they purchase by reading labels on foods. Individuals who read and understand the ingredients listed on labels helps to ensure that the food they consume is healthy. In 2016, President Barack Obama signed a bill that would require companies to conform to a certain standard of accurately labeling foods that contain GMOs. Food labels will benefit consumers who are attempting to make well-informed choices. Furthermore, food that is labeled properly will provide vital information for those trying to understand the development of new food allergies (Landrigan et al., 2015). One study that emphasized reading food labels claimed, "The primary roles of food labels are to inform consumers about nutrition, help them compare the nutrients in similar products and choose the one that best suit their needs, as well as helping them to make healthy food choices" (Darkwa, 2014, p. 13). Although manufacturers supply an ingredients list for foods, not all individuals know how to properly read an ingredients label. With all of the ingredients added to foods, many of them with bizarre names, it can be difficult to comprehend what ingredients are safe, and which might be potentially harmful. A valid point that deserves consideration is that individuals might not be making healthy choices because they lack the knowledge necessary to understand what ingredients are healthy and what ingredients to avoid. While individuals may monitor the labels on the foods they purchase, that does not necessarily mean that they are knowledgeable about the ingredients. Darkwa's study about knowledge pertaining to food labels claims, "...it is worth deliberating consumers' knowledge of this information, and their willingness to read, understand and use the information as a guide when making decisions about what food to buy" (Darkwa, 2014, p. 13). While some individuals review the ingredients list before purchasing the item, there is evidence to support the idea that many do not even review the ingredients list (DeVille-Almond & Halliwell, 2014).

Not only do the consumers have to worry about understanding the ingredients in a particular item, but vibrant packaging, often used to attract the viewer's attention, has misleading phrases emblazoned on the front. Phrases such as "Low-Calorie," "Excellent Source of Fiber," or "Reduced Sodium," catch the consumer's attention, even though these claims do not always correspond with one another. For example, the word 'natural' has become an issue, and there are a variety of lawsuits against food companies who utilize this phrase on packaging for their food. "From a food science perspective, it is difficult to define a food product that is 'natural' because the food has probably been processed and is no longer the product of the earth" (Gerald & Dorothy, 2015, p. 4).

According to naturalsociety.com not all "NON-GMO" labels mean that it is indeed GMO-free. Unless the label is verified by a reliable source there is a high chance that the product being purchased has GMOs in it. An article on jonrappoport.wordpress.com reported that Whole Foods was sued for false labeling products as "NON-GMO."

The plaintiff's claim was that, "Whole Foods advertised and sold Blue Diamond Almond Breeze Almond Milk and Vanilla Almond Milk with non-GMO labels, when these products had not been verified as such by the Non-GMO Project" (Rappoport, 2014, para. 1). Trying to remain GMO- free, from a consumer's point of view, could pose difficult if the labels on the food cannot be trusted. In order to ensure one is avoiding foods with GMOs, they should make sure that the labels are verified by a legitimate source for non-GMO foods. Until there are proper labels on foods or GMOs are banned, it is important to learn the effects of GMOs in order to ensure that one is protecting himself/herself and his/her family (Gucciardi, 2012).

One of the best ways to ensure the avoidance of foods containing GMOs would be to adhere to a strictly organic diet. While that certainly is not ideal for most consumers due to the high prices of organic foods, it is definitely one of the easiest ways to avoid foods containing GMOs. "On produce, the USDA organic seal verifies that irradiation, sewage sludge, synthetic fertilizers, prohibited pesticides and genetically modified organisms (GMOs) were not used" (Gerald & Dorothy, 2015, p. 4). Opting for organic foods with the USDA organic seal is the most foolproof way of avoiding foods containing harmful GMOs.

The top foods that one should avoid when trying to live a GMO-free lifestyle includes: corn, soy, sugar, papayas, aspartame, canola, zucchini, yellow squash, dairy, and cotton in the form of oil. Other foods that one should avoid are canned soups, frozen foods, cereal, grain fed meats, and soft drinks. The bulk of processed foods tend to contain GMOs. Fresh fruits and vegetables are usually safe to eat, with some minor exceptions:

> *"The only GM produce you're likely to find is the Hawaiian papaya, a small amount of zucchini and squash, and some sweet corn. No meat, fish, and poultry products approved for direct human consumption are bioengineered at this point, though most of the feed for livestock and fish is derived from GM corn, alfalfa, and other biotech grains. Only organic varieties of these animal products are guaranteed GMO-free feed" (Caldwell, 2013, para. 4).*

Beans, nuts, and seeds are also great to eat when leading a GMO free lifestyle. When possible purchase organic items, as these items are the safest way to be sure they are not genetically modified.

The bottom line is, "It's up to consumers to decide which type of food they want to buy, and to register their opinion on GMO foods the simplest way... with the power of their purchases. Sooner or later, companies will want to provide the products that people are buying the most" (Erdosh, 2014, p. 14). If individuals become more aware of the side-effects said to be associated with GMOs and refuse to purchase foods containing GMOs, then the demand for items containing GMOs will decrease and stores might be less likely to stock products containing GMOs.

The key to making wise choices at the grocery store involves the consumer educating himself/herself about ingredients and their meanings. Reading the labels on foods, comprehending what potential health complications the ingredients may cause, and avoiding misleading text on packaging all play a role in making educated decisions. Individuals who are monitoring varying foods' labels in the grocery store, while paying attention to the foods they are consuming indicates that the individual cares about what harmful ingredients they may be putting in their bodies. The main reason someone would inspect the label on foods is to ensure that the ingredients are somewhat healthy.

Label Reading and Lifestyle Choices

Our study argues that understanding labels should portray a positive correlation, that is, as one variable increases (knowledge about GMOs), the other variable will also increase (healthy lifestyle habits). A

healthy lifestyle is defined as "orientation toward the prevention of health problems, and the maximization of personal well-being" (Kempen, Muller, Symington, & Van Eeden, 2012, p. 15). Individuals are also more likely to read food labels if they are on a low-fat diet, as opposed to those who have high-fat diets (Svederberg, Gustafsson, Reuterswärd, & Svensson, 2008). There is evidence to support that lifestyle habits are correlated with a multitude of other variables. "USA consumers, who followed a healthy lifestyle, were found to average a higher consumption of fruit and vegetables, were largely female, had a higher level of education, and were predominantly older than consumers who adhered to an unhealthy lifestyle" (Kempen et al., 2012, p. 15). This data our claim that individuals who avoid GMOs in their foods do so intentionally because they have educated themselves on the topic and are striving to lead a healthy lifestyle. Individuals known to have diets mainly comprised of fruits and vegetables, both known to be low in GMOs, tend to lead healthy lifestyles (Caldwell, 2013).

GMO inside has been trying to push to get all products to show on their labels if GMO is included in the product. Many individuals do not realize that many of the common beverages that we drink contain a high amount of GMO, some of which include Pepsi (or any type of soda), Tropicana juices, Simply juices, Hi-C, and Kool Aid. Producers of these items would rather not disclose the GMO information on their product label due to the risk of decrease in sales of the product resulting in a loss of sales for the company. People do not realize that the detailed labeling of GMOs on products in the United States is not mandatory:

> *"GMO Inside is also calling attention to the fact that Coca-Cola and Pepsi have spent more than $4.1 million to derail GMO labeling in the US. There are now more than 60 countries that require GMO labeling; however the US is not one of them. Last fall, voters in California went to the polls to try to become the first state to allow for the statewide labeling of GMO ingredients. Despite growing consumer demand for labeling and popular public support for this proposition, Prop 37 was defeated, due to millions of dollars spent by major food and chemical companies. PepsiCo contributed $2,485,400 against Prop 37 and Coca-Cola spent $1,700,500" (Newswire, 2013, p. 3).*

Therefore, regardless of what the label states the product may still contain GMOs. This can make it difficult for consumers to make informed and healthy decisions when purchasing food. However, Internet research on the topic may help individuals gain a better understanding of certain foods that are usually known to contain high amounts of GMOs. Some foods that are said to be extremely high in GMOs are: processed foods, soda, and frozen foods. Again, it is best for the consumer to stick to a diet containing fresh fruits, vegetables, and organic foods. The compilation of research supports the notion that individuals who monitor food labels to ensure they are making wise and healthy decisions about the food they consume tend to be educated about harmful ingredients such as GMOs.

GMO and the Effects It Has on the Environment

Many of us do not realize the harmful effects that GMOs not only have on our bodies, but also in the environment. Throughout the world there are thousands of farmers that rely on their crops for their income. Depending on the farmer, some crops are being sprayed with different types of chemicals to speed up the growth of the crops. "In 2017, you'll be able to purchase genetically modified apples that won't turn brown when cut open" (Benson, 2015, p. 18-21). Will this intrigue consumers to purchase these apples that are filled with chemicals or will it make them realize that this is not natural and cannot be safe for our bodies? Many of us do not take the time to look at the effects it could have but rather focus on the convenience of the product.

GMOs are becoming a growing issue to deal with, especially since GMOs are extremely common in the United States. Many crops that include GMOs, such as: soy, corn, cotton, and canola are grown in the United States. Other countries have banned GMOs, while the United States does not even ensure proper labeling of foods containing GMOs. "USA still tops the list of number of approved GM events followed

by Japan, Canada, Mexico, South Korea, Australia, the Philippines, New Zealand, the European Union, and Taiwan" (Broeders, De Keersmaecker, & Roosens, 2012, p. 1). As of now, only two states, Connecticut and Maine, have passed GMO labeling laws, while Vermont's labeling laws will go into effect in 2016 (Trager, 2014). "Following numerous other states in the US, a poll has found the majority population in Ohio don't like genetically engineered foods, and 87% of them want foods containing GMO ingredients to be labeled" (Barrett, 2015, para. 1).

GMOs are also negatively affecting other living organisms. Many argue that GMOs are toxic to other living organisms, such as butterflies, birds, and bees:

> *"Bees are hugely important in the pollination of many food crops, but are unfortunately extremely endangered by modern agricultural techniques, such as GM crops. Monarch butterflies are specifically at risk from GMO maize plants. In addition to bees and butterflies, birds are also at risk from pesticides, and work as biological control agents and pollinators, again, like bees" (Glass, 2013, para. 3).*

Furthermore, since GMOs are known to be resistant to certain agricultural techniques, GMOs may prove difficult to eradicate GMOs from agriculture, which means that it can create a considerable ecological shift.

This evidence supports the notion that GMOs are not only harmful to humans, but they also negatively impact the environment. With toxicity on the rise and the increase in deaths of certain organisms, GMOs are undoubtedly harming the environment. Therefore, GMOs need to be monitored, and the United States needs to embrace stricter labeling laws.

DATA AND METHODOLOGY

This study's participant pool was acquired via Facebook and email solicitation. The participants of our survey were ages twenty-one and older. Of our total seventy-seven participants, one individual chose not to disclose his/her gender. Our sample was predominately female respondents with a total of fifty-four female participants. Twenty-two men made up the other portion of our sample.

This study was conducted in October 2015, and the survey was available to the public for a total of nine days. The participants were asked a total of fifteen questions prodding participants to analyze their personal level of knowledge about GMOs and their habits of reading or ignoring food labels. Then, participants were asked about their lifestyle habits including questions about whether they exhibited sedentary or active lifestyles, sleeping patterns, and eating and drinking habits, among others.

We utilized an online delivery of our survey to collect a random sample of people in Ohio. The survey was provided through an online survey website called Zoho. Participants who chose to take the survey were given a brief introduction to the survey to help participants understand what their participation would entail. Participants were told that their responses would remain completely anonymous, and that they could opt out of the survey at any time. There was no incentive for this study. Participants did not have a time frame to answer the questions, and they could do so at their own leisure.

Participants were asked to answer questions about gender and age. Questions were presented in a close-ended format, and an "other" box was available to those who did not feel comfortable answering the questions about gender and age. The demographic questions were presented at the end of the survey, and they were utilized merely to gain a better understanding of the audience who took the survey.

The researchers created the questions for this survey, and a five-point Likert-type response scale was utilized to enable easy interpretation for the recorded results. After participants completed the 15 questions about knowledge of GMOs and lifestyle choices, they were presented with the two demographic questions.

RESULTS

Genetically Modified Organisms and Lifestyle Habits

Our survey had a total of seventy-seven participants who completed the entire survey. As table 1 illustrates, of the 28 respondents who opted for the neutral option of "neither agree nor disagree" about being knowledgeable about GMOs in foods. Twenty-three (29%) of the total participants surveyed claimed to be neutral about understanding the side effects of GMOs. As table one illustrates, thirty-five participants (45%) claim that they do not inspect the labels on foods to see if the foods contain GMOs. This is important to note, as reading labels on foods provides vital information to the consumer about GMOs and ingredients that would be avoided by those pursuing a healthy lifestyle, such as sugars, sodium, and saturated fats. Fourteen respondents claim to be very knowledgeable about GMOs in foods, nine claim to be very aware of the side effects associated with GMOs, yet, only four individuals claimed to inspect the labels on their foods for the purpose of avoiding GMOs.

Table 1: Survey Responses

Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I am knowledgeable about GMOs in foods	10	13	28	12	14
I am aware of the side effects of GMOs	12	20	23	13	9
I inspect the labels on my foods to see if they contain GMOs	35	18	12	7	4
I am aware of the impact GMOs have on the environment	17	21	16	10	12
I often opt for soda as my non-alcoholic beverage of choice	45	10	9	8	5
I often purchase organic foods	18	21	20	13	4
I avoid frozen foods in the grocery store	24	22	13	11	4
I often purchase fresh produce in my grocery store	0	6	11	20	40
I closely monitor the foods I purchase and consume	6	12	30	18	11
I exercise for at least 30 minutes a day (3-5 times per week)	16	19	11	12	19
I usually get a healthy amount of sleep per night (minimum seven hours)	9	9	8	35	16

This table portrays how many respondents answered for each category (strongly disagree to strongly agree) out of the total seventy-seven participants acquired for survey questions 1-11.

As noted in table 1, more than half of the participants, forty (51%) claimed that they "strongly agree" to purchasing fresh produce in the grocery store. Fresh produce is typically safe to consume and is mostly considered non-GMO. On the contrary, twenty-four participants (31%) claimed that they do not avoid frozen foods in the grocery store, and unlike fresh produce, they are known to be extremely high in GMOs. Organic foods are not the choice of a vast majority, probably due to the expensive prices associated with organic foods. Forty-five participants (58%) "strongly disagree" that soda, which are known to be high in GMOs, is their first choice of non-alcoholic beverage.

Nearly half of the participants get a minimum of seven hours of sleep per night, which is considered a to be a healthy and adequate amount of sleep. The amount of participants who exercise at least thirty minutes a day three to five times a week is roughly half of the participants who took the survey. Individuals embracing a healthy lifestyle should be cognizant of the health benefits associated with exercise, and along

with receiving adequate amounts of sleep, are incorporated in the habits of those trying to live a healthy life. When the survey statements became more specific in regards to GMOs, the majority of the answers were neutral. Unfortunately, this survey has "fence-sitters," or people who are more inclined to opt for the neutral option, neither strongly agree nor strongly disagree. For example, when participants were asked if they know what GMOs are, the neutral option had the most respondents at twenty-eight. There was more of an unbiased result when asked if people monitor the foods they purchase and consume.

As Table 2 illustrates below, of the seventy-seven total participants, 70 (90%) do not smoke and 62 (80%) do not binge drink alcohol. Although individuals may not relate smoking to GMOs, medical research has made the public aware that smoking has a myriad of negative effects on the body. Individuals who claim to know more about GMOs and choose to omit GMOs from their diets are conscious of their health choices, and that should reflect in other personal lifestyle habits, too, such as not smoking, avoiding large consumption of alcohol, and getting regular exercise and sleep.

Table 2: Survey Responses

Responses	**Yes**	**No**
I currently smoke cigarettes	6	70
I tend to binge drink alcoholic beverages	14	62
	Male	Female
I am:	22	53
What is your age group?	Responses	
21-24	27	
25-28	10	
29-32	10	
33-36	6	
37-40	8	
41 or older	14	

Table 2 portrays the collected responses from participants regarding more personal lifestyle habits, gender, and age to grasp a better overall understanding of the participants surveyed.

The gender and ages of the participants were collected to better understand the data in relation to the participant pool. Some participants opted out of sharing these answers due to the personal nature of the questions. Of the seventy-five individuals who chose to share their age group, 27 (36%) were aged twenty-one to twenty-four years old. Of the seventy-fived who shared their gender, 53 (70%) were females, while 22 (29%) were males.

Rationale and Hypothesis

Individuals who lead healthy lifestyles are more likely to be knowledgeable about GMOs, which might indicate that these individuals take the time to inform themselves about harmful ingredients in foods. If individuals are knowledgeable about harmful ingredients, then they are more likely to monitor the foods they purchase and consume. Individuals may read food labels to follow dietary restrictions due to allergies, but some may be reviewing the label to ensure that the food they eat is healthy and nutritious. There is evidence to support the notion that label reading and lifestyle choices coincide with one another, since individuals who are concerned with the ingredients in the foods they eat are more likely to carry those health concerns into other aspects of their lives, such as getting a sufficient amount of sleep and exercise.

It is predicted that the habit of inspecting food labels to avoid harmful ingredients, such as GMOs, will be positively correlated with the individual's concern to make healthy lifestyle choices. A positive correlation means that as one variable increases (avoiding GMOs), then the other variable will also increase (healthy lifestyle choices). Individuals who inspect food labels to avoid GMOs or other harmful ingredients are more likely to monitor other decisions that may negatively impact their health, such as smoking, drinking, or not receiving an adequate amount of sleep of exercise.

CONCLUSION

Our study was created to understand the relationship, or lack thereof, between knowledge of GMOs and lifestyle choices. The hypothesis for our study was supported indicating that individuals who are more knowledgeable about GMOs tend to lead healthier lifestyles in general. Those who claim to be more knowledgeable about GMOs tend to be more conscientious of reading food labels, eating organic foods, leading active lifestyles, and exhibiting healthy sleeping patterns.

The data collected for our study was measured using the Likert scale for easy data interpretation. While this method provides an easy and straightforward way to analyze and interpret the collected data, one big drawback of the Likert scale is that participants are likely to exhibit "fence-sitting," which means that participants often opt for the middle or neutral response, as to not strongly agree nor disagree.

One beneficial thing to note for future studies on the topic would be to more closely monitor extraneous variables. One extraneous variable not accounted for in our study is that some individuals who are inspecting the labels on their foods might be merely inspecting the labels because they have some type of allergy. Avoiding certain foods due to an allergy does not necessarily signify that the individual cares about his/her health. Avoiding certain ingredients because of an allergy is different than avoiding an ingredient because one is trying to live an overall healthy lifestyle. As stated in this study:

> *"Consumers may use nutrition labels for different reasons. Some may use the nutrition information to aid in the consumption of more healthful foods and overall chronic disease prevention, whereas others may have chronic diseases and have been advised by their doctors to follow certain nutrition or dietary guidelines" (Lichtenstein, Appel, Brands, Carnethon, Daniels, Franch, & Wylie-Rosett, 2006, para. 6).*

This notion was also supported by another study claiming, "It has also been shown that consumers with a health problem that lead to dietary restrictions are more likely to use nutritional information on labels while shopping than those without such a problem" (Bender and Derby, 1992; Nayga et al., 1998; as cited in Svederberg, Gustafsson, Reuterswärd, & Svensson, L., 2008, p. 193). Therefore, it is important to consider that some individuals might be reading labels to avoid ingredients that may have to be avoided for allergies or other health complications. Another thing to consider is that some individuals might be reading the labels of foods to avoid other ingredients, while not worrying about the GMOs in a particular item. This was another extraneous variable that should have been accounted for when creating the survey.

Another suggestion to consider when doing a survey about GMOs is to present a demographic question about the level of one's education. As previously discussed, there has been evidence to support that females who have a higher education tend to be more educated on GMOs than others (Kempen et al., 2012). Adding this demographic question to the survey will allow the researcher to better understand his/her sample.

Time may be a factor for working individuals with families with regards to having the time to not only have the knowledge but to apply what they know while they are shopping for their meals. When families have parents that both work and have multiple children involved in sports in the evenings after school, it can get difficult to have the time to prepare meals. Many fall on the convenience factor of buying frozen meals or

ordering carry out from a local restaurant to save the time in order to relax before starting the hectic day all over again the following day. Time may be a big factor, but lack of money could also be a factor that individuals have to consider when shopping for their foods at the grocery store. The unhealthy garbage foods tend to be much cheaper than the lean meats, organic foods, or foods that do not contain GMO's. Individuals that may not have the additional money to pay for the healthier foods may decide to eat what they can afford and exercise or involve themselves in a recreational sport to offset the not so healthy food that they are eating. Adding a salary range to the survey could be beneficial when reviewing the results to compare if individuals with knowledge about GMO's that make a certain range of salary value their health enough to spend the money.

With the ever-growing research and questions that arise about GMOs, there is always more research that is needed to better understand GMOs and the effect on humans and the environment. One suggestion for future research is to ask specific questions about GMOs to analyze whether or not the individual is knowledgeable. Our participants were asked to self-analyze their knowledge on the topic, as well as their lifestyle habits. This type of survey relies on the participants to analyze themselves, which means that individuals may have embellished or downplayed their knowledge on GMOs and whether or not their daily habits were healthy or not. By asking specific questions, as opposed to having them make general observations about themselves, this research could be taken a step further and improved upon.

Furthermore, future research can be done to incorporate another variable, such as asking the participants if they avoid other harmful ingredients in foods, such as high fructose corn syrup and soybean oil (which is known to contain GMOs). By asking the participant if they avoid other harmful ingredients, it allows for a more in-depth study on the overall lifestyle of the participant. As previously discussed, reading food labels is an important part of leading a healthy lifestyle, but not all food labels accurately label its contents. GMOs, in particular, are not always labeled on foods in the United States.

APPENDIX

Survey

The survey employed a numbered scale for eleven of the questions. The scale ranged from 1 through 5, with 1 labeled Disagree and 5 labeled Agree. Three of the questions allowed a Yes, No, or Prefer not to answer response. The final question allowed selection of the respondent's age range from 21-24 years old, 25-28, 29-32, 33-36, 37-40, and 41 years or older.

For the purposes of data analysis, the numbered responses were understood as 1 equal to strongly disagree, 2 equal to somewhat disagree, 3 equal to neither disagree nor agree, 4 equal to somewhat agree, and 5 equal to strongly agree.

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EFFECT OF FOREIGN DIRECT INVESTMENT ON DOMESTIC ENTERPRISES IN THE GULF COUNTRIES

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ABSTRACT

This study examines the impact of foreign direct investment (FDI) on privately owned domestic firms in the Gulf oil producing countries. It provides its analysis through an examination of the role of FDI in sustainable economic development and the extent to which the interaction between FDI and private sector enterprises can enhance their productivity and competitiveness in domestic markets. In doing so, this study underlines the conditional factors and challenges of productivity enhancement in domestic enterprises in an economic structure and environment characterized by weak private sector. Empirical evidence collected from 96 survey questionnaires and 42 interviews with government officials and executives underscores the limited effect of FDI on domestic firms due to passive government role and improper management of FDI, weak absorptive capacity, and unattractiveness of private sector firms to local labor force.

JEL: F20, F21, F22, F23

KEYWORDS: Foreign Direct Investment, Domestic Enterprises, Productivity Spillover, Institutions, Gulf Countries

INTRODUCTION

The impact of foreign direct investment (FDI) on economic development has been widely examined in literature. As explained in the literature review, empirical studies sum-up three different perspectives on the effect of FDI on host country economy. The liberal perspective highlights the positive impact of FDI on development. Structuralists underscore the negative impact of FDI on development. While a more realistic perspective conditions the positive impact of FDI with certain internal conditions at the country and company levels. Lipsey (2002) and Borensztein, De Gregorio and Lee (1998) provide empirical evidence that supports the realist perspective and confirms that the positive effects of FDI depend on certain conditions. Such conditions whether in the form of policy framework or company characteristics are essential for effective transmission of productivity spillover effects from foreign to domestic enterprises. Liberal economic theory argues that FDI affects positively the business sector in host country through competition and improvement in the legal and regulatory environment. It also argues that FDI can benefit the internal business sector through the transfer of technology, knowledge, capital, innovative managerial practices, marketing strategies and whole attributes of corporate culture to domestic enterprises. In a well-developed market, the business sector often receives substantial support from national government that is committed to develop infrastructure, create business linkages, provide access to finance, and provide public services essential for the efficient operation of companies.

Companies can also increase their productivity by upgrading production techniques, accessing advanced technology, developing operational and marketing strategies, and allocating efficiently their capital and human resources. Mishrif and Al Balushi (2017) argue that this is a standard business practice in most developed countries, where foreign and domestic companies enjoy an array of supporting services from the government and operate in a healthy competitive market place. Yet, the distinctive characteristics of Gulf

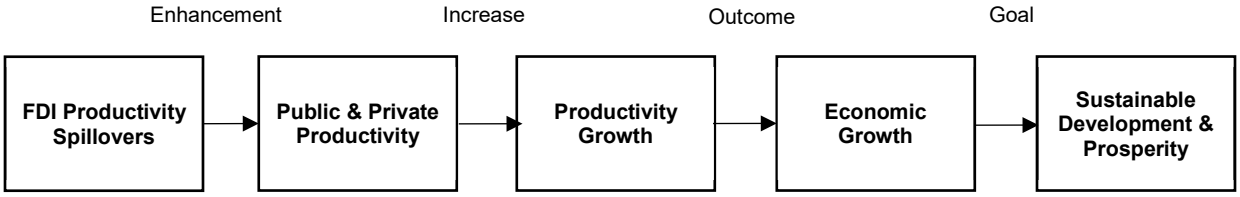
rentier economies that is marked by heavy dependency on hydrocarbons, central planning and dominance of the public sector have negatively affected the business sector and limited the share of the private sector in the development process. The rationale of examining the case of Arab Gulf states is manifold. First, Gulf economies do not depend on the productive sectors as oil represents between 39 and 70 per cent of GDP, 86 per cent and 90 per cent of government revenues, and 66 per cent and 98 per cent of exports. They are dominated by the public sector, while the private sector remains small and ineffective in the development process (Hvidt, 2013; Hertog, 2010). Second, most Gulf countries have embarked on large scale economic diversification programs; the success of these programs depends on the capacity of domestic enterprises to invest and expand in sectors such as finance, services and manufacturing. Third, the majority of state subsidies goes to public sector enterprises, while private sector enterprises lack financial and technical support. Fourth, most Gulf countries have establisihed investment ptomotion agencies to attract FDI, which has steadily increased in Saudi Arabia, United Arab Emirates (UAE) and Oman since 2010.

Literature review reveals that most studies conducted on FDI in the Gulf countries focus largely on the determinants of FDI, but there is hardly any research conducted on the effect of FDI on domestic enterprises in the Gulf context. Methodologically, this study employs a multidisciplinary approach that allows for a comperhensive, in-depth analysis through a case study approach, together with a combination of qualitative and quintitative techniques. This approach enables us to collect sufficient primary and secondary data to analyse the entext to which domestic enterprises can benefit from the presence of their foreign counterparts. In doing so, this study conducts its analysis through two main aspects: the level and quality of transmission of productivity spillover effects from foreign to domestic enterprises; and the absorptive capacity of domestic enterprises to learn from their foreign counterparts to imitate and innovate in a way that enable them to create their own competitive advantages and become more productive and competitive. The study is divided into five main sections. The following section provides a literature review on the effect of FDI on economic development and the channels and mechanism through which productivity spillover effects are transmitted from foreign to domestic enterprises. Section three explains the methodology employed in this study and quantitative and qualitative techniques used to collect primary data. Section four presents data analysis and results. This section tests the two hypothetical assumptions that the effect of FDI on domestic firms depends on the level of productivity spillover effects from foreign to domestic firms and the strength or weakness of the domestic firm's absorptive capacity. Section five provides discussions of the key findings and concluding remarks.

LITERATURE REVIEW ON THE EFFECT OF FDI ON DOMESTIC ENTERPRISES

The effect of FDI on sustainable economic development has been widely examined in literature. For most developed countries, the way to achieve sustainable development is the diversification of the outcomes by producing new products and services and finding new markets. In this case, the host country should possess a high degree of innovation and higher absorptive capacity. For many developing countries, achieving sustainable development occurs by diversifying their income resources and allowing both the government and the private sector to play their essential roles. The government focuses on preparing the business environment, in terms of regulations, and creating a platform on which foreign and domestic enterprises can flourish. Figure 1 provides a general framework of using FDI to achieve sustainable development. It shows how the efforts by the government can improve the business environment, which, in turn, attracts FDI and facilitates its interaction with the private sector, and subsequently improves the performance and competence of various industries and economic sectors. Foreign and local companies operating in host developed countries tend to diversify outputs as means of economic diversification and growth, while those operating in host developing countries concentrate on diversifying inputs or income resources to attain economic diversification and growth.

Figure 1: General Framework for Sustainable Development Using FDI



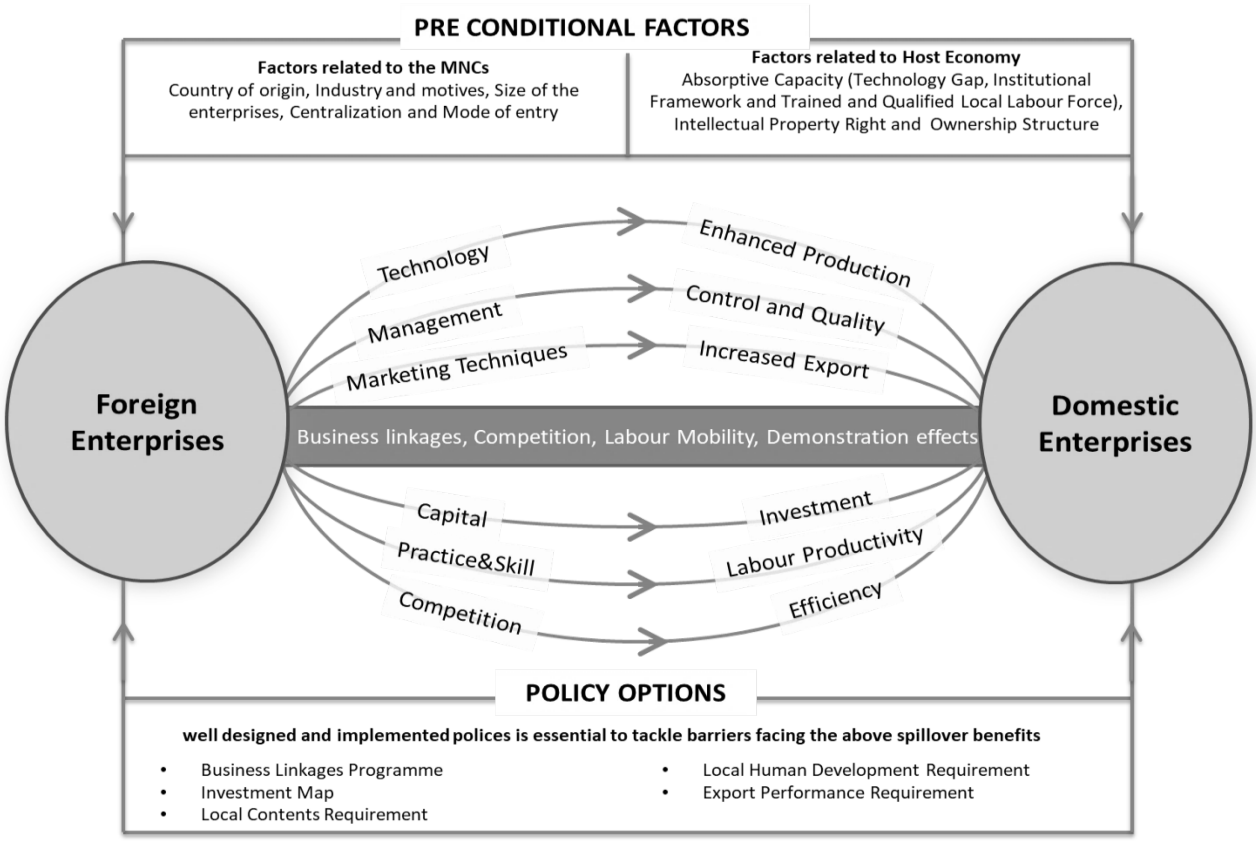
Source: Developed by the Authors

The contribution of FDI to sustainable economic development is positive when the relationship between foreign and domestic investment is complementary and when foreign investment is made in an underdeveloped sector of the economy (Mishrif and Al Balushi, 2017). Another study argues that the positive effect of FDI on domestic enterprises occurs when the former becomes more of a substitute to the latter, where the industry has plenty of domestic firms or domestic firms have access to technology that FDI brings to the host country (Blomstrom et al., 1999). This perspective follows the line of free market argument, where FDI operatives with the least possible barriers and often results in raising the productivity of domestic enterprises. The findings of several studies conducted by Buckley el al (2007), Cave (1999), De Mello (1999), Fry (1992), Borensztein et al (1998), and Moran (1998) also find that FDI accelerates economic growth, increase income, and contribute to economic development beyond available domestic resources. Other studies argue that the positive effect of FDI can materialize only under certain local policy conditions. Mishrif and Balushi (2017) identify the absorptive capacities in host country economy, where the impact of FDI on economy depends largely on the nature of the industry and the degree of liberalization in domestic policies. Also, a study by Borensztein et al (1998) using data of 69 developing countries over a period of two decades, finds that FDI is an important vehicle for technology transfer, hence contributing relatively more to growth than to local investment.

However, the study finds that the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. Javorcik (2004) also argues that positive productivity spillover effects from foreign investment to local firms are associated with joint ventures sharing domestic resources and foreign ownership, but not with fully owned foreign firms. Mayer and Sinani (2008) used meta-analysis to underscore that FDI generates positive spillover under certain circumstances, often related to local firms' motivation and capability to react to foreign entry, such capabilities are grounded in their human capital and organizational structure. Thus, positive spillover effects depend on a number of factors, including host country's openness to trade (Bhagwati, 1978), the ability of industries to support learning, and the capacity of its domestic enterprises to internalize spillovers. For positive spillover to have an effect, the technological gap between foreign and domestic firms should not exceed a threshold (De Mello, 1999), and domestic firms should benefit from relatively developed internal financial markets and qualified human capital.

However, a number of studies find a negative effect of FDI on domestic enterprises due to intense competition and market dominance that often result in crowding out small and medium sized enterprises (SMEs). De Backer and Sleuwaegen (2003) identify three factors that could result in crowding out of local SMEs: when there is a large technological gap; labor force in host economy is not sufficiently qualified; and differences in the access to credit between foreign and domestic firms. Aitken and Harrison (1999) also argue that provision of offering high wages to employees in foreign firms in contrast to lower wages paid by local firms affect negatively the quality of the latter's workforce due to labor mobility from local to foreign firms and consequently their productivity. In fact, an increase of wages and the prices of locally supplied inputs often lead to reduced employment and displacement of domestic businesses. Fry (1992) goes further to argue that the negative effect of FDI can result in the reduction of domestic enterprises, where foreign firms are technologically more advanced and capable of exploiting more rapidly and effectively business opportunities projected initially to domestic enterprises.

Figure 2: Framework of Productivity Spillover Effects from Foreign to Domestic Enterprises



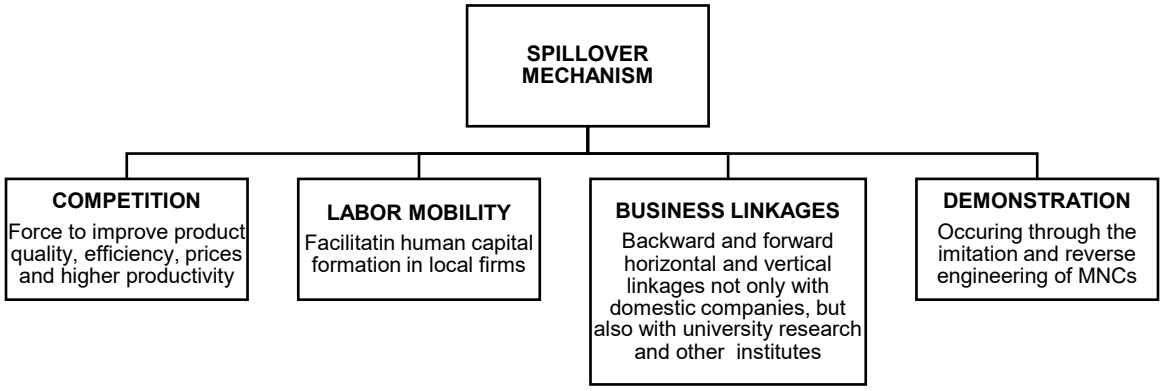
Source: Developed by the Authors

FDI affects domestic enterprises in many ways. Figure 2 highlights a number of channels and mechanisms through which spillover effects from FDI can enhance the performance of domestic enterprises. In the marketplace, foreign and domestic enterprises often cooperate and compete in the factor and product markets, and that such variation of interaction necessitates the need to determine the productivity spillover channels between foreign and local firms. Figure 2 also maps the transmission of productivity spillover effects from foreign to domestic enterprises. While providing the overall framework of transmission process, including the pre-conditional factors that should exist and the policy options for enhancing the process, it identifies six channels through which foreign and local firms interact, namely technology transfer, management attributes, marketing techniques, capital flows, best practice and skills, and competition. Mishrif and Balushi (2017) argue that effective utilization of these channels is likely to improve the performance, raise the productivity and enhance the competitiveness of local firms. They also argue that in order to attain such objectives, "a number of pre-conditional factors relating to both foreign firm and host country economy should exist. At foreign firm level, productivity spillover effects are influenced by country of origin, type of industry, motives, size of the firm, centralization, and mode of entry". At domestic firm level, spillover effects are affected by the absorptive capacity of the firm in terms of technology gap, size of the firm, organizational structure, ownership and quality of its workforce. At policy level, effective utilization of productivity spillover channels requires well-designed and implemented policies to tackle the barriers that hinder the functionality of the channels. In theory, technological spillover from foreign to domestic firms can enhance the production process, while management attributes improve control and quality of production. Proper implementation of foreign marketing strategies by domestic firms could increase their exports. FDI capital flows, mainly through joint ventures, enable domestic firms to

expand their operations beyond their own financial capabilities. Spillover of business practices and skills from foreign to domestic firms can improve the quality of the workforce and increase its productivity. Competition plays a key role in enhancing the efficiency of domestic firms. Nonetheless, spillovers do not transmit automatically, or guaranteed, because foreign firms do not generally handover their competitive advantages to other firms (Cohen, 2006).

To benefit from spillovers, domestic firms must prepare the ground through well-designed and implemented strategies to collaborate with their foreign counterparts to strengthen their absorptive capacity, narrow the technology gap, and enhance forward and backward linkages, while asserting government support to benefit access to funding and improved business environment (UNCTAD, 2003). As for spillover mechanisms, Gőrg and Greenaway (2004) identify four mechanisms for productivity spillovers, which are business linkages, labor mobility, competition and demonstration effects. Figure 3 shows that competition forces local firms to improve product quality, efficiency, price and, hence higher productivity. Labor mobility facilitates human capital formation in local firms. Business linkages influence productivity of local firm through backward, forward, horizontal or vertical linkages, not only with local firms but also with universities and other research institutions. Demonstration occurs through the imitation and reverse engineering of foreign firms in the host country economy.

Figure 3: Productivity Spillover Mechanisms



Source: Developed by the Authors from Gőrg and Greenaway, 2004.

DATA AND METHODOLOGY

Building on previous studies by Lipsy (2002) and Borenztein, De Gregirio and Lee (1998), which argue that the positive effects of FDI depend on certain conditions, this study attempts to test this hypothesis through an empirical examination of the effect of FDI on domestic enterprises in the Gulf oil producing countries. Such examinations requires collections of primary data and application on a case study approach to make the data meaningful and understood. In the context of the Gulf countries, we do have sufficient available data on FDI, obtained from the databases of the World Bank and UNCTAD's World Investment Reports. However, there are no available reliable data on the size and number of domestic enterprises and the levels of their productivity. This lack of data on the second main variable in this examination hinders the possibility of employing any form of statistical analytical programs or economitric models. For the sake of compitablility, we limit our approach to the conventional methods of collecting and analysing primary data. We adopt a multidisciplinary approach that allows for a comperhensive, indepth analysis through a case study approach of one representative country of the region, together with a combination of qualitative and quintitative techniques.

The similarities in the economic structure and outlook of Gulf economies allow for sparing the efforts to include all Gulf countries in the empirical part of this study. During the fieldwork, limited resources and lack of available data and access to data in all the Gulf countries have forced us to limit our analysis to a country-specific case study, where we examine the impact of FDI on domestic enterprises in the manufacturing sector in Oman. This approach enables us to have a good representative sample of the promising Omani manufacturing sector, which is almost identical in terms of size and structure to that of other Gulf countries. The selection of Oman is based on the country's efforts to launch an intensive economic reform program, aiming at liberalizing its trade and investment regime, improving its business environment, and diversifying its economy in light of its limited oil production and reserves.

Mishrif and Balushi (2017) also argue that Oman has invested heavily in developing free zones and business parks to attract FDI to the industrial sector, where the scope of productivity spillover is significant compared to other sectors. These efforts beard its fruits in terms of substantial rise in FDI, which increased by 400 per cent, totaling US$26.5 billion and amounting to 43 per cent of GDP in 2011, from its 2002 level (UNCAD, 2012). In the same year, manufacturing received almost 30 per cent (US$2.3 billion) of total FDI, only second to oil and gas, which received 51 per cent (US$7.1 billion). Most investments came from the UK, the USA and UAE, and concentrated in the manufacturing of basic chemicals or refined petroleum products. This type of investment has made substantial contribution to Omani economy, generating 45 per cent of economic value added and 88 per cent of exports (Oman Central Bank, 2013), while diversifying exports, particularly chemical products (32 per cent), basic metals (26 per cent) and food and beverages (15 per cent) (Omani Ministry of Commerce and Industry, 2011).

In this study, a combination of qualitative and quantitative techniques are employed to explore opinions and perceptions of all stakeholders concerned with FDI policies and whether these policies are appropriate for improving the performance and increasing productivity and competitiveness of domestic enterprises. A set of semi-structured interviews are conducted in Oman between January and June 2015 with foreign and local executives and with relevant government officials in Ministry of Commerce and Industry, Supreme Council for Planning, Investment Authority, Chambers of Commerce and Industry, and Free Zone Authorities in Duqam, Sohar and Salalah. Geographically, the samples collected from four major business and industrial cities: Muscat, Sohar, Duqam, and Salalah, where the vast majority of foreign operations are located. The authors conducted 42 Interviews with policy makers and executives, of whom 13 interviewees are government officials, 9 interviewees from foreign firms, 10 interviewees from joint ventures, and 10 interviewees from domestic firms. Patton (2002) argues that this technique provides information that answers the research questions and allows for better understanding of the variables examined in relation to the role of local executives in maximizing the benefits of interactions with foreign firms, while guiding policy makers to develop policies aiming at facilitating the transmission of productivity spillover effects from foreign to local enterprises.

Meanwhile, the authors have designed and sent a survey to foreign and local company executives to allow for some generalization on their responses to specific questions regarding their firms and experience in working in Omani market. Each questionnaire sample is divided into five sections. The first section collects general data on the respondent's occupation, economic activity, ownership structure and business environment (questions 1-20). The second section focuses on how foreign operations effect the upgrading of domestic firms through spillover channels and mechanisms (questions 21-38). The third section collects data on preconditioned factors such as absorptive capacity, institutional framework, mode of entry and ownership (questions 39-53). The fourth section collects data on public policies, strategies and incentives (questions 54-74). The fifth and final section draws a SWOT analysis for Omani business environment in relation to attracting FDI and formulating business linkages between foreign and domestic firms (question 75). Table 1 illustrates the response rate of the survey. From 114 returned questionnaires, only 96 completed (valid) questionnaires used in this study. The 76 per cent response rate shows that joint ventures (46

companies with response rate 92 per cent) were keener to participate in this study than local companies (34 firms with response rate 68 per cent) and foreign firms (34 companies with response rate 68 per cent).

Table 1: Survey Response Rate

	No of Questionnaires Sent	No of Questionnaires Returned	Response Rate (%)
Fully domestic owned firms	50	34	68
Fully foreign owned firms	50	34	68
Joint venture	50	46	92
Total	150	114	76

Source: Prepared by authors

DATA ANALYSIS AND RESULTS

Analysis of the descriptive and statistical data collected from the interviews and survey questionnaires unveils some important insights on the way FDI affects the performance of domestic enterprises in the Gulf context. It also provides us with new knowledge on how spillover effects of FDI affect the productivity of domestic firms. In doing so, this section provides its assessment and findings by analyzing the effectiveness of productivity spillover channels and mechanisms and the absorptive capacity of domestic firms to learn from their foreign counterparts. This section is divided into two main parts; each addresses one hypothetical element of the study. First, we use the primary data to explain how the low levels of transmission of productivity spillover effects minimize the effect of foreign direct investment on domestic companies. Second, we use data to explain the text to which the weak absorptive capacity of domestic companies hinders their ability to benefit from the presence of foreign direct investment in the host country.

Low Productivity Spillover Effects from Foreign to Domestic Enterprises

Analysis of primary data reveals low levels of productivity spillover effects from foreign to domestic enterprises in the Gulf countries. Analysis also reveals that the effectiveness of productivity spillover mechanisms is largely influenced by the institutional settings, business environment and demographic structure of the country, while also affected by key company characteristics such as ownership structure and geographical location. Determining the intensity and levels of interaction between foreign and domestic enterprises, we have considered the above factors when we conducted the survey in the case study Gulf State of Oman. In terms of ownership structure and geographical distribution, the survey shows that 70.8 per cent of manufacturing firms concentrate in Muscat, 11.5 per cent in Salalah, and 10.4 per cent in Sohar. Of the 96 firms surveyed, 40.6 per cent are joint ventures, 35.4 per cent are Omani, and 24 per cent are foreign-owned. As for foreign-local business arrangements, data shows that 28.1 per cent strongly agreed of existing arrangements and 67 per cent agreed of existing relationships in terms of purchasing materials, services, distribution, and maintenance, which result in upgrading the work practice of domestic enterprises. Survey responses confirm that, in the best case scenario, foreign firms pass on to their local counterparts the latest technology and quality standards, proven human resources plans, information technology systems, technical know-how, applying safety procedures, training manpower, and advanced management techniques. Nonetheless, evaluation of the effectiveness of productivity spillover mechanisms in facilitating interaction between foreign and domestic enterprises should include an examination of the key factors affecting performance of domestic enterprises.

Business linkage: quantitative and qualitative data shows that business linkages between foreign and domestic enterprises exist but remain weak in our case study. Analysis underscores an equitable level of business linkages, particularly backward linkages with suppliers, as foreign firms prefer to concentrate on their core activities and transfer their non-essential business to local enterprises. The executive of the joint venture Bahwan Exel brands this type of linkage as “complementary”. His view complements that of the executive of the local firm Oman Food Investment Holding Co., who argues that “the exposure by local

firms and the linkage sought will improve the way local firms do their business". But, when asked about their satisfaction with existing linkages, local firms expressed their dissatisfaction with the level of linkages because there are fewer linkages within a small scope with foreign companies (interview with the executive of the local manufacturing Poly Products LLC.). In the meantime, director of the foreign manufacturing firm Safety Industries argues that the extent of linkages is weak because local firms do not have sufficient capacity in terms of knowledge, skills and experience to engage with foreign firms.

Nevertheless, survey data reveals that business linkages are fundamentals for spillovers and are beneficial for Omani firms, even if there are no spillovers. Although backward and forward linkages exist on a small scale due to limited absorptive capacity of Omani firms, data identifies the importance of skills spillover (mean 4.40), technology linkage (mean 4.34), marketing techniques (mean 4.36), and managerial spillover (mean 4.11) as indispensable for effective linkages. Data also confirms the existence of indirect linkage with local firms covering demonstration effect and labor mobility that has a mean 3.98, with 11.5 per cent strongly agree and 77 per cent agree of the existence of this type of linkage. It also acknowledges the existence of direct forward linkage with local customers for supply of inputs, marketing and distribution at a mean 3.93, with 11 per cent strongly agree, and 74 per cent agree of the importance of this linkage. Such data underlines the potential for Omani firms to increase backward linkages by realizing that most foreign firms have incentives to provide technical assistance to and share knowledge with their local firms, particularly suppliers in order to improve the quality of their supply chain (Mishrif and Balushi, 2017).

Labor Mobility: labor market efficiency, in theory, is another key factor in facilitating the transmission of productivity spillover effects from foreign to local companies. It allows workers to change their employers and move from one firm to another. However, our case study shows that labor mobility is weakened by the unique economic structure in the Gulf countries that limits the transmission of spillover effects between companies. The dominance of the public sector over the small, weak and somewhat ineffective private sector, together with preference of local human capital to work in public sector jobs for job security and fiscal incentives, creates a tendency among nationals not to learn new knowledge and skills. Moreover, local private firms are dominated by expatriates, who are typically employed on short-term contracts and do not stay in the country for long. Such peculiarity limits the effect of labor mobility in transmitting productivity spillovers from foreign to Omani firms. Analysis also shows that foreign firms contribute to this negative outcome due to their high wages, which incentivize citizens to move from local to foreign firms for better wages and social status (World Bank, 2009; Chatham House, 2014). In fact, survey date records mobility in the opposite direction, but with a higher mean of 3.98, with 19.8 per cent strongly agree and 64.4 per cent agree that workers move from local to foreign firms, than that recorded for workers moving from foreign to local firms, which stood only at a mean 3.23.

Competition: although competition is a healthy practice for local firms to upgrade their systems and working practices, Omani firms argue that competition gives foreign firms a competitive edge that makes them more productive than their local counterparts. Their argument complements the early findings of Aitken and Harrison (1999), who argue that the entry of foreign firms into a specific market is likely to result in crowding out of a significant number of local SMEs that cease to operate or lose their market share due to competition. However, our data produces mixed results, as competition has both positive and negative effects on local firms. On the positive side, our date shows that foreign firms and joint ventures see the role of their companies complementary by having "different market targets, mainly for export, hence they work in partnership with local counterparts rather than competing with them". As for local firms, only those with sound organizational, financial and human capabilities that enable them to remain in the market perceive competition as a healthy practice due to their need to innovate and develop more efficient production techniques. On the negative side, survey data shows a mean 3.70, with 15.6 per cent strongly agree and 54.2 per cent agree that foreign firms compete with their local counterparts. Although the levels of competition vary, some local company executives argue that they face a high level of competition from

foreign firms. The severity of competition has led one executive to argue that foreign firms come "to eat up our market share".

Demonstration Effects: FDI transfers technology, knowledge, techniques, practices and skills and, hence, one expects greater potential of spillover effects to Omani companies through observation and imitation. Analysis shows that this factor is not as effective as one would expect because the majority of local firms are small and do not have the minimum requirement to learn effectively from their foreign counterparts. Supply chain manager of Occidental of Oman argues that "spillovers depend on the ability of domestic firms to learn ... the stronger and bigger the more they can learn … [and] local companies need to improve their own absorptive capacity".

The majority of interviewees condition the capacity of Omani firms to increase their productivity through this channel to (1) upgrading their technological and operating methods close to that of foreign firms; and (2) existence of some degree of similarity in the work practice and the goods produced in order for demonstration to take place and be effective. Survey data, however, shows positive opinion on this channel, as 11.5 per cent of respondents strongly agree and 75 per cent agree that local firms learn through observation and imitation of their foreign counterparts by adopting their technology, marketing techniques, and changing their products to local condition and needs. In addition, 38.5 per cent strongly agree and 45.5 per cent agree that local firms make efforts in terms of demonstrating new technologies and training workers in order to master the new technology. Despite such efforts, this factor remains a challenge for most local firms.

Weak Absorptive Capacity of Domestic Enterprises

This study also finds a link between low productivity spillover in the Omani manufacturing sector and structural and organizational weaknesses that limit the absorptive capacities of Omani firms. It is apparent from the primary data that local firms have developed neither external nor internal strategies to create their own competitive advantages; nor were able to utilize the capabilities and practices brought in by foreign companies to their market. Our findings show a dissatisfaction with domestic enterprises' ability to do this. Survey data reveals that 33 per cent of respondents have a low level of satisfaction and 4 per cent have a very low level of satisfaction about the quality and readiness of domestic enterprises to benefit from the presence of foreign companies. Analysis of interviews and secondary data produces similar results. For instance, Supply Chain Manager of Occidental Of Oman Inc. argues that Omani companies should try to get stronger and bigger in order to be able to learn from their foreign counterparts and must focus on improving their own absorptive capacity.

Descriptive analysis of the survey data presented in table 2 reveals a strong link between the absorptive capacity of the firm and availability of effective institutional arrangements to provide domestic enterprises with necessary technical and financial support that is essential for increasing their productivity and competitiveness. Survey respondents consider institutional arrangements the most important factor, with the highest mean 4.41, for enhancing firms' absorptive capacity and transmission of spillover effects from foreign to domestic firms. Data shows that 50 per cent of respondents strongly agreed and 43.8 per cent agreed on the importance of this factor for the company. Despite such importance, available data and official reports confirm that there is a shortage of absorptive capacity in the country, particularly in terms of needed institutions to drive private sector-led growth, not in terms of quantity but quality, as there are numerous bodies, and programs in place, but working in a conflicting way.In addition, technical and managerial skills are needed to drive this transformation and private sector competitiveness. The quality of current institutions should be enhanced and new institutions created to build linkages and scale up success stories e.g. local content and in-country value programs. According to our findings, the level of coordination among institutions and with domestic and foreign companies is low. Qualitative data also reveals that although such institutions are vital to ensure that companies receive the appropriate support, there are no

institutions dedicated to the enhancement of companies' absorptive capacity. For instance, the Director General of Research and E-Services in Public Authority for Investment Promotion and Export Development says "we have different government bodies, but we do not have a tool for that [coordinating their works to enhance absorptive capacity]. There are Ministry of Foreign Affairs, Ministry of Commerce and Industry, Oman Chamber of Commerce, and Public Establishment of Industrial State, but none of them focuses on building relations between foreign and domestic companies".

Another major weakness is the human capital resources of local firms. In an interview with Director General of Rusayl Industrial Estate, Public Establishment for Industrial Estates, he argues the most private sector companies lack skilled, high-qualified workforce because "Omanis prefer to wait for public jobs instead of working in the private sector". CEO of Freezone Sohar (SFZ) also stressed that "there is still a lot to be done about small and medium enterprise in Oman [because they are] very dominated by expatriates". He asserted "more engagement between the foreign direct investments and the private sector to educate, train and qualify local workforce". This is echoed by Director Poly Products L.L.C., a domestic manufacturing firm in Muscat, who argued that "We need to educate our people that human resource is the power of manufacture"; and by the Managing Director of Bahwan Exel, a joint venture manufacturing firm in Sohar, who says that "you can never stop investing in human capital". Survey data also stresses the importance of human capital with high mean of 3.92, where 18.8 per cent strongly agree and 62.5 per cent agree that this factor is vital to improve the absorptive capacity of Omani firms.

Table 2: Factors Affect Absorptive Capacity of Domestic Enterprises

	No. of Samples		Mean*	Median	Mode	Range	Min.	Max.
	Valid	Missing						
Institutional Framework	96	3	4.41	4.5	5	4	1	5
Human Capital	96	3	3.92	4	4	4	1	5
Property Rights	96	3	3.86	4	4	3	2	5
R&D	96	3	3.64	4	4	4	1	5
Technology Gap	96	3	3.14	3	3	4	1	5

**Sorting mean – items at top of table have highest importance in influence and linkage formation.*

Another measure of absorptive capacity is the technology gap between foreign and domestic firms. For domestic companies, closing the technology gap rated the least important priority, with mean 3.14. Table 2 shows that this mean is below the mean scored in property rights (mean 3.86) and R&D (mean 3.64). As for property rights, survey response reveals that 16.7 per cent answered strongly agreed and 46.9 per cent agreed of the importance of R&D for enhancing the absorptive capacity of firms. A senior economist in the Central Bank of Oman explained this by arguing that "R&D is something that is not really focused on widely in the country. There are R&D centers but I think more and more is needed in future". This view confirms that existence of intellectual property law promulgated by the royal decree No. 37 of 2000, but this law lacks enforcement and implementation. General Manager of Operations of the joint venture manufacturing firm Reem Batteries and Power Appliances Co. SAOC adds that "local companies have not got too much of facility because R&D requires both time and capital. This is why R&D is normally administrated by large companies". If this to indicate anything, it mirrors the poor quality of research institutions and low R&D budget, which stood at only 0.1 per cent of GDP in 2010 (BTI Index, 2014). The majority of this modest R&D funding used by public sector enterprises because the private sector is scattered in small units and does not have the resources and ability to do R&D. Resident Managing Partner of Trowers & Hamlins, a joint venture Law firm in Muscat, reaffirms "the area that we have been lacking as a country [is] innovation and what you call technologies. We are very behind in R&D. There is no law at the moment that forces local companies or any company to spend money on R&D". The attitude towards

R&D varies from one company to another. In terms of domestic firms, the Director of Media & Communication in Public Establishment for Industrial Estates confirms that spending on R&D is "nothing, it is a big zero". In foreign companies, the Senior Vice President of Shadeed Iron & Steel LLC., a foreign manufacturing firms in Sohar, says that "it is limited; more needs to be done". The attitude is imprecise in joint manufacturing venture companies, as the Managing Director in Bahwan Exel in Sohar states "we do not have much of R&D".

DISCUSSIONS

The analysis of qualitative and quantitative primary data presented above is consistent with the findings in literature. There are several possible explanations for the limited effect of FDI on domestic enterprises in the Gulf countries. As explained above, these countries depend heavily on the hydrocarbon sector and hence the majority of foreign and domestic investments go to oil and gas, a sector that has limited scope for productivity spillover effects due to lack of interactions between international oil companies and domestic companies. One could also attribute the limited effect of FDI on domestic firms to the passive role of the government in promoting and facilitating FDI into the most underdeveloped sectors of the economy. Mishrif and Al Balushi (2017) find strong correlations between the organizational structure and size of public institutions dealing with FDI and the levels of productivity spillovers effects from foreign to domestic companies. They conclude their study by "placing greater responsibility on the state in developing specialized institutions with clear mandates for effective transmission of productivity spillover effects from foreign firms to local ones".

A third explanation is the weak absorptive capacity of domestic enterprises to learn from their foreign counterparts. Mishrif and Al Balushi (2017) argue that one cannot ignore the responsibility of the state in developing and implementing "effective investment policies that could strengthen absorptive capacity of local firms, hence increasing their productivity". Their argument is consistent with the findings of this study, which reveal that the current level of investment in R&D at both country and company levels is insufficient to support domestic enterprises to benefit from the presence of FDI. Our findings also match similar results found by Halpern and Murakozy (2006), Abraham et al. (2006), and Girma et al. (2006). These studies argue that domestic firms with more advanced technology or R&D capability are likely to benefit most from the presence of foreign firms. Todo (2006) also argues that the size of R&D of domestic enterprises is directly associated with the magnitude of spillovers. Other empirical studies in the case of India (Kathuria, 2000) and the Czech Republic (Kinoshita, 2000) find that investment in R&D by domestic enterprises is a necessary condition for spillovers to occur. In terms of technology gap, Kokko et al. (1996) find a positive and highly significant effect of FDI on Uruguayan manufacturing firms with small technology gaps, while Takii (2005) stresses that large technology gaps reduce positive spillovers in the case of Indonesian firms. Similar results by Keller and Yeapl (2003), Damijan et al (2003), Kinoshita (2000) and Borensztein et al (1998) support the argument that FDI contributes to domestic productivity growth only if the technology gap between domestic and foreign firms is not too large and when a sufficient absorptive capacity is available in domestic firms.

A weak absorptive capacity is caused also by the inability of the domestic company to attain qualified, high-skilled workforce. Although this a company problem, Al Qudsi (2005) argues that this is a nation-wide problem as Oman's labour market is characterized by three main disadvantages for productivity spillovers. First, citizens prefer to work in government jobs. Second expatriates who are hired on short-terms contracts represent the majority of workforce in domestic firms, hence companies are unable to build and keep knowledge and skills in-site. Third, there is a skill mismatch between national job seekers and the requirements of domestic firms. A number of empirical studies supports our human capital resource findings. For example, Borensztein et al (1998) suggest that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment; but the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. Hoppe (2005)

also finds that human capital is the most important for the absorption capacity. Moreover, Meyer (2004) stresses that productivity spillovers might happen through the human resources market, because local trained employees of the foreign firms might move to local suppliers and, hence, the transfer of proprietary knowledge can occur. Another possibility is that qualified employees might choose the entrepreneurship path and pursue their own businesses through foreign firms outsourcing arrangements. Generally, qualified national workforce prefers to work for the public sector than jointing domestic firms.

Our findings on productivity spillover mechanisms are consistent with established literature. Moran (2008) finds that business linkages are prerequisites for spillovers and are beneficial for domestic firms, even if there are no spillovers. This supports our finding that both backward and forward business linkages exist in Oman on a small scale. The small size of linkages results consequently in low level of transmission of productivity spillovers from foreign to domestic firms. Thus, there is a genuine need for domestic firms to upgrade their capabilities through effective linkage with their foreign counterparts. Crespo and Fontoura (2007), Smarzynska (2002),Bessonova, et al. (2002),Rodriguez-Clare (1996) and Lall (1980) find this possible because foreign firms may have incentives to provide technical assistance to, or share knowledge with, their local counterparts, particularly suppliers in order to improve and ensure the quality of the supply chain. Low productivity spillovers could also be attributed to the small size of domestic companybecause the size reflects the capability of firms to learn from their foreign counterparts (Yan Zhang, 2010; Ornaghi, 2004). This kind of shortage in firm's capability limits the impact of demonstration effect on domestic firms, as well as limiting its ability to compete with their foreign counterparts, if not ceasing their production or losing some market share. (Cohen, 2006;, Griffith, et al., 2004; Gőrg and Strobel, 2001; Aitken and Harrison, 1999).

CONCLUSION

This study examines the effect of FDI on domestic enterprises in Gulf oil producing countries. It used the empirical case study of Oman to test two key hypothetical assumptions that are vital to host country economy. The study focuses mainly on analysing the extent to which productivity spillover effects from FDI and absorptive capacity of domestic firms facilitate successfully the transmission of spillover effects from foreign to domestic firms. It reveals that productivity spillover channels and mechanisms have been ineffective in our case study and that in order to stimulate such mechanisms a more active government role should facilitate all channels of interactions between foreign and domestic firms. This finding validates the hypothesis that low productivity spillover effects have limited the impact of FDI on domestic firms. In the case of the second hypothesis, the study reveals that the vast majority of domestic firms are small in terms of size and operations and their inability to upgrade their financial, technological and human capabilities resulted in noticeable weakness in their absorptive capacity. Such finding validates the second hypothesis that weak absorptive capacity of domestic firms often undermines their ability to benefit from the presence of their foreign counterparts. The analysis of this examination fills a significant gap in literature as it provides new insights and knowledge on the conditions under which these factors affect domestic enterprises in such markets with distinctive characteristics as those of the Gulf oil producing countries. It offers new insights for policy makers to develop policies that could benefit private sector enterprises in a fast growing sector such as manufacturing, where the majority of firms are private-owned SMEs, with limited financial, human and technological capabilities. Gulf countries should also realize that the success of their economic diversification programs depends largely on their ability to develop the business environment, provide sufficient support to private sector companies to upgrading their capabilities and strengthen their absorptive capacity in a way that narrow the knowledge and technological gaps with their foreign competitors. However, we acknowledge the limitation of our study that focuses on a one-country-one sector approach and hope that is will open the way for a larger project to include sizable samples of countries and sectors across the entire Gulf region.

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AN EXAMINATION OF STUDENTS' ATTITUDES AND PERCEPTIONS TOWARDS INCORPORATING COMPUTER ASSISTED AUDIT TECHNIQUES IN AN UNDERGRADUATE AUDITING COURSE

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ABSTRACT

The use of Computer Assisted Audit Techniques (CAATs) in the form of generalized audit software (GAS) for increasing both the efficiency and effectiveness of audits has been well recognized. With this recognition, changes have been made to the auditing curriculums of many business schools by devoting substantial time and resources towards integrating audit software. Despite these developments, the relevance and usefulness of these tools from the students' perspective has not been fully examined, which is imperative for appropriately designing not only the content, but also the extent of the treatment of CAATs in undergraduate audit curriculums. This paper attempts to fill this gap by examining students' perceptions and attitudes towards CAATs following the successful integration of a module on generalized audit software in the undergraduate auditing curriculum of an AACSB accredited business school. A survey instrument was utilized for this purpose, and analyzed by Paired Sample T-tests and One Sample T-Tests. The implications of a number of statistically significant perceptions are discussed in the paper that provide new insights into the perceived value of incorporating CAATs into the curriculum, which ultimately has a bearing on both curriculum development and instructional pedagogy.

JEL: M42, M15, C88

KEYWORDS: Perception, Attitude, Generalized Audit Software, Computer-Assisted Audit Techniques, Audit Command Language (ACL), Auditing Curriculum

INTRODUCTION

The effectiveness of computer aided audit techniques (CAATs) in the conduct of audits has been widely recognized by both regulatory bodies and the audit profession (Kuruppu, 2012; Weidenmier and Ramamoorti, 2006; Debreceny et al., 2005;). This has consequently led to the establishment of a number of new certification programs from both CAAT vendors and professional associations such as the International Certified CAATs Practitioner (ICCP) qualification by the International Computer Auditing Education Association (ICAEA). These developments have led to changes in both the curriculum and the methods of teaching auditing courses. An increasing number of business schools now actively promote the integration of audit software into the auditing curriculum, which is seen as a skill in high demand by employers (Kuruppu, 2012; Weidenmier and Ramamoorti, 2006).

While knowledge of CAATs is a sought-after quality of new accounting graduates, research is specifically needed to uncover whether students actually benefit from learning about CAATs *within* the auditing curriculum, and what specific facets of the course structure and instructional pedagogy can be improved upon and how. The main objective of this paper is therefore to investigate the attitude and perception of students towards CAATs following its implementation in an undergraduate auditing course. This objective

is achieved by administering a survey instrument to examine the student participants' attitudes and perceptions towards CAATs in the auditing curriculum. Some of the themes addressed by the survey include an assessment of whether there is a statistically significant difference in students' perceptions towards CAATs prior to and after completing the module, whether learning about CAATs is useful for conducting an audit, the perceived value of incorporating the module in all topics of the auditing curriculum, and whether undertaking the module is expected to increase employment prospects, amongst others. This paper will be of interest to accounting academics in appreciating and applying the more effective means and methods of integrating audit software into the curriculum, from the context of the key aspects pedagogy which students consider to be important.

The remainder of the paper is structured as follows. The next section reviews the extant literature in the area and the objective of this paper. This is followed by section three, which details the research methodology. This is followed by a discussion of the survey results, with section four concluding the paper with a summary of the main findings and opportunities for further research.

BACKGROUND AND LITERATURE REVIEW

Audit firms operate in an increasingly competitive environment. There is considerable interest in how a quality audit can be conducted both effectively and efficiently. In this context, computer based audit methods is recognized as an effective way of enabling audits to be conducted cost effectively (Bourke, 2010; IIARF, 2009). For instance, audit software based techniques can be used to verify depreciation charges of all fixed assets instead of relying on sampling to assess a relatively smaller portion of the assets in the fixed assets register. In a similar vein, thousands of accounts receivables customers can be easily checked for negative balances in a few seconds, when such extensive examination will not be possible using traditional audit methods. This consequently allows audits to completed in less time. A number of audit software exists that is widely used by audit firms, which includes ACL™ and IDEA® (Brennan, 2008; IIARF, 2009; Lanza, 1998). With the increasing use of audit software, employees with the requisite skills is in high demand. Thus, audit firms also increasingly invest in training employees in utilizing these techniques (Debreceby et al., 2005; Weidenmier and Ramamoorti, 2006).

Despite the increasing prevalence of the use of generalized audit software, there is a scarcity of new graduates entering the audit workforce with the requisite audit software skills (O'Donnell and Moore, 2005; Kuruppu, 2012). Consequently, there is a well-recognized demand for accounting graduates who are proficient in computer assisted audit techniques (Kuruppu, 2012; Weidenmier and Herron, 2004; Sharifi, 2004). This shortage has led some audit firms to even cross-train current employees in information technology (Debreceny et al., 2005; O'Donnell and Moore, 2005; Baker, 2009).

It is imperative in the context of these developments that CAATs skills are imparted to accounting graduates to meet the needs of employers (Weidenmier and Herron, 2004; Sharifi, 2004; O'Donnell and Moore, 2005). Business schools on their part need to take the initiative by modifying and updating the auditing curriculums appropriately, perhaps through a comprehensive e-learning strategy. Students can be coached utilizing audit software led by the instructor, or by self-contained modules that can be completed at the students own pace (Kuruppu, 2012; OECD, 2005; Clark and Mayer, 2007). Bates (2009) supports this view of e-learning since it facilitates the development of critical skills and capabilities necessary for an occupation by integrating IT into the course.

A number of popular auditing textbooks already facilitates the incorporation of audit software into the curriculum, by including material on CAATs within the text. For instance, the internationally available textbooks by Arens, Messier, Rittenburg and Louwers all incorporate material on audit software into the text, and also provides an educational version of either IDEA or ACL that can be installed on any Windows based computer. These resources together with appropriate coverage in the audit curriculum can also enable

students to attain the newly established professional certifications such as International Certified CAATs Practitioner, ACL™ Certified Data Analyst (ACDA), Certified IDEA™ Data Analyst (CIDA) and Jacksoft Certified CAATs Practitioner (JCCP).

Despite recognizing the necessity of educating business students on the use of CAATs, which is a key skill demanded by employers, only a limited number of studies have examined appropriate pedagogies for including CAATs in the auditing curriculum (O'Donnell and Moore, 2005; IIARF, 2009). Most studies are limited to suggesting possible exercises that can enable audit software to be introduced to students. For instance, Gelinas et al., (2001) reported a series of exercises based on a case study. While the exercises are inherently a useful start for an instructor teaching the use of audit software for the first time, the real-world facets of pedagogy that can enhance its delivery in the classroom is overlooked. A similar study by Nieschwietz et al., (2002) presented a number of assignments covering the main accounting cycles using generalized audit software. The use of sampling was also covered in this paper.

Since these initial studies, Weidnmier and Herron (2004) has compared the ACL and IDEA generalized audit software and reported observations from both students and instructors. The latter study analyzed the software manuals of both programs, and used it as a foundation to suggest how the software can be introduced into the classroom. However, these was little by way of reference to the pedagogy of introducing the software. Moreover, Weidnmier and Herron (2004) did not advance any specific audit software based exercises or cases that can help integrate the software as part of the auditing curriculum. These studies were improved upon and extended by (Kuruppu, 2012), who outlined a comprehensive pedagogy that has been successfully implemented in the auditing curriculum of an AACSB accredited business school. This study was wide-ranging with the module delivered-over three weeks of a fifteen-week semester.

It becomes evident from the above literature review that an increasing number business schools have attempted to integrate CAATs into the auditing curriculum, recognizing that knowledge of audit software is a key attribute desired by accounting employers. Despite the relatively small number of studies that focused on disseminating pedagogies for incorporating audit software into the curriculum, questions still remain unanswered concerning whether students actually benefit from learning about CAATS *within* the auditing curriculum, and what specific facets of the course structure and instructional pedagogy can be improved upon and how. These are critical questions that needs to be answered, given the importance that employers place on knowledge of CAATs in auditing. The methodology followed to answer these questions is detailed in the next.

METHODOLOGY

This section outlines and describes the two distinct stages of this research. Firstly, the pedagogy followed to implement the CAATs module in the Advanced Auditing course at UAE University is presented. This is followed by a description of the survey questionnaire employed to ascertain students' perceptions and attitudes towards the module and the utilized statistical methods used to analyze the data.

The accounting baccalaureate at UAE University follows a typical U.S. program, and is AACSB accredited. There are three streams available to accounting students: Financial Accounting, Management Accounting and a General Specialization. Principles of Auditing is a required major course for students in each of the streams, while Advanced Auditing is an elective with the principles level course being the prerequisite. Most of the students who complete Principles of Auditing also take Advanced Auditing prior to graduation. The number of students in each semester ranges from about forty to sixty students. Each of the students in the class is provided with a laptop running Microsoft Windows and all lecture rooms are WiFi enabled. A typical class timeslot is for 75 minutes and meets two times per week. CAATs as a generalized audit software tool is the opening module in the Advanced Auditing course outline. Students coming into this class do not have any prior experience or proficiency with audit software. Appendix B systematically

presents the pedagogy followed to present the module together with pertinent teaching notes. The course profile given to students on the first day of class has three weeks allocated to this topic, which comprise twenty percent of the final grade. Together with the course outline, a survey questionnaire is also given to the students to examine their attributes and perceptions about CAATs *before* commencing the module. A similar questionnaire with additional questions are given at the *conclusion* of the three weeks allocated to the module to ascertain changes in perceptions. The survey was administered in the semester commencing Spring 2010, and utilized Likert item statements on a 1 to 5 scale, with 1 standing for 'Strongly agree' to 5 standing for 'Strongly disagree'.

An extract of the survey instrument is given in Appendix A, which details the specific attitudes and perceptions assessed. The survey was ultimately completed by 113 students across three semesters, comprising of the *entire population* of students undertaking Advanced Auditing, yielding a hundred percent response rate. The population of students across the three semesters were homogenous, which is essential for the statistical analysis.

A number of statistical methods are available to analyze Likert item surveys. Among these, the *t test* and *Mann-Whitney-Wilcoxon* test are commonly used to analyze Likert type survey instruments (Frost, 2016; Carifio and Perla, 2008). Although there is some debate as to whether Likert item data should be investigated by means of parametric or nonparametric procedures, it has been shown that both methods have similar power with the t-test also being robust to violations of the normality assumption as long as the sample size exceeds twenty (De Winter and Dodou, 2010; Frost, 2016). This makes the t-test well suited to the analysis of the Likert items in the current study, where the entire population of students participated. Accordingly, the *paired sample t-test* is used to analyze differences in students' perceptions *before* and *after* takings the CAATs module. In addition, directional *one sample t-tests* are used to determine the statistical significance of perceptions from the mean value of the Likert item scale of three. Scale items less than three indicates agreement with the particular Likert statement, while scores above three indicate perceptions that show disagreement with the given statement. The statistical tests were run in *Minitab*® and reconfirmed with *RStudio*®.

RESULTS AND DISCUSSION

The attributes of the survey participants show that the majority are female (60.2%), while only 39.8% of the students are male. In addition, 85% of them did not have any prior auditing exposure, with only 15% indicating auditing related work experience. Prior to taking the CAATs module, 93% of the students did not have an awareness of generalized audit software such as ACL or IDEA, whereas 7% of the students indicated they were aware of such tools.

The first key questions in the survey instrument examined whether students thought that CAATS in the form of generalized audit software were useful for conducting an audit. An analysis of the change in perceptions of students *before* undertaking the module and *after* undertaking the module indicate that there is a statistically significant difference. The difference in the *before* mean perception (3.540) and *after* mean perception (2.460) is significant with a p-value of 0.000. This favors the alternative hypothesis that the mean difference between the before and after effects is *not* zero, and is shown by the Paired T-test in Table 1. Students after completing the module more strongly agreed on the usefulness of generalized audit software for conducting an audit compared to before embarking on the module. This indicates that undertaking the module had a statistically significant effect on students' perception about the usefulness of audit software for conducting an audit.

Table 1: Paired T-Test for Generalized Audit Software Usefulness for Conducting an Audit

	N	Mean	StDev	Mean
useful.7a	113	3.540	1.150	0.108
useful.7b	113	2.460	1.210	0.114
Difference	113	1.080	1.728	0.163
95% CI for mean difference: (0.758, 1.402)				
T-Test of mean difference = 0 (vs ≠ 0): T-Value = 6.64 P-Value = 0.000***				

*This table reports whether students thought that CAATs in the form of generalized audit software were useful for conducting an audit, before and after taking the module. The 95% Confidence Interval for the mean difference and the T-test of the mean difference are given in the last two rows of the table. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

When the above differences are further analyzed by a directional One Sample T-test, shown in Table 2, it becomes evident that students strongly believe that generalized audit software is useful for conducting an audit, with a mean value on the Likert item of 2.460 at p-value of 0.000. A mean less than 3 indicates strong concordance with the given Likert statement, and thus the null hypothesis that the mean equal to 3 ($\mu = 3$) is rejected in favor of the alternative hypothesis ($\mu < 3$).

Table 2: One-Sample T-Test for Audit Software Usefulness (After Effect)

Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P
useful.7b	113	2.460	1.210	0.114	2.649	-4.74	0.000***
Test of $\mu = 3$ vs < 3							

*This table shows through a directional One Sample T-test whether students thought that generalized audit software were useful for conducting an audit after taking the module. The hypothesis examined is shown in the last row of the table, while the statistical significance is shown in the last column under P. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

The above statement was extended to ascertain whether learning about audit software was useful for understanding some of the 'actual techniques' used by auditors, and specifically, whether they believe that learning about such software showed them how computer technology can improve the effectiveness and efficiency of auditing. Students were also asked whether they thought the incorporation of material on generalized audit software made the auditing course more engaging and interesting. Table 3 presents these results. The Paired T-test in Panel A of Table 3 indicates a statistically significant difference between the *before* perception for the Likert item (mean 3.168) to the *after* mean perception of 2.336 at a p-value of 0.000. This is also confirmed by the One Sample directional T-test with a mean of 2.336 at a p-value of 0.000 in Panel B of the table. Panel C of Table 3 also shows that students strongly believe that computer technology in the form of generalized audit software can improve the effectiveness and efficiency of auditing. It can be seen that the null hypothesis ($\mu = 3$) is rejected in favor of the alternative hypothesis at a p-value of 0.000, indicating strong agreement with the statement.

Furthermore, the positive belief statement towards incorporating generalized audit software material into the course is supported by the finding that it makes the course more engaging and interesting. It can be seen from Panel D of Table 3 that the p-value for the latter statement is 0.003, which favors the alternative hypothesis ($\mu < 3$). These findings also lend credibility to the effectiveness of the pedagogy utilized to incorporate the audit software material into the curriculum.

Table 3: Aspects of the Perceived Usefulness of Audit Software

Panel A							
	N	Mean	StDev	Mean			
useful.8a	113	3.168	1.541	0.145			
useful.8b	113	2.336	1.147	0.108			
Difference	113	0.832	1.880	0.177			
95% CI for mean difference: (0.481, 1.182)							
T-Test of mean difference = 0 (vs ≠ 0): T-Value = 4.70 P-Value = 0.000***							
Panel B							
Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P
useful.8b	113	2.336	1.147	0.108	2.515	-6.15	0.000***
Test of μ = 3 vs < 3							
Panel C							
Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P
useful.15b	113	2.354	1.077	0.101	2.522	-6.38	0.000***
Test of μ = 3 vs < 3							
Panel D							
Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P
useful.14b	113	2.699	1.133	0.107	2.876	-2.82	0.003***
Test of μ = 3 vs < 3							

*Table 3 shows specific aspects of the perceived usefulness of generalized audit software after completing the CAATs module. Panel A reports the Paired T-Test for the variable 'Learning about generalized audit software was useful for understanding some of the actual auditing techniques utilized by auditors' (before/after effect). Panel B reports the One-Sample T test for 'Learning about generalized audit software was useful for understanding some of the actual auditing techniques utilized by auditors' (after effect). Panel C reports the One-Sample T test for 'Learning about generalized audit software showed me how computer technology can be used to improve the effectiveness and efficiency of auditing' (after effect). Finally, Panel D reports the One-Sample T test for 'Learning about generalized audit software made the auditing course more engaging and interesting' (after effect). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

The above statements indicated that students positively viewed the impact of generalized audit software in conducting an audit and also that it facilitated understanding some of the actual methods used by auditors, whilst concurrently making the course more engaging and interesting. Given these generally positive views, students were asked whether it is important to introduce CAATs in the form of generalized audit software as an integral component of the auditing curriculum, and whether it would be more useful and appropriate to have learnt about these methods starting in the Principles of Auditing course rather than having the content deferred to the Advanced Auditing course. Table 4 presents these results.

Panel A of Table 4 shows that the consensus among students is that generalized audit software must be integrated into the auditing curriculum, with a mean of 2.558 that is less than the neural value on the Likert item of 3. The result is statistically significant with the p-value at 0.000, which rejects the null hypothesis ($\mu = 3$) in favor of the alternative hypothesis. An interesting finding, however, is about students' perception towards incorporating audit software in Principles of Auditing, rather than deferring the module to Advanced Auditing. These results are shown in Panel B of Table 4. It is found that students do not perceive that there is merit in learning about CAATs in the earlier offered Principles of Auditing course. This is indicated by the mean value of 3.336, which is above the mean value on the Likert item scale of 3. This is also confirmed by the p-value of 0.996, which indicates that there is no evidence to show that the true mean is less than 3, indicating concordance with the statement.

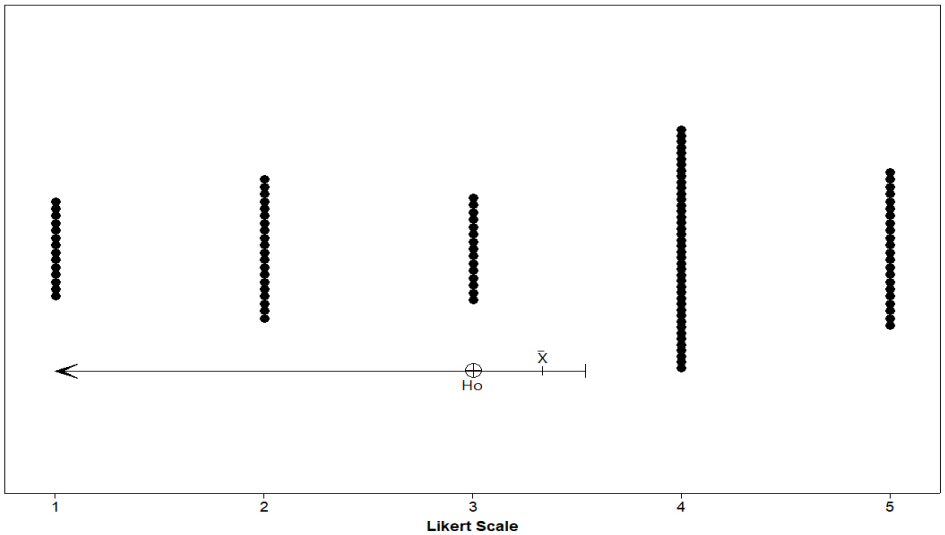
An individual value plot of the responses for this Likert item further clarifies the students' perception towards introducing CAATs in the Principles of Auditing course, and is presented in Figure 1. It is clear from the individual value plot that the mean response ($\overline{X}$) exceeds 3, and that most students have marked their responses on either 4 or 5 of the scale indicating their disagreement towards introducing CAATs in Principles of Auditing. A possible reason for this outcome may be due to the fact that nearly all students who complete Principles of Auditing also go on to take Advanced Auditing. Thus, from the students' viewpoint, they will not be missing learning about CAATs entirely, but merely deferring it to a later semester in Advanced Auditing. Students may perceive this to be advantageous, as they are better able to follow the CAATs module with the foundation laid in the earlier principles level course.

Table 4: Perceptions Towards Integrating Audit Software into the Auditing Curriculum

Panel A							
Variable	**N**	**Mean**	**StDev**	**SE Mean**	**95% Upper Bound**	**T**	**P**
useful.9b	113	2.558	1.274	0.120	2.756	-3.69	0.000***
Test of μ = 3 vs < 3							
Panel B							
Variable	**N**	**Mean**	**StDev**	**SE Mean**	**95% Upper Bound**	**T**	**P**
useful.13b	113	3.336	1.313	0.124	3.541	2.72	0.996
Test of μ = 3 vs < 3							

*Panel A of the table reports the One-Sample T test for the variable 'It is important to introduce students to CAATs in the form of generalized audit software as an integral part of the auditing curriculum', while Panel B shows the One-Sample T test on the variable 'It is more appropriate to have learnt about generalized audit software starting from the Principles of Auditing course rather than in Advanced Auditing'. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Figure 1: Individual Value Plot of Introducing CAATs in Principles vs. Advanced Auditing



This figure shows the individual responses on the Likert scale for the statement 'It is more appropriate to have learnt about generalized audit software starting from the Principles of Auditing course rather than in Advanced Auditing.' Responses above 3 indicate disagreement with the statement. The horizontal arrow indicates the 95% confidence interval for the responses. The test value for the null hypothesis (H_0) and the mean of the responses are also reported.

A number of statements sought to obtain information from the students about specific aspects of the pedagogy used to introduce CAATs into the curriculum. These include soliciting students' perceptions about (a) whether they believed that audit software activities should be incorporated into every topic of the Advanced Auditing course; (b) whether it is always necessary for the instructor to provide guidance to

students in solving these activities; and (c) whether the time allocated to audit software activities described earlier in the paper is sufficient. Table 5 presents students' perceptions for these three aspects of the module using One Sample T-tests.

The results presented in Panel A of Table 5 indicate that students perceive the value of CAATs in the auditing course, where the mean response of 2.779 on the scale is statistically significant at a p-value of 0.046. The null hypothesis that the mean is equal to 3 ($\mu = 3$) is rejected in favor of the alternative hypothesis ($\mu < 3$), demonstrating that students perceive the usefulness of incorporating generalized audit software activities into every topic of the auditing course. In contrast, however, students were found to be neutral on the statements concerning whether the instructor should always provide guidance in solving these activities and whether the time allocated to the CAATs module is adequate. This is shown in Panels B and C of Table 5. The p-values of 0.074 and 0.968 respectively indicates evidence in favor of the null hypothesis ($\mu = 3$) and does not indicate a statistically significant level of agreement with the latter two statements. Students' attitude hovering on neutrality on these two statements might be indicative of the fact that they are comfortable with the level of guidance provided by the instructor in the course, and the allocated time for the module being sufficient.

Table 5: Perceptions on Aspects of the Pedagogy used to Introduce CAATs into the Curriculum

Panel A							
Variable	**N**	**Mean**	**StDev**	**SE Mean**	**95% Upper Bound**	**T**	**P**
actv.10b	113	2.779	1.387	0.130	2.995	-1.70	0.046**
Test of $\mu = 3$ vs < 3							
Panel B							
Variable	**N**	**Mean**	**StDev**	**SE Mean**	**95% Upper Bound**	**T**	**P**
guide.11b	113	2.814	1.353	0.127	3.025	-1.46	0.074*
Test of $\mu = 3$ vs < 3							
Panel C							
Variable	**N**	**Mean**	**StDev**	**SE Mean**	**95% Upper Bound**	**T**	**P**
time.12b	113	3.230	1.303	0.123	3.433	1.88	0.968
Test of $\mu = 3$ vs < 3							

*Panel A in this table shows the One-Sample T test for the variable 'It is important to have generalized audit software based activities integrated into every topic of the auditing curriculum' (after effect); Panel B shows the One-Sample T test on the variable 'It is always necessary for the professor to guide students in solving generalized audit software based activities' (after effect), while Panel C shows the One-Sample T test on the variable 'The time allocated to learning about generalized audit software in the course was sufficient' (after effect). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

The key motivation behind incorporating CAATs into the auditing curriculum is to enable students to have an awareness and a practical knowhow of how auditors use these methods in the modern auditing environment, thus making students with these skills more marketable to potential employers (O'Donnell and Moore, 2005; Baker, 2009; Kuruppu, 2012). Indeed, incorporating CAATs into the curriculum will directly assist business schools in actively responding to the call by employers and regulatory bodies to assist in producing accounting graduates who possess the core skills needed in an increasingly IT intensive audit environment (Kuruppu, 2012). A secondary motivation is to facilitate students in attaining the newly established professional certifications in the area such as the International Certified CAATs Practitioner qualification. It is therefore important to ascertain how students themselves feel about the value gained by learning about the application of generalized audit software in relation to above stated dual objectives of incorporating CAATs into the auditing curriculum.

This was assessed by examining students' perceptions regarding increasing their marketability to employers as a result of completing the CAATs module. Table 6 presents these results, which indicate a strong concordance with the statement that learning about generalized audit software increased their potential marketability to employers. The p-value of 0.000 indicates the null hypothesis that the mean equal to 3 ($\mu = 3$) is rejected in favor of the alternative hypothesis ($\mu < 3$). Scores less than 3 indicates concordance with the statement.

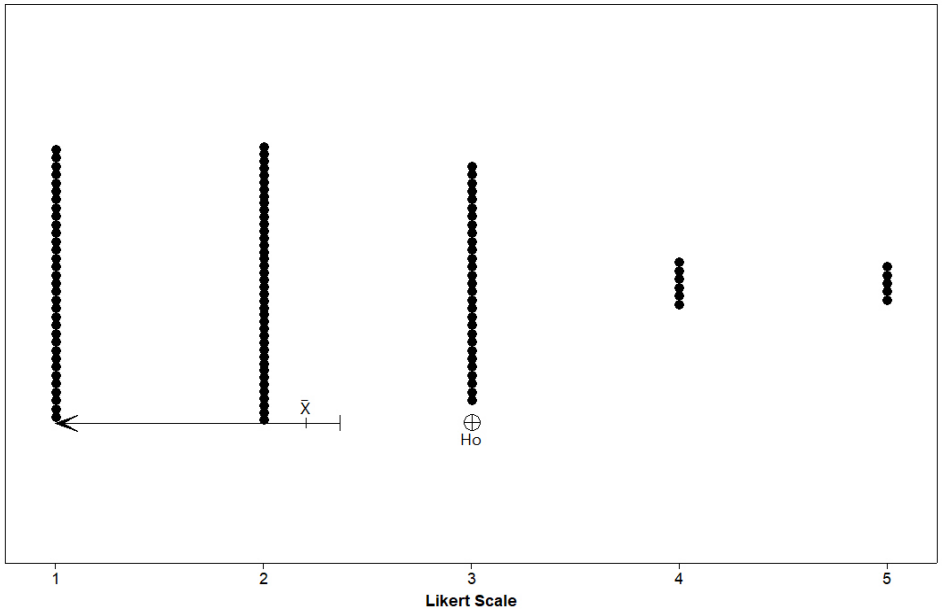
Table 6: Marketability to Potential Employers

Variable	N	Mean	StDev	SE Mean	95% Upper Bound	T	P
job.16b	113	2.2035	1.0620	0.0999	2.3692	-7.97	0.000***
Test of $\mu = 3$ vs < 3							

*This table shows the One Sample T test statistics for students' perceptions of their marketability to potential employers following the CAATs module. The hypothesis examined is shown in the last row of the table, while the statistical significance is shown in the last column under P. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

An individual value plot of the responses for the above statement further demonstrates the students' perceptions about their marketability to employers following the CAATs module, and is presented in Figure 2. It is clear from the figure that that the majority of students show agreement with the statement that learning about generalized audit software increased their marketability to employers, with only a significantly smaller number of students opining that it is unlikely to help their job prospects. The 95% confidence interval includes responses in agreement with the alternative hypothesis ($\mu < 3$), further supporting the findings presented in Table 6.

Figure 2: Individual Value Plot of the Perception of Marketability to Employers



This figure shows the individual responses on the Likert scale for the statement 'Learning about generalized audit software significantly increased my marketability to potential employers.' Responses below 3 indicate agreement with the statement. The horizontal arrow indicates the 95% confidence interval for the responses. The test value for the null hypothesis (H_0) and the mean value of the responses are also reported.

CONCLUSION

CAATs in the form of generalized audit software has been recognized as an indispensable part of the auditor's toolbox that can make audits more effective and efficient. Consequently, regulatory bodies and accounting firms have encouraged business schools to consider these recent developments and to integrate audit software into the auditing curriculum. An increasing number of business schools have responded to this challenge, by incorporating material on CAATs in their respective programs. Despite this increase in adaption, little has been done to understand students' perception and attitude towards CAATs, whether the methodology used to introduce CAATs to students is effective and what changes to the curriculum and teaching pedagogy may be necessary to make the learning process more efficient from the students' perspective. This paper addressed these issues by utilizing a survey instrument to ascertain students' perceptions both before embarking on a CAATs module in an Advanced Auditing course, and upon completing it.

An analysis of students' perceptions indicated that they were able to appreciate how generalized audit software is useful for conducting an audit. Students indicated that they had a better appreciation of how computer technology can be used to improve the effectiveness and efficiency of auditing, and also believed that incorporating the CAATs module into the curriculum made the course more engaging and interesting. Although students held that material on generalized audit software should be an integral part of the curriculum, they did not feel that it should be introduced in the principles level course in auditing. This might be explained by the fact that nearly all students taking the Principles of Auditing course also go on to take the Advanced Auditing course. Having the material deferred to the advanced course a semester later is not going to materially change the learning outcome related to CAATs.

As for the degree of integration of the audit software, students strongly believed that related material should be including in every topic covered in Advanced Auditing. However, they also do not believe that it is always necessary for the instructor to provide guidance in solving CAATs based activities, as they can independently attempt the exercises and problems once a solid introduction to the software is given. The time allocated to the CAATs module of three weeks (out of the typical fifteen-week semester) is also seen as appropriate. Importantly, students strongly value the audit software module in the course. It is perceived by them to significantly improve their marketability to potential employers, by imparting on them a key skill that is recognized as being necessary in the current audit environment.

The pedagogy used in this paper in light of the students' perceptions towards the incorporation of CAATs can be used by accounting and auditing faculty to introduce audit software into their own respective curriculums. Where CAATs is already incorporated, students' feedback from the survey can be used to fine-tune aspects of the pedagogy and curriculum structure to make the delivery more effective, thereby adding value to both the students and to the degree program. The conclusions in this paper are derived from the analysis of the perceptions of 113 students in one of the main state universities in the UAE. This may be considered to be a limitation of this paper. Students' perceptions, especially regarding the employed pedagogy, might be found to be dissimilar in other settings. An interesting area for future research is to examine the effect of students' Learning Styles in incorporating CAATs into the auditing curriculum.

APPENDICES

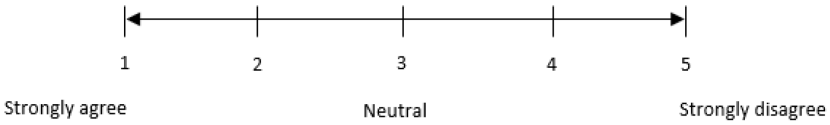
Appendix A: Extract from Survey Instrument

Your Gender:
❑ Male ❑ Female

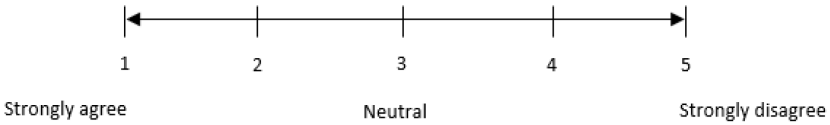
Before undertaking this course, were you aware of CAATs in the form of generalized audit software? ❑ Yes ❑ No

State your level of agreement or disagreement with the following statements. Indicate your response by circling your choice on the scale, which ranges from Strongly agree to Strongly disagree.

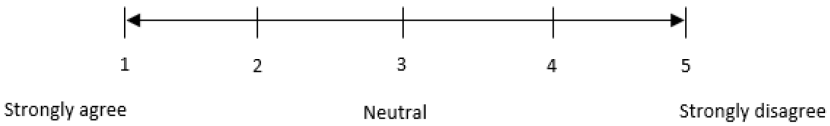
Generalized audit software is useful for conducting an audit. [useful7a/useful7b]



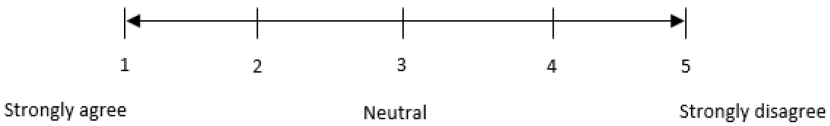
Learning about generalized audit software was useful for understanding some of the actual auditing techniques utilized by auditors. [method8a/method8b]



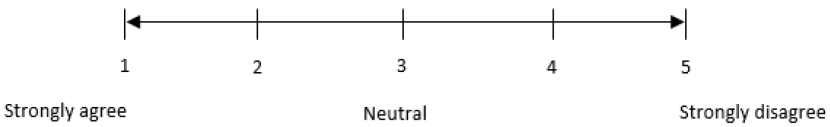
It is important to introduce students to CAATs in the form of generalized audit software as an integral part of the auditing curriculum. [intro9b]



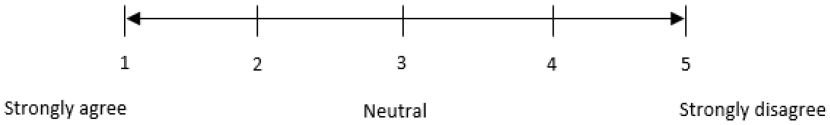
It is important to have generalized audit software based activities integrated into every topic of the auditing curriculum. [actvty10b]



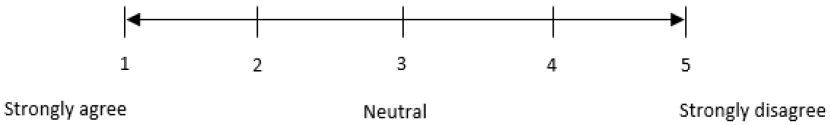
It is always necessary for the professor to guide students in solving generalized audit software based activities. [guide11b]



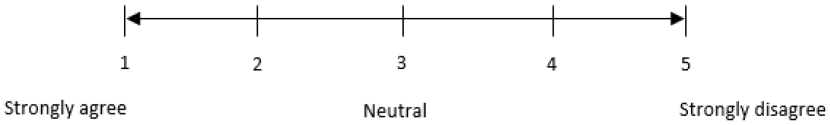
The time allocated to learning about generalized audit software in the course was sufficient. [time12b]



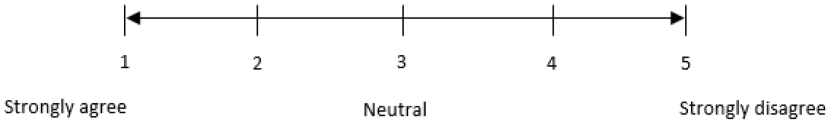
It is more appropriate to have learnt about generalized audit software starting from the Principles of Auditing course rather than in Advanced Auditing. [course13b]



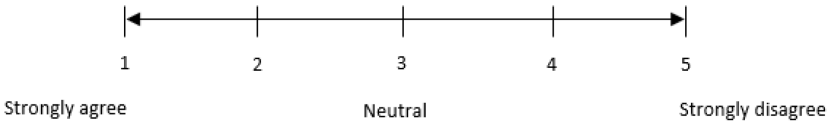
Learning about generalized audit software made the auditing course more engaging and interesting. [interest14b]



Learning about generalized audit software showed me how computer technology can be used to improve the effectiveness and efficiency of auditing. [comp15b]



Learning about generalized audit software significantly increased my marketability to potential employers. [job16b]



Appendix B: Teaching Pedagogy

The following sections detail the pedagogy that was used to introduce students to the ACL generalized audit software, in six sessions of 75 minutes each. This is prior to administering the terminal survey (Appendix A) to gauge students' perceptions of the usefulness and relevance of incorporating CAATs in the auditing course.

Class session 1 (75 minutes)

A brief introduction to the course together with the course outline and the initial survey is given to the students to determine students' attributes and the 'before' effects prior to completing the CAATs module. Following this, students are given a brief lecture on ACL and its specific uses, and told how the next three weeks will be proceeding. Then they are asked to install the ACL software off a CD on their laptops. As most students do not bring textbooks to class which contains the ACL program CD until the second week of lectures, it is efficient for the instructor to use several copies of the CD to ensure the quick installation

on each of the students' laptops. Students are specifically asked to also install the 'ACL in Practice' PDF file as part of the installation routine.

Class session 2 (75 minutes)

The second class starts the hands-on practice using ACL. Prior research such as Weidnemier and Herron (2004) show that they essentially got students to go through the ACL workbook at their own space covering the first five modules. However, having first tried this approach, it was found to be more challenging for students as they had to familiarize themselves with the program and it capabilities on their own, with minimal input from the instructor.

A more effective method that improve the cognitive experience of students and get them off to a faster start is to first familiarize them with the ACL workspace, and then go on to the necessity of creating an ACL project, which precursor any analysis. This is done using a separate dataset on a company's accounts receivable data. During this time, key points including the need to define data columns in the proper formats are explained. This first visual introduction to ACL is easily achieved by the use of a projector hooked onto the instructor's laptop. It is also important to inform students that the source data used in creating the project is read-only, as ACL does not modify them at all.

Most students initially fail to see the purpose of creating a project in ACL, as they are mainly familiar with spreadsheets such as Excel. It helps at this juncture to stress that an ACL project is like a drawer or a cabinet, which is used to store all the relevant data for a particular audit. Once the project has been created, the concept of data categories should be explained in more detail, emphasizing that the three commonly encountered data types in ACL is character (ascii), numeric and date formats (Arens and Elder, 2008). Many students will have the misconception that if a particular column in ACL contains numbers, then it should be defined as numeric data. It is helpful to tell students that if a particular column is not going to be used for performing mathematical operations, then it should be set as character, unless it contains date type data. The example of a column of students' ID numbers can be used to illustrate this further. Since there is little value in adding or subtracting students' ID numbers, such a column should be defined as character even though they comprise of numbers or digits. This can be contrasted with a column of sales figures, where the auditor would be interested in obtaining the total value of sales or the highest value of a sales transaction. Such a column should always be defined as numeric.

After this visual introduction to ACL, students are asked to work through the first two chapters of the 'ACL in Practice' manual in the remainder of the class. This can be achieved by students in about 45 minutes as the first chapter is only a description of the fictitious company used in the manual. Chapter two requires students to open an existing project and familiarize themselves with basic ACL functions such as the statistics command and duplicate commands. It also introduces students to simple filters.

Class sessions 3-5 (225 minutes)

Once the students are familiar with the basics, they proceed to complete chapters 3-5 chapters in the 'ACL in Practice' manual during the next three subsequent class sessions. These three chapters require students to first create a new project from a number of file types including Excel, Access and Text files. More advanced aspects of ACL are covered in these sessions, comprising of advanced filters and functions. Each chapter is allocated one class session of 75 minutes, and most students are able to complete each of the chapters in less than 75 minutes. During these sessions, the instructor will monitor the progress and provide feedback. It was also found to be practical and effective at this stage to engage 2-3 students who are ahead of the other students to help their colleagues in going through the more challenging parts of the chapters. It was found that the chosen students were eager to contribute in this way, and it also ensured that students

needing assistance received it in time as the instructor may not have sufficient time to devote to each individual student, especially in large classes.

By the end of chapter five, most students will have a good grasp of the key ACL commands ranging from the creation of projects to the writing of appropriate filters to achieve specific objectives such as to isolate invoices amounts within a given range. A number of students, however, will still overlook the importance of having to properly define variable columns according to the data types. It is therefore important for the instructor to frequently remind students of this critical task before starting to perform any analysis using ACL.

Class session 6 (75 minutes)

Session six is the final sitting for the module and it is used to reinforce in students the main concepts that they have learned in the previous classes. Each student is provided with a printed sheet of six ACL exercises based on an accounts receivable dataset. The data in Excel format is made available to students via Blackboard™. They are instructed to solve them within 45 minutes and submit to the instructor for marking. This assessment counts towards the final grade for this module. Appendix C presents these final exercises. Once the exercises have been submitted, the students are given the terminal survey instrument to assess their perceptions of CAATs after completing the module.

Appendix C: Final Exercises

A summary of the exercises, the corresponding ACL steps needed to achieve them and key teaching notes are presented below. The instructor walks through each of the exercises using the projector once the students have submitted their answers in the remainder of the class, stressing the main points.

Exercise 1

Objective: Provide a statistical snapshot of the credit sales transactions.
ACL steps: Go to Analyze} Statistical} Statistics. Select 'Amount' and click OK.
Teaching note: explain to students that a similar snapshot can also be obtained by using the 'Profile' command. However, this command provides more concise information than that provided by the statistics command, and it only works on numeric fields. On the contrary, the statistics command works with both numeric and date type data. This alternative approach can be quickly shown on screen.

Exercise 2

Objective: Identify if there are any duplicate invoices in the accounts receivable file.
ACL steps: Go to Analyze} Look for Duplicates. Select 'Invoice_Number' in the Duplicates On section and click OK.

Teaching note: inform students that the Duplicates command can be used on numeric, character and date fields. Mention that the result of this procedure is automatically saved as a file unless it is specified otherwise before running the command. Show students that more information about the identified duplicates can be viewed by clicking on the hyperlinks in the results table.

Exercise 3

Objective: Identify any gaps in the invoice numbers.
ACL steps: Go to Analyze} Look for Gaps. Select 'Invoice_Number' in the Gaps On section and click OK.

Teaching note: inform students that if there are more than five missing items, then ACL by default will report the results in ranges. This behavior can be changed by selecting the 'List Missing Items' radio button and changing it to a different number. It is important at this point to emphasize the difference between the Gaps command and the Sequence command. Many students consider both commands to be identical. However, it should be stressed that ACL does not consider gaps or duplicates to be sequence errors, as long as the data is in ascending or descending order.

Exercise 4

Objective: Determine if there are any issues with the segregation of duties between the Accounts receivable clerk and the Cash receipts clerk.

ACL steps: Click 'Edit View Filter' button. Write the filter 'AR_Clerk = Cash_Receipts_Clerk' by double clicking on the variable names in the 'Available Fields' section. Click the Verify button followed by OK.
Teaching note: many students tend to manually write filters thereby increasing the risk of errors in the formulae. This is specially the case when dates have to be entered into the filter, given that ACL has its own syntax for describing date values. Therefore, it is helpful to advise students that it is more efficient to select variables for the filters by double clicking on them from the 'Available Fields' section, or by utilizing the 'Date' button where appropriate.

Exercise 5

Objective: Determine the total value and number of transactions for each customer.
ACL steps: Go to Analyze} Summarize. Select 'Customer_Number' in the Summarize On field and select 'Amount' in the Subtotals field. Click OK.

Teaching note: it is important to stress that the Summarize command can only be used on data defined as character or date type. An alternative to the Summarize command is the Classify command, which will give in addition the percentages for the classified items. Students find it helpful to see both techniques demonstrated on screen with the difference in the output pointed out.

Exercise 6

Objective: Perform an aging of the accounts receivables data to determine accounts that are more than three months overdue.

ACL steps: Go to Analyze} Age. Click on the Age On button and select 'Due_Date' from the list of available fields. Click Subtotal Fields button and select 'Amount'. In the Cutoff Date field, enter 31 December 2007, which is the company's year end. Keep the default periods in the Aging Periods section and click OK.

Teaching note: students often misunderstand or misinterpret the purpose of the Age On field and the Cutoff Date field when performing the aging. It is important for the instructor to clarify the latter points by explaining that the Age On field is used to calculate overdue period for each account, while Cutoff Date refers to the entity's year end. The intervals used in the aging are based on the values in the Aging Periods section, and this often requires further explanation. It should be emphasized that the default intervals calculated by ACL for aging are: 0-29 days, 30-59 days, 60-89 days, 90-119 days and 120-10,000 days. Students often query the last value of 10,000 in the interval. It should be explained that while the value of 10,000 is useful for identifying exceptionally old accounts, the user is able to designate any interval as required.

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KEY FACTORS IN IMPULSE BUYING: EVIDENCE FROM TAIWAN

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ABSTRACT

This study aims to explore the influence of website design, electronic word-of-mouth, perceived value, buying emotion on impulse buying-using 7Net as an example. A questionnaire survey was conducted on the users of the 7Net websites in north, central, and south/east of Taiwan and offshore island. The data were analyzed statistically. The results show that: (1) Website design has a significant positive and direct impact on electronic word-of-mouth, perceived value, and buying emotion; electronic word-of-mouth, perceived value, and buying emotion has a significant positive and direct impact on impulse buying. (2)The demographic variables of the 7Net users including educational attainment, current residence, average monthly income, experience in using/browsing online shopping and the frequency to use/browse online shopping each month have a significantly different perception on the website design, electronic word-of-mouth, perceived value, buying emotion and impulse buying.

JEL: M1, M10

KEYWORDS: Website Design, Electronic Word-of-Mouth, Perceived Value, Buying Emotion, Impulse Buying

INTRODUCTION

The increasing prevalence of the Internet has facilitated the growth of the global market. The value generated by the Internet is hard to estimate, because with the development of the Internet, new business opportunities are created, and consumers are also gradually switching to online shopping from traditional methods of shopping. In this era where people are allowed to shop using a mobile phone or a Tablet PC anytime and anywhere, online shopping has become the best way of shopping in spare time for Taiwanese consumers. Online shopping is very promising market in Taiwan. From the statistics of the research institution, the population who uses online shopping has been more than the proportion of 50% in Taiwan. Today, consumer purchases some goods which includes commodity, electrical equipment not by the store, but by the Internet. In the online market, you can find all kinds of the online shopping website. Dealer can sell their products on different kinds of online shopping website. Moreover, consumer has too many options to select own goods on the online shopping website. Therefore, how to attract consumer to purchase product? It has become a problem for online shopping website. Business operators can access huge business opportunities if they can win consumer trust in the first place with their website design. In Taiwan, electronic word of mouth (eWoM) that is circulated among consumers is important.

The experiences shared by other consumers are seen as an objective foundation for choosing among shopping websites and goods. Consumers are also influenced by the ease of use of the website design. An easy-to-use website create positive value perceptions and buying emotions, which in turn, can induce impulse buying in consumers. In Taiwan, 7Net is one of the popular online shopping stores. Built and operated by Uni-President Co. Ltd., 7Net distributes products sold by Uni-President affiliated stores, including 7-11 Convenience Store, Cosmed, MUJI, and Starbucks. Also working with the logistic systems

of 7-11 and T-Cat, 7Net has become a gigantic online distribution system. In this paper, we will use 7Net as an example to explore the relationship among website design, eWoM, perceived value, buying emotion, and impulse buying. The issue of this paper is to find the factors in impulse buying of 7Net in Taiwan. The remainder of this research is as follows. We align our work with the relevant literature including website design, eWoM, perceived value, buying emotion, and impulse buying in section 2. The data and methodology and results are described in section 3, 4, respectively. Finally, concluding comments are illustrated in section 5.

LITERATURE REVIEW

Website Design: Page and Lepkowska-White (2002) pointed out that website design affects consumers' assessment of a website and perception of its value. Janda et al. (2002) stated that browsing a website is like a receiving a service from the website. The webpage content affects consumer perceptions. A website with good design characteristics can give consumers a better impression and motivate their buying behavior more easily. According to Angelides (1997), online stores have many characteristics that are absent in physical stores, but for them, website design is still a determinant of success. Therefore, website design is one of the keys to building a positive perception and stimulating actual buying behavior.

*Electronic Word of Mouth (eWoM):*Marteaux (2007) suggested that electronic word of mouth (eWoM) differs greatly from traditional forms of word of mouth. On the Internet, people are allowed to freely share their experiences, search for opinions shared by others, and interact with them to build WoM online. Park et al. (2007) pointed out that eWoM is not a kind of commercial messages. Unlike general commercial advertisement, it consists of personal and real shopping experiences shared by consumers. Hence, eWoM has a tremendous impact on the decision-making of its receivers. According to Hennig-Thurau and Walsh (2003), eWoM consists of text, photos or images, and can be completely preserved on the Internet without limitation of time and space.

Perceived Value: Zeithaml (1988) argued that customer perceived value is a customer's overall assessment of the utility of a product based on perceptions of what is received and what is given, including the time cost and the search cost. Breur (2006) showed that customer value is typically used in one of the two ways: either to describe the benefit a customer gets from using a product or to describe the profit a customer generates for the company. Butz and Goodstein (1996) defined customer value as an emotional bond generated after personally using the product or service of a supplier. The emotional bond will lead them to buy repeatedly or exclusively from the supplier and/or recommend the supplier to others.

Buying Emotion: Jennings (2000) mentioned that giving customers a pleasant feeling as they browse the website is very important, because the positive feeling influences their first impression with the website, driving them to spend more time on the website and ultimately place an order. Clore and Huntsinger (2007) suggested that buying emotion is the degree to which a customer likes a product or service and will be affected by the customer's buying behavior, psychology or past experiences. In other words, it is an emotional response. Huang (2012) defined buying emotion as an emotional response to stimuli in the external environment (e.g. shopping atmosphere, website design) that will affect customers' emotions and buying behavior.

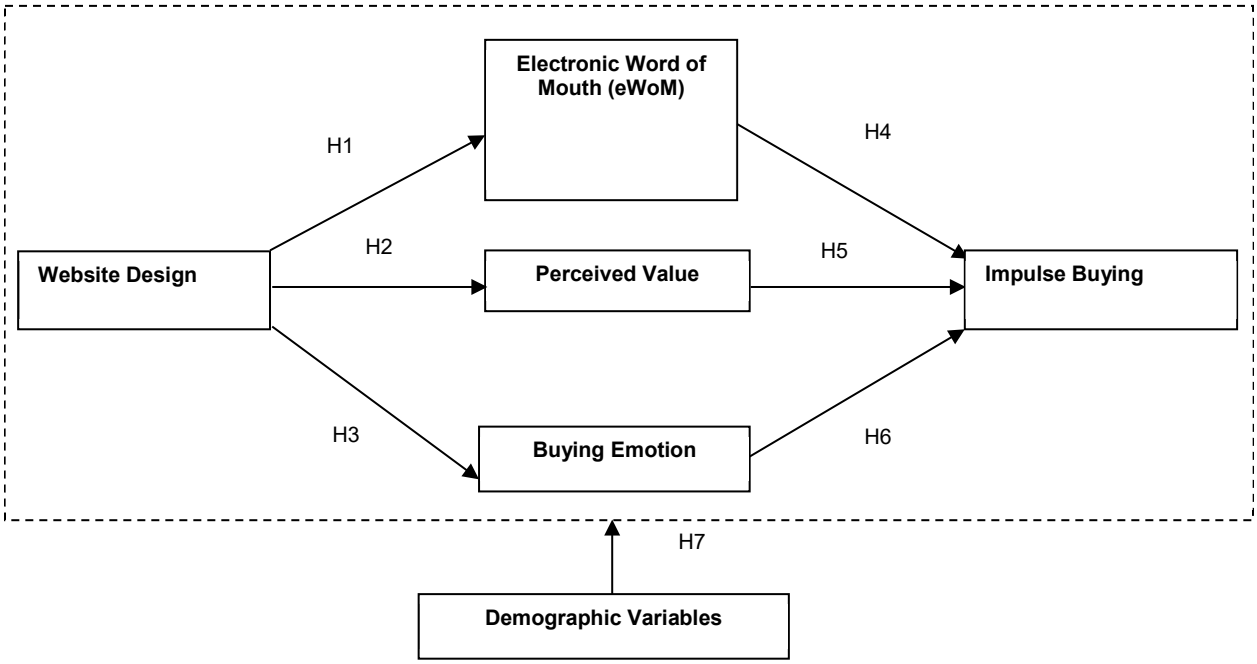
Impulse Buying: Strack et al. (2006) argued that impulse buying is a quick and instant behavior, and it is an unplanned buying decision that is made just before the purchase and without rational considerations and usually triggered by external stimuli. The evidence in Hausman (2000) indicated that consumers who engage in impulse buying pay greater attention to the emotional satisfaction than to the economic benefit brought by the purchase. Sreedhar and Debra (2004) defined impulse buying as a result of a buyer's immediate reaction to external stimulations. An impulse buying episode signifies a change in the buyer's intention to purchase that particular product before and after exposure to stimuli. The stimuli are not limited

to just the product, and the change in the buyer's intention does not include a reminder item that is simply out of stock at home.

DATA AND METHODOLOGY

In this study, we will examine the research question from 7Net customers' perspective. In assessment of website design, we adopt DeLone and McLean's (2003) model which consists of three dimensions, including service quality, information quality, and system quality. eWoM is measured as a single dimension. Perceived value is measured by four variables introduced by Sweeney and Soutar (2001), including emotional value, social value, price value, and quality value. Buying emotion is measured along two dimensions, namely pleasure and arousal, suggested by Russell and Steiger (1982) and Ku and Yan (2004). As to impulse buying, we measure it by a single dimension and view it as a predictor of buying decision. In this study, we will also explore if perceptions of website design, eWoM, perceived value, buying emotion, and impulse buying vary by demographic variables. The research structure of the impacts among website design, eWoM, perceived value, buying emotion, impulse buying, and consumers' (7Net users) perceptions on them is illustrated in Figure 1.

Figure 1: Research Structure



This figure shows the research structure of the impacts among website design, eWoM, perceived value, buying emotion, impulse buying, and consumers' (7Net users) perceptions on them.

Website Design is Significantly and Positively Related to Electronic Word of Mouth (eWoM): Wangenheim and Bayon (2004) indicated that WoM is a key success factor for shopping website operators. When one's experience with a website exceeds personal expectations, he/she is likely to spread positive WoM about the website. Their findings also confirmed that website design has a positive effect on eWoM. Zeithaml et al. (2002) showed that website design has a positive effect on perceived value and eWoM. Chen et al. (2013) explored the effects of platform quality, website awareness, and eWoM on brand evaluation in the context of online group-buying. Their findings suggested that website design and eWoM are positively related. Chou et al. (2012) also confirmed the positive relationship between website design and eWoM in a study of the correlations between information quality, information source credibility, and eWoM. From the

above-mentioned results, they can be inferred that Website design affects electronic word of mouth (eWoM) positively. Therefore, this study proposes the following hypothesis:

H1 : Website design is significantly and positively related to electronic word of mouth (eWoM).

Website Design is Significantly and Positively Related to Perceived Value: Chen and Liu (2010) pointed out that consumers show higher confidence and perceive higher value in a website when the website's information processing mechanism is able to facilitate positive interactions between buyers and sellers. Their empirical evidence ascertained the positive effect of website design on perceived value. Szymanski and Hise (2000) identified online convenience, product offerings and information, site design, and financial security as important factors that customers would consider in assessment of a shopping website. They suggested that website design has an impact on customers' perceived value. Ghose and Dou (1998) analyzed the interactivity and attractiveness of website designs and found that higher website interactivity led to higher perceived quality and perceived value (Chiu and Lin, 2013). According to Mayer et al. (1995), a better designed website wins customer trust more easily and is associated with higher perceived value. Tsai and Liu (2011) examined the relationship between website design and perceived value in Payeasy online store and confirmed the positive effect of website design on perceived value.

H2 : Website design is significantly and positively related to perceived value.

Website Design is Significantly and Positively Related to Buying Emotion: Childers et al. (2001) found that improving the richness of website content can create more enjoyment for online shoppers and will positively affect their buying emotions. Wulf et al. (2006) pointed out that website design is positively related to buying emotion. Online shoppers tend to show a pleasant buying emotion when the website they are browsing meets their needs. Koufaris (2002) noted that a powerful search mechanism provided by the website is able to offer more information to customers. Hence, it also helps create a positive buying emotion and more fun of shopping for customers. Tsai (2013) investigated the relations of online shopping atmosphere and consumer's personality traits to online impulse buying. Their empirical evidence also confirmed that website design is positively related to buying emotion. Huang (2012) obtained the same positive relationship between website design and buying emotion in a study of the effects of website design factors on shopping mood and unplanned buying behavior.

H3 : Website design is significantly and positively related to buying emotion.

Electronic Word of Mouth (eWoM) is Significantly and Positively Related to Impulse Buying: Jin et al. (2013) examined the effect of positive and negative eWoM on goal-directed and impulse buying behavior. Their findings showed the credibility of positive eWoM positively affects goal-directed buying and impulse buying in both the online and physical shopping contexts. Chen (2010) probed into the effect of eWoM on impulse buying and confirmed a positive relationship between them. Ho (2013) obtained a similar finding in a study of the effect of eWoM informational conformity on impulse buying.

H4 : Electronic word of mouth (eWoM) is significantly and positively related to impulse buying.

Perceived Value is Significantly and Positively Related to Impulse Buying: Zeithaml (1988) showed that consumers' value perception that arises during the purchase process has a positive effect on impulse buying. Kumar et al. (2009) indicated that the low product availability resulting from limited supply and high demand creates a stronger need for uniqueness or conformity behavior among consumers, who in turn, will perceive a higher value of the product and be more likely to engage in impulse buying. Dholakia (2000) showed that higher perceived value leads to a higher tendency toward impulse buying. Chiu and Lin (2013) found in their study of customers' personality traits and shopping websites that perceived value and impulse

buying are positively related. Hung et al. (2008) also empirically confirmed that perceived value has a positive effect on impulse buying.

H5 : Perceived value is significantly and positively related to impulse buying.

Buying Emotion is Significantly and Positively Related to Impulse Buying: Dholakia (2000) found that when having a pleasant mood, consumers tend to accept higher risk and engage in impulse buying. Kotler (2003) argued that impulse buying occurs because buying is a way to improve or increase emotional quality. Huang's (2012) study of Lativ online store revealed that consumers' buying emotion is positively related to reminder impulse buying. Ha and Sharron (2010) probed into the effect of consumer emotions (pleasure and arousal) on impulse buying intention. Their evidence suggested that buying emotion has a significant and positive effect on impulse buying intention. Chang (2010) obtained the same finding in a study of the effects of creative product features and shopping context on college students' impulse buying behavior.

H6 : Buying emotion is significantly and positively related to impulse buying.

Demographic Differences Exist in Perception of Website Design, Electronic Word of Mouth (eWoM), Perceived Value, Buying Emotion, and Impulse Buying: Shiaw and Chiang (2005) conducted a survey study of online shopping behaviors. Their study showed that consumers' perception of website design vary significantly by demographic variables. Cheng (2008) surveyed users of Yahoo Auction and also found that consumer perception of the online shopping environment and consumer buying emotion vary significantly by demographic variables. In Lee and Lee's (2010) study of the impact of eWoM on consumers' buying decision, consumer perception of eWoM varies by gender, age, and occupation. Liu and Ruan (2013) investigated the perceived value and user satisfaction of mobile Apps. In their study, users' value perception varied across gender, age, occupation, and marital status. Wu (2011) showed that perceived value varied by demographic variables in a study of buying emotion and purchase intention. Chou's (2008) research of online advertisement and impulse buying also revealed that consumer perception of impulse buying varied by demographic variables.

H7 : Demographic differences exist in perception of website design, electronic word of mouth (eWoM), perceived value, buying emotion, and impulse buying.

RESULTS

The data analyses were performed on SPSS 20.0 and AMOS 21.0. The methods adopted included reliability analysis, one sample t-test analysis, factor analysis, correlation analysis, linear structural relation model, independent sample t-test analysis, and one-way analysis of variance. The number of question items including website design, eWoM, perceived value, buying emotion, and impulse buying in this research is 55 (excluding demographic variables). In reality, we distributed a total of 580 copies of the questionnaire across the nation. We calculated the minimum size of samples from every region and excluded duplicate responses or responses with incomplete answers based on the statistics of population by region released by Directorate-General of Budget, Accounting, and Statistics, Executive Yuan in December 2014. All the acceptable responses were coded and filed. At last, 474 acceptable responses were obtained, 144 of which came from northern Taiwan, 161 from central Taiwan and 169 from southern Taiwan and other areas. The acceptable response rate was 81.72%. The questionnaires of this study were distributed to the consumers who had bought by using 7Net Web sites including the northern area, the central area, the southern area, and the eastern area in Taiwan. The data were collected for the period 9/1/ 2014 until 1/10/2015.

Reliability Analysis

This study was based on data from the questionnaire titled "An Effect of the Key Factors on Impulsive Buying" Ruling out copies with incomplete answers or too many unanswered questions, out of the 580 questionnaires responded, 474 were acceptable, with an acceptable response rate of 81.72%. In the reliability analysis, the reliability values of all main dimensions were 0.7 (or more), with the overall reliability coefficient at 0.946, which shows high-level stability of the reliability of questionnaires administered in this study. The correlation coefficient between revised items and overall items in this study was 0.4 or more to meet the requirement proposed by Choi and Lee (2003). Therefore, the data gathered with the questionnaire adopted in this study demonstrate high level of stability and consistency, enabling subsequent analysis results to be more significant.

One Sample *t* Test Analysis

This study adopted one sample t-test analysis to show the degree of satisfaction (agreement) analyzed by each question of the questionnaire. In the areas of website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulsive buying, for all questions with p=0.000 less than the level of significance of α= 0.001. The results show that for questions on website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulsive buying, most participants selected the options satisfied (agreed) or very satisfied (very agreed). Therefore, we can conclude that questions on website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulsive buying have reached the "satisfy" ("agree") or above consensus level.

Factor Analysis

In this study, we use Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy proposed by Kaiser (1974) to evaluate if data are good for factor analysis. KMO ranges between 0 and 1. KMO=1 indicates that all the variables can be completely explained by other variables. To meet the requirement for factor analysis, the KMO value should be greater than 0.6. According to Chang (2000), the suggested conditions for factor analysis include factor loadings>0.4, eigenvalue>1, and cumulative variance explained>50%. Wu (2011) proposed to use Bartlett's sphericity test to examine if data are good for factor analysis. In Bartlett's test, the correlation coefficient between variables is tested. A significant coefficient indicates presence of common factors in the correlation matrix, and data are good for factor analysis. In our factor analysis, all the variables met the suggested levels of KMO, Bartlett's test, factor loading, eigenvalue, and cumulated variance explained.

In other words, our research variables are appropriate, meaningful, and reliable. We performed principal component analysis (factor analysis) to extract three dimensions of website design, respectively named "information quality","service quality" and "systems quality", one dimension of electronic word-of-mouth (eWoM), named "electronic word-of-mouth (eWoM)", three dimensions of perceived value, respectively named "quality and price value","social value"and"emotional value", two dimensions of buying emotion, respectively named"pleasure"and"arousal", and one dimension of impulse buying, named"impulse buying". The factor analysis of website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulse buying is shown in Table 1.

Correlation Analysis

Using correlation analysis, we assessed whether a significantly positive correlation exists between website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulse buying. Pearson's correlation analysis method was employed to analyze the correlation between website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulse buying. The results show

that a significantly positive correlation exists between website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulse buying.

Table 1: Factor Analysis of Website Design, Electronic Word-of-Mouth (eWoM), Perceived Value, Buying Emotion, and Impulsive Buying

Factor	Dimension	Eigenvalue	Explanatory Variance (%)	Cumulative Explanatory Variance (%)
Website Design	Information Quality	3.868	25.788	56.872
	Service Quality	2.340	15.597	
	Systems Quality	2.323	15.486	
Electronic Word-of-Mouth (eWoM)	Electronic Word-of-Mouth (eWoM)	2.408	54.164	54.164
Perceived Value	Quality and Price Value	6.989	34.945	54.157
	Social Value	2.267	11.337	
	Emotional Value	1.575	7.874	
Buying Emotion	Pleasure	3.083	30.832	56.839
	Arousal	2.601	26.007	
Impulse Buying	Impulse Buying	2.796	55.915	55.915

This table shows the five kinds of factor, dimension, eigenvalue, explanatory variance (%), and cumulative explanatory variance (%).

Linear Structural Relation Model

A linear structural relation model (Structural Equation Modeling; SEM) is created to examine whether the path coefficient of the variables was significant. The goodness-of-fit test was conducted on the factors of website design, electronic word-of-mouth (eWoM), perceived value, buying emotion, and impulse buying.

For assessment indices of the goodness-of-fit of the overall model, chi-square/ degree of freedom (χ^2/df) value of this study was 1.276, which means that it had considerable explanatory abilities. Moreover, goodness-of-fit index (GFI) 0.88, adjusted goodness-of-fit index (AGFI) 0.818, normed fit index (NFI) 0.886, and comparative fit index (CFI) 0.941 were obtained from this study, which means that they were acceptable values greater than 0.8(inclusion; the lowest standard value) (Scott, 1994). Root mean square residual (RMR) value was 0.028, within the acceptable level, and root mean square of approximation (RMSEA) value was 0.043, which is also within an acceptable level. Results show that the overall structure of the model employed in this study possessed good fit, with a level of significance of $\alpha = 0.001$. The standardized regression coefficient of consumers' perceptions of website design related to perceived value was 0.726, with a p-value less than significance level of $\alpha = 0.001$. The results show that a positive and direct correlation exists between the two variables. Higher satisfaction of website design increases consumers' satisfaction with perceived value. The standardized regression coefficient of website design related to electronic word-of-mouth (eWoM) was 0.668, with a p-value below the level of significance $\alpha = 0.001$.

This finding shows that a positive and direct correlation exists between the two variables. Higher satisfaction of website design increases electronic word-of-mouth (eWoM). The standardized regression coefficient of website design related to buying emotion was 0.490, with the p-value below the level of significance of $\alpha = 0.001$. The findings show that a positive and direct influence exists between the two variables. Higher satisfaction of website design increases buying emotion. The standardized regression coefficient of perceived value related to impulse buying was 0.822, with the p-value below the level of significance of $\alpha = 0.001$. The findings show that a positive and direct influence exists between the two variables. Higher satisfaction of perceived value increases impulse buying. The standardized regression coefficient of electronic word-of-mouth (eWoM) related to impulse buying was 0.288, with the p-value below the level of significance of $\alpha = 0.001$. The findings show that a positive and direct influence exists

between the two variables. Higher satisfaction of electronic word-of-mouth (eWoM) increases impulse buying. The standardized regression coefficient of buying emotion related to impulse buying was 0.405, with the p-value below the level of significance of $\alpha = 0.001$. The findings show that a positive and direct influence exists between the two variables. Higher satisfaction of buying emotion increases impulse buying. Overall, a total of six paths are significantly positive and the results support Hypotheses 1, 2, 3, 4, 5, and 6(H1, H2, H3, H4, H5, H6). Based on the above illustration, the path analysis of the goodness-of-fit of the overall model is displayed in Figure 2.

Independent Sample t-Test Analysis

We further performed independent sample t-test to compare perceptions of website design, eWoM, perceived value, buying emotion, and impulse buying between genders. Levene's test with assumption of equal variances showed no significant difference in perception of website design, eWoM, perceived value, buying emotion, and impulse buying between genders.

One-Way Analysis of Variance

One-way ANOVA is a method for analyzing perceptual differences across demographic variables. We first used the test of homogeneity to examine if the assumption of homogeneity of variance was violated. An insignificant p-value indicates that data are good for ANOVA. In ANOVA, a significant p-value is required for subsequent Scheffé's post-hoc comparison. The analysis results showed that consumers' perceptions of eWoM and buying emotion varied significantly by education degree; consumers' perceptions of impulse buying varied significantly by place of residence; consumers' perceptions of website design varied significantly by average monthly income; consumers' perceptions of perceived value and impulse buying varied significantly by experience of online shopping; consumer perceptions of website design and impulse buying varied significantly by frequency of online shopping. Hence, H7 is partially supported.

CONCLUDING COMMENTS

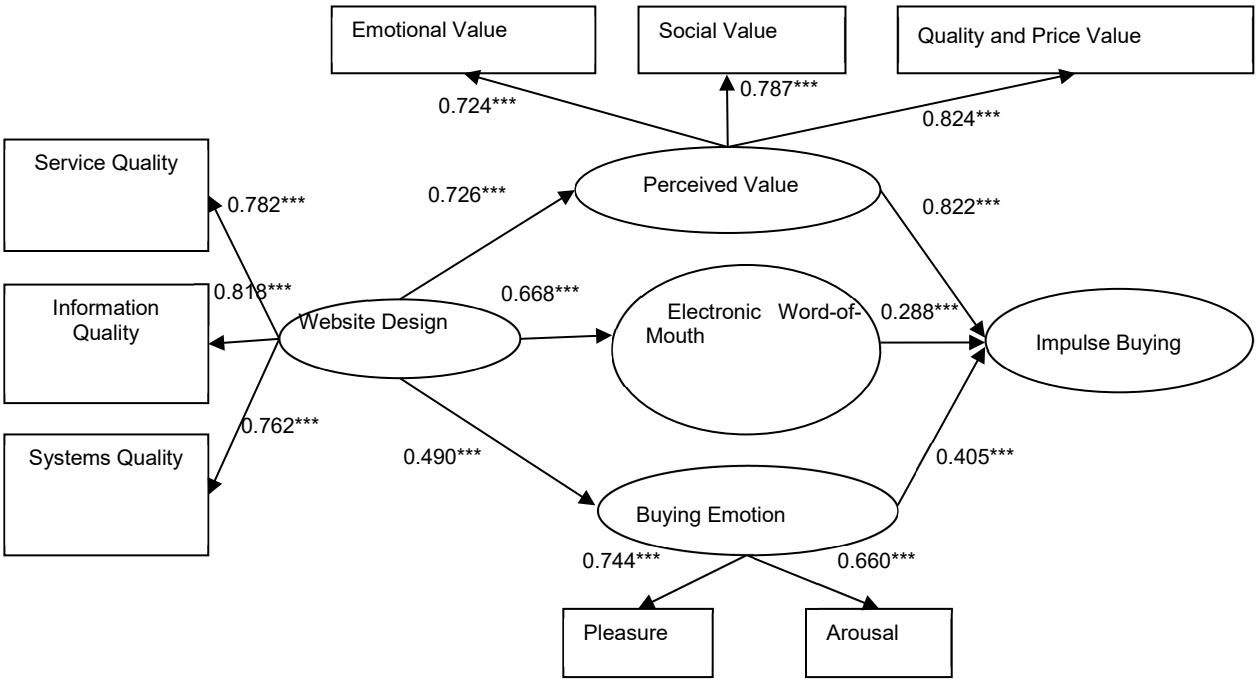
In conclusion, we suggest that 7Net improve their performance on items that their users recognized as important (agree or above) but ranked relatively lower. Our results indicated that website design, eWoM, perceived value, and buying emotion were all related to impulse buying. This empirical evidence is meaningful. Based on this finding, 7Net can develop effective marketing strategies to strengthen its existing customer base and attract new customers, so as to improve its business performance. We propose two suggestions as follows:

Among items measuring website design, eWoM, perceived value, buying emotion, and impulse buying, improve the ones that users recognized as important (agree or above) but ranked relatively lower: In website design, we suggest 7Net to integrate an error reporting mechanism that allows consumers to report mistakes on the website immediately. Through this mechanism, they can ensure that the product information on their website is up-to-date and accurate. As to eWoM, the rapid development of the Internet has facilitated the spread of eWoM, both positive and negative. Consumers may be influenced by negative eWoM to switch to other online stores. Therefore, we suggest that 7Net invest more resources to improve their eWoM marketing.

Proper use of positive eWoM marketing can influence consumers to view 7Net as their first choice of online store. In the aspect of perceived value, we suggest that 7Net manage to differentiate their online store from physical stores. Compared to online stores, it is harder for physical stores to provide all kinds of products. Online stores can offer a wider diversity of products, such as providing more colors or styles, to expand their online shopping market. As for consumers' buying emotion, 7Net can offer discounts on bundle sales or use lucky draws to enhance the pleasure of shopping online for consumers and further motivate their

buying. Besides, 7Net can also improve eWoM, perceived value, and buying emotion by improving their website design. The resulting improvements in eWoM, perceived value, and buying emotion can help induce impulse buying in customers, generate new sources of customers, and bring more opportunities.
2. Pay attention to website design and use eWoM, perceived value, and buying emotion to influence impulse buying: In website design, 7Net is advised to improve their customer service system to respond to customers' issues more quickly and more effectively. The webpages should be simple and clear, allowing consumers to find desired products easily and quickly. Besides, security and privacy issues are also important. They need to provide consumers a safe and secure shopping experience. In the improvement of eWoM, 7Net should manage to disseminate more positive messages about 7Net on the Internet to increase consumers' trust in the store. Besides, they should provide more detailed product information in each product's description page.

Figure 2: The Path Analysis of the Goodness-of-Fit Structure of the Overall Model



*This figure shows the regression estimates of the equation: Y1=0.726X1 (Y1: perceived value; X1: website design; the standardized regression coefficient was 0.726); the regression estimates of the equation: Y2=0.668X1 (Y2: electronic word-of-mouth (eWoM); the standardized regression coefficient was 0.668); the regression estimates of the equation: Y3=0.490Y1 (Y3: buying emotion; the standardized regression coefficient was 0.490); the regression estimates of the equation: Y4=0.822Y1 (Y4: impulse buying; the standardized regression coefficient was 0.822); the regression estimates of the equation: Y4=0.288Y2 (the standardized regression coefficient was 0.288); the regression estimates of the equation: Y4=0.405Y3 (the standardized regression coefficient was 0.405). ***indicates significance at the 0.1 percent level.*

This allows consumers to save the hassle of searching for related information when they have any concerns about a product and can increase their chances of impulse buying. As to perceived value, we suggest 7Net to strengthen their affective bond with consumers. A large percentage of 7Net consumers take advantage of the special offer on products to be paid upon pickup at convenience stores. 7Net can work with these convenience stores to provide promotional deals, such free coffee for store-pickup deals over a certain dollar amount, to attract more customers and induce impulse buying in consumers. In improvement of consumers' buying emotion, 7Net can work on creating more fun of online shopping for consumers. For instance, they can embed animations in webpages to draw consumers' attention or develop mobile APPs to enable consumers to buy on their mobile phones or Tablet PCs. Consumers' intention to buy increases when shopping is made easier and simpler.

In this study, the subjects are 7Net users living in northern, central, eastern, and offshore islands of Taiwan. We administered a questionnaire to explore the relationship of website design, eWoM, perceived value, buying emotion, and impulse buying among 7Net users. The objective of this research is to examine the impacts among website design, eWoM, perceived value, buying emotion, and impulse buying. We further argued whether consumers' perceptions of website design, eWoM, perceived value, buying emotion, and impulse buying differed significantly according to demographic variables.

Below is a summary of our findings: (1) The one-sample t-test showed that all the items for measuring website design, eWoM, perceived value, buying emotion, and impulse buying had a mean score equal to or above the "agree" level. Website design, eWoM, perceived value, and buying emotion were all positively related to impulse buying.; (2)In linear structural equation modeling of the theoretical model, the preliminary fit indices were met. Besides, it was confirmed that website design had a significantly positive and direct effect on eWoM, perceived value, and buying emotion, whereas eWOM, perceived value, and buying emotion had a significantly positive and direct effect on impulse buying. Therefore, the results support Hypotheses 1, 2, 3, 4, 5, and 6; (3) Through one-way analysis of variance, as to test of differences between demographic variables, consumers' perceptions of eWoM and buying emotion varied significantly by education degree; consumers' perceptions of impulse buying varied significantly by place of residence; consumers' perceptions of website design varied significantly by average monthly income; consumers' perceptions of perceived value and impulse buying varied significantly by experience of online shopping; consumer perceptions of website design and impulse buying varied significantly by frequency of online shopping. Thus, Hypothesis 7(H7) is partially supported.

This research has a limitation in collecting the data of the questionnaires by the convenient sampling method due to limited time, cost and labor. The result of this paper also could not indicate the perceptions of all 7Net users in other countries because it only investigated the users for the domestic 7Net in Taiwan. Another limitation of this research indicates that some 7Net users took a long time to fill out the questionnaires to produce an unserious attitude to do these because of a questionnaire which had many items. In a future study, we plan to explore other website types of online shopping such as Women's clothing shopping website, booking website, and auction website to understand whether or not differences in consumers for a different website type of online shopping options in order to further promote the value of the study. Another interesting issue would examine other interference variables such as brand image, perceived risk, and perceived quality on whether or not they would affect website design, eWoM, perceived value, buying emotion, and impulse buying.

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SOCIAL IMPACT AND ONLINE COMMUNICATION IN B-CORPS

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ABSTRACT

The main aim of the present study is to empirically analyze the relationship between the level of social impact and the level of online communication in B Corps. To reach this aim, the following indices were developed: the SIA index (based on the overall score of the Benefit Impact Assessment) and the SIA online communication index (based on a mix of variables selected from the literature). An analysis of 400 B-Corp websites was then carried out to highlight companies' behaviors and point out differences between the US and the EU. The research provides a matrix in which four main typologies of B Corps are identified: newbies, overexposed, undervalued and best practice. The research highlights that a high number of companies, especially in the European context, have not yet fully understood the potential of being a B Corp and that there is room for improvement. Companies can adopt the matrix as a benchmarking tool for a self-evaluation of their position, and identify the required actions to improve their performance.

JEL: M14, M31

KEYWORDS: Benefit Corporations, B Corps, Social Impact Assessment, Stakeholder Communication, Corporate Social Responsibility

INTRODUCTION

Today companies operate in a context in which addressing CSR issues is gaining increasing strategic relevance (Moura-Leite and Padgett, 2011). Furthermore, there is an important shift in business focus that is empowering companies to not only declare their intent to be ethical firms that do good while making a profit, but also to submit proof of that commitment by outside evaluators and through the assessment of their social impact (Wilburn and Wilburn, 2014, Grieco *et al.*, 2015). Recently, some companies that have a strong Corporate Social Responsibility focus are moving toward new forms of organizations, such as Benefit Corporations that are obligated to pursue a public benefit in addition to the core responsibility to return profits to shareholders (Hiller, 2013), or are certifying, becoming B Corps, that must prove to have met rigorous standards of social and environmental performance. In this scenario, multiple tools for social impact measurement are spreading and consolidating. These include the Benefit Impact Assessment (BIA), a widely adopted tool developed by B Lab, which issues the B Corp certification. B Corps represent future potential Benefit Corporations, especially in contexts and environments where there is no specific regulation (as in the case of Europe).

Furthermore, scholars stress the importance to not only measure the impact but to communicate it properly (Montecchia *et al.*, 2016) since, by disclosing sustainability information, companies increase transparency, enhance brand value, reputation and legitimacy, enable benchmarking against competitors, signal competitiveness, motivate employees, and support corporate information and control processes. The presence on a company's website of the tangible results achieved has been read as a sign of

transparency that is highly stressed in the literature (Cheung *et al.*, 2010). However, in spite of the increasing number of Certified B Corps and the growing importance of Social Impact Assessment (SIA), the literature on this topic is still lacking (partly because it is a recent phenomenon), so there is still not a full understanding of this nascent multifaceted paradigm.

Against this background, the final aim of the present study, and the contribution to the existing literature, is to empirically analyze the relationship between the level of social impact and the level of SIA online communication in B Corps. In so doing, we first developed a theoretical framework useful for classifying the behavior of B Corps according to their level of social impact and online communication, then applied it to measure the relationship among EU and US B Corps to pinpoint similarities and differences. To reach this goal, a total of 400 B Corps were analyzed using mixed variables. In particular, the analysis focused on the way in which these 400 companies communicate their social commitment through their corporate websites, comparing the congruency of the level of SIA and the level of communication employed. In the final section, conclusions are drawn regarding operational implications, the limitations of this study, and future avenues for research.

LITERATURE REVIEW

The Non-Profit-Profit Continuum: Towards a Hybridization Process

Over the last decade, several authors have pointed out the emergence of hybrid organizational forms (Haigh *et al.*, 2015, Battilana and Lee, 2014, Haigh and Hoffman, 2014) that act by integrating different values and aims (social, environmental and financial). This phenomenon is leading to the shifting of traditional boundaries between public, private and non-profit organizations, and is becoming so relevant that some authors have highlighted the need to explore "a world of blended value in which every new venture is required to be a hybrid organization" (McMullen and Warnick, 2015, p.630). As shown in Figure 1, the hybridization process starts from the two sides of a continuum where social and financial values are opposed. On the non-profit end, the growing costs and higher competition for fewer donations and grants pose the need for non-profit organizations to become more entrepreneurially oriented, so non-profit organizations are shifting towards increasingly entrepreneurial business models. The article published by Dees in 1998 entitled "Enterprising Non-Profit" underlined that the increasing number of non-profit organizations "have been seeking additional revenues by behaving more like for-profit organizations" (Dees, 1998, p. 56). In accordance with this perspective, Kuratko *et al.* (2017) noted that most organizations exist as a variant somewhere in between the two extremes of profit and non-profit, giving examples of non-profit organizations that have introduced financial value whereby they exist to generate social value. On the opposite side of the continuum, the for-profit sector is moving towards social value creation (Kuratko *et al.*, 2017) by introducing higher levels of corporate social responsibility. In the middle we find social enterprises that seek to balance social and financial value and certified B Corps and Benefit Corporations which have a reinforced commitment to CSR practices and a blended mission to generate a social benefit.

Social enterprises can be structured as for-profit or non-profit, and may take the form of a co-operative mutual organization, a disregarded entity, a social business, a community interest company or a charity organization (Kerlin, 2009). The complexity of these organizations depends on the legal framework of each country and the various differences, such as the methods of redistribution of profits or sectors, in which they can operate. In this scenario, the combination of multiple logics within one organization can create significant internal tensions (Rawhouser *et al.*, 2015). To help address this issue, the increasing number of hybrid organizations has led to the creation of B Corp certifications and Benefit Corporations as a new legal form of organization. The hybridization process has also led to the need to submit proof of social commitment by outside evaluators (Wilburn and Wilburn, 2014) – especially from the profit side, and the rise of the relevance of social impact assessment. Each type of organization adopts a different

kind of reporting/assessment, so while the reporting of for-profit-oriented companies is limited to meet basic financial requirements and SIA can be adopted as part of the regulatory process (Bice, 2015), in CSR-oriented companies the reporting includes the Sustainability or Integrated Report and SIA can be introduced as an indicator. Social enterprises and non-profit organizations generally use specific tools to measure their impact, such as the SROI or the social BSC, a form of SIA (Grieco, 2015), and Benefit Corporations and B Corps, in addition to regular reporting, add the Benefit Report to requirements, introducing the BIA as an evolution of SIA.

Figure 1: The Hybridization Process of Profit and Non-Profit Organizations

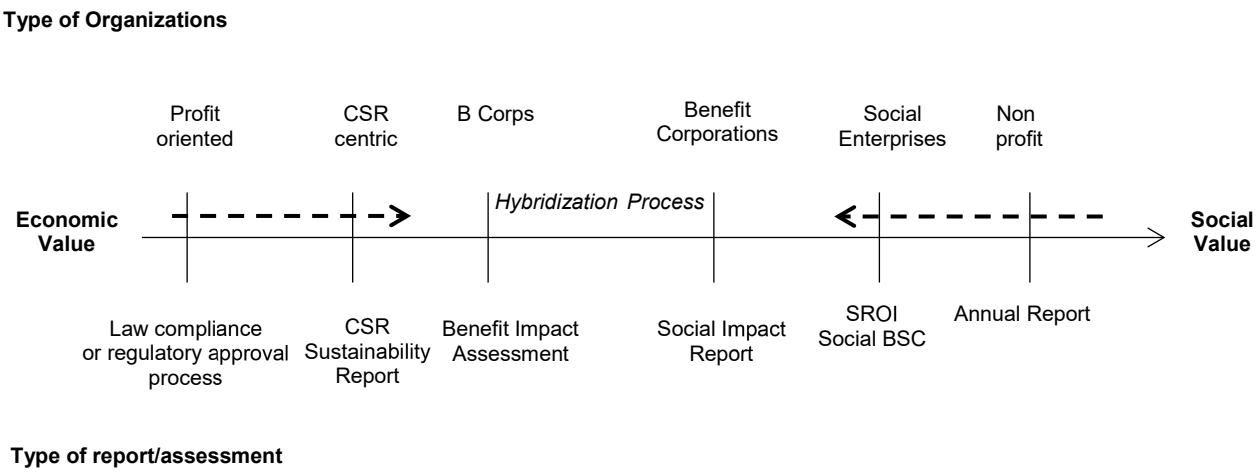

Figure 1 shows the hybridization continuum between profit and non-profit and how the market tends to shift to a more hybrid form of company such as a Benefit Corporation or B Corp. On the left hand side of the continuum are the profit oriented firms and on the right hand side are the non-profit and social enterprises.

Benefit Corporations & B Corps: Background and Literature Overview

The rise of Benefit Corporations dates to 2006 when Jay Coen Gilbert, Bart Houlahan and Andrew Kassoy founded B Lab. In 2007 B Lab developed the Benefit Impact Assessment, which is an Impact Rating System that verifies and measures the impact of a corporation's practices and issues the B Corp certification. It is important to note that a B Corp is not a different legal entity, but a member of a voluntary association subject to an assessment and rating standard that supports corporate responsibility (Hiller, 2013). Since 2008, B Lab has then begun to work on developing a new corporate entity statute and in 2010, with The Maryland Benefit Corporation Act, Benefit Corporations, which pursue a public benefit in addition to the core responsibility to return profits to shareholders (Hiller, 2013), were introduced (Collins and Kahn, 2016, Clark & Babson, 2012). To date, 31 US states have passed the law, and the approval process is currently underway in seven other states. Benefit Corporations increase the obligations of board members, adding environmental and social factors to the financial interests of shareholders. This gives directors and officers the legal protection to pursue a mission and consider the impact their business has on society and the environment.

Benefit Corporations do not have to be audited or certified, corporation laws and tax laws remains the same, and their status only affects the requirements of corporate purpose, accountability, and transparency (The Public Benefit Corporation Guidebook). The law regarding Benefit Corporations differs from state to state, but retains some commonly shared points. Benefit Corporations are required to: 1) include a general and a specific public benefit on top of maximizing share value, 2) value the impact of their decisions on all their stakeholders, and 3) publish, except in Delaware, an annual Benefit Report that assesses, through the evaluation of a third-party standard, their social and environmental performance (B

Lab, 2016). Certified B Corporations (or B Corps) and Benefit Corporations have much in common, but there are a few important differences. As Collins and Kahn (2016) observed, "B Lab founders envisioned the new legal charter operating in tandem with B Lab: the non-profit would offer the kind of third-party certification the charter required while also promoting the legislation and providing support for individuals and groups interested in passing it in their state. The parts are separate but interrelated: a corporation can be chartered as a benefit corporation, but seek certification somewhere other than B Lab. And any corporation – including those not chartered as benefit corporations – can go through B Lab's certification procedure" (Collins and Kahn, 2016, p. 3). Becoming a legally recognized Benefit Corporation does not preclude the possibility for the company to receive the B Corp certification. On the contrary, the legal status of Benefit Corporation facilitates the achievement of the necessary requirements for the certification, even though it must be pointed out that an organization can be a Benefit Corporation without necessarily being a certified B Corp while on the other hand, a B Corp can only renew its B Corp certification twice (2 years + 2 years) before deciding to vary its statute.

The analysis of the literature on this topic reveals that the number of articles published in scholarly journals rose from one in 2010 (year in which the law was passed) to 54 in 2017. One of the most relevant issues that has characterized the debate on Benefit Corporations is the analysis of legal aspects (Hemphill and Cullari, 2014, Cohen, 2012, Blount and Offei-Danso, 2013, Reiser, 2011) and governance issues, particularly those related to stakeholder and shareholder theories and CSR (Jonsen, 2016, Collins and Kahn, 2016). Part of the legal aspects is literature focusing on the role of the ecosystem. In particular, Rawhouser *et al.* (2015) identified the state-level factors that create an environment amenable to the emergence of a social hybrid category through Benefit Corporation legislation (attractiveness for for-profit businesses and non-profits, existing social hybrid organizations, legislative intensity, political leanings) and what arguments have to be marshaled to support or prevent the passing of new legislation.

Other scholars, in supporting the development of institutional instruments to facilitate the rise of hybrid organizations, have underlined that Benefit Corporation legislation can safeguard against greenwashing (Stecker, 2016) and have pointed out the positive role of B Corp certification and its potential to develop a fourth sector of the economy that uses socially responsible business practices to create both profit and social benefit (Wilburn and Wilburn, 2014). In this scenario, McMullen and Warnick (2015) state that blended value can play an ideal or guideline as opposed to normative or legal obligation. In particular, the author affirms that whether requiring new or existing ventures to register as B Corps, "a one-size-fits-all approach to preventing the potential for negative externalities could undermine the specialization that has been a hallmark of capitalism and a key mechanism behind its creation of unprecedented material benefits" (McMullen and Warnick, 2015, p. 657). There is, therefore, a difference between using a persuasive argument to encourage someone to make a choice and forcing them to comply through coercion, and policy makers are encouraged to consider blended value carefully. Finally, one of the most hotly debated topics is the need to manage the dual mission and the importance of accountability and third-party evaluators (Wilburn and Wilburn, 2014, Andrè, 2012).

Even in the case of the specific literature on certified B Corps, one of the most relevant issues that characterizes the debate is how B Corps can be designed and implemented as a new form of business model able to integrate social and environmental goals. In this respect, Stubbs (2017) has identified the relevant key themes to analyze the business models (mainly dominant objectives, measuring success, stakeholders, and influencing the sustainability agenda). The author pointed out that the B Corp model has a social and environmental embedded mission, with the objective of creating positive public impacts for its stakeholders, profit with a purpose. B Corps do not seek to maximize profits, as per the market logic, but profits are the *means* by which they achieve their social purpose and positive societal ends. Furthermore, B Corps work to provide thought leadership around sustainability and to drive change on a broader scale (Stubbs, 2016, 2017).

Measuring and Communicating Social Value

Pursuing missions that differ from the increasing of shareholder wealth poses the need for B Corps, and more generally for all of those forms of hybrid organizations where the focus has to be on multiple bottom lines, to identify proper ways to monitor and measure the generation of value beyond the achievement of economic goals. The overall discourse about measuring social impact takes on a pivotal role in this type of organization. There is a consistent call for the development of theories and tools that enable organizations with a social purpose to prove their success in generating benefits for society (Liket and Maas, 2015, OECD, 2015, Mitchell, 2013, Alexander *et al.*, 2010). This is because the pursuit of social value, be it pivotal or additional, makes traditional reporting standards mostly unsuitable. Indeed, despite the advantages these metrics have in terms of scalability, collectability, objectivity and comparability (Rey Garcia, 2008), focusing on economic and financial results leads to a misrepresentation of the wider impact socially purposed organizations can create (and destroy) for society (Liket and Maas, 2015, Grieco *et al.*, 2015).

To meet this need, scholars and practitioners have in the last decades widely addressed the concept of Social Impact Assessment (SIA) as a distinctive discipline that provides a mechanism by which human and social ecosystems are integrated into decision making (Ahmadvand *et al.*, 2009). Assessing social impact allows an organization to clarify, measure and gather evidence of the benefits that it is able to create for the communities, environment and local economy in which it operates (Ashoka, 2013, Epstein and Yuthas, 2014). The object of the measurement should include the effects – intended and unintended, positive and negative – at the final level of the causal chain that connects the action to the eventual impact on society (Ebrahim and Rangan, 2010, Hehenberger *et al.*, 2013, OECD, 2015), focusing on the long-term results of an organization's activity in terms of economic, environmental and societal change (Ebrahim and Rangan, 2010, Arena *et al.*, 2015).

SIA has important benefits for social enterprises as a management tool (Olsen and Galimidi, 2009): it helps them to set objectives, monitor and improve performance, allocate resources and prioritize decisions (Nicholls, 2007). In this way it is closely linked to the concept of "effectiveness" (Bagnoli and Megali, 2011, Manetti, 2014), which in socially purposed organizations is seen as the ability to achieve goals and implement strategies while using resources in a socially responsible way. Measuring effectiveness raises the need for some form of assessment. As Mitchell (2013) pointed out in his analysis of non-profit leaders' perceptions, the notion of effectiveness itself implies the concept of measurability as a means to show the progress achieved towards specific goals.

The ability to undertake a social mission requires an equally important ability to show that you are actually pursuing it. As it allows organizations to prove that what they are doing is actually having an impact on society, SIA has a great communicative power, and this is consistent with the wider discourse about sustainability reporting. Indeed, as stated by Wray (2015), the declaration of a social scope is no longer enough, and organizations committed to the fulfilment of a social mission are increasingly asked to share their success. Esptein and Yuthas (2014) pinpoint the connection between SIA and accountability, where reporting evidence about performance helps stakeholders develop a common understanding of the organization's challenges and accomplishments. This is particularly useful for investors too, in order to assure them about the worthiness of their investments, and strengthen relationships and shared purposes. Hehenberger *et al.* (2013) suggest that, as it is of relevance for stakeholders, organizations should identify the forms of SIA communication that can best meet the needs of each involved category. Forti (2012) analyses the channels non-profit organizations use to share impact information, shedding light on a recent trend in which these organizations are increasingly turning to the tried-and-true formats that have so far been used by publicly traded for-profit organizations to raise capital from the public, such as performance reports, earning calls, analyst coverage, prospectuses and roadshows. This trend is underpinned by the need to share their successes and learnings in a more authentic way in order to effectively attract donors.

The importance of the dissemination of results is also witnessed by the analysis of existing models that have been developed to drive the SIA process. What emerges is that, despite the fact that they differ considerably from each other in terms of purpose, required data and approach to the impact (Grieco, 2015), the majority of them propose the internal and external communication of achieved information as one of the phases of the overall process.

The measurement and communication of non-economic value is a relevant aspect for Benefit Corporations and certified B Corps: the former because they are explicitly designed to fulfil a social mission and the latter because it is at the core of the certification itself. The first step towards B Corp certification is the measurement of the organization's overall impact on all of its stakeholders, assessing its performance by benchmarking it against best practice (B Lab, 2016). The tool adopted for this purpose, as mentioned earlier, is the Benefit Impact Assessment developed by B Lab.

The rating measures the impact on the following areas: environment, workers, customers, community and governance. The BIA index is: 1) Native – the measurement method was invented prior to the legal framework, 2) Systemic – it measures all impacts, 3) Global – the measurement protocol is unique and allows an overall result regardless of country of origin or sector in which a company operates, 4) Adaptable – the indicator is calibrated depending on the size and reality of the company, 5) Dynamic – every two years new versions of the instrument are developed in order to address possible new market conditions, 6) Independent – a third party, the Standard Advisory Council (SAC), an external group of independent experts, processes the assessment, 7) Verified – the certifying body may require any documentation to support the different answers contained in the BIA and 10% of the sampled B Corporations can undergo an on-site control and 8) Free – the instrument is free of charge. The BIA is a mix of all of the standards and certifications that a company can obtain. When inserted into the algorithm developed by B Labs' SAC, these are weighed with consideration of the impact they might generate. The result is a number between 0 and 200, where 80 or above proves that the company generates a positive impact in several areas and can be certified as a B Corp because it is not only profitable, but creates value. The obtained certification has itself a strong communication power (Rao, 1994, Terlaak and King, 2006, Wade *et al.*, 2006). However, the extent to which certified organizations actively promote its obtainment has recently received great scholarly attention, witnessing the interest towards a better understanding of the topic (Delmas and Grant, 2014, Carlos and Lewis, 2015, Gehman and Grimes, 2016).

METHODOLOGY

In order to design a useful framework for evaluating the consistency between the level of social impact and the online communication, two indices were developed: the *SIA index* and the *SIA online communication index.* The *SIA index* was developed using the overall B Score of the BIA (minimum score for eligibility = 80 vs. maximum score = 200), collected from the B corporation website (bcorporation.net). This score summarized the results obtained in the following areas: Environment, Workers, Customers, Community and Governance. The *SIA online communication index* was developed using different variables selected from the literature, and listed in Table 1. In the absence of extensive literature focused on the specific topic of SIA communication, we first reviewed studies that deal with the overall field of sustainability reporting and communication, in order to identify the main variables to use and that could be set down in the context of SIA (Montecchia, *et al.*, 2016) except for some specific tools that were identified through inductive approach whereby researchers immerse themselves in the data to allow new insights to emerge (Kondracki et al., 2002).

Table 1: Variables for the SIA-COM Index

Variable	References	Value
Benefit Report	New variable selected from the data analysis	1 = present 0 = absent
Sustainability Report	Sousa Filho and Wanderley, 2007, Wanderley *et al.*, 2008	1 = present 0 = absent
Code of Ethics	Sousa Filho and Wanderley, 2007, Wanderley *et al.*, 2008	1 = present 0 = absent
Partnerships with NGOs	Sousa Filho and Wanderley, 2007, Wanderley *et al.*, 2008, Du and Vieira, 2012	1 = present 0 = absent
Other SIA Tools	New variable selected from the data analysis	1 = present 0 = absent
Logo in Home Page	New variable selected from the data analysis	1 = present 0 = absent
CSR/SIA section	Cheung *et al.*, 2010, Montecchia *et al.*, 2016	0 = no information, 1 = few lines of description in other section, 2 = one page description in another section, 3 = 1 page of specific section, 4 = more than one page.
Philanthropic Activities	Cheung *et al.*, 2010, Montecchia *et al.*, 2016	0 = no information, 1 = few lines of description in other section, 2 = one page description in another section, 3 = 1 page of specific section, 4 = more than one page.
Other Certification	Du and Vieira, 2012	0 = no certifications, 1 = one certification, 2 = two certifications, 3 = three certifications, 4 = four certifications, 5 = five certifications.

Table 1 shows the chosen variables, taken from the literature and that emerged through an inductive approach, used to develop the SIA/COM Index. The column on the left highlights the chosen variables and the column on the right underlines the values utilized to code them. The column in the center helps to place the variables and methodology in the literature.

The two indices were measured on a sample of 400 EU and US B Corps. The sample was selected considering the total number of EU B Corps. We selected 201 B Corps, we then excluded one duplicate (a company with multiple locations throughout Europe that appears twice), obtaining a sample of 200 EU B Corps. To compare results with the US and ensure homogeneity, we identified a sample of 200 US B Corps stratified by country and then selected randomly. The analysis was performed from January to April 2017. Both the SIA index and the SIA online communication index were measured for each registered B Corp as the ratio of the score obtained/the maximum obtainable score (200 for the SIA index and 19 for the SIA online communication index). To collect data about the selected variables, company websites were content analyzed. This methodological choice was in line with a broad branch of research which shows that the web has become the preferred channel to investigate the socially responsible behaviours of firms (Parker *et al.*, 2015, Maignan and Ralston, 2002, Patten, 2002, Wanderley *et al.*, 2008, Holder-Webb *et al.*, 2009, Moreno and Capriotti, 2009, Bravo *et al.*, 2012, Du and Vieira, 2012, Sobhani *et al.*, 2012, Gehman and Grimes, 2016). Results have been analysed on a total of 4,000 observations

RESULTS

First of all, a descriptive analysis was developed to point out differences in results among sector, year of foundation, and country. In particular, as Table 2 shows, a first analysis of the results by industry reveals that among those analysed, the greatest number of B Corps operate in the business products & services sector, even though the construction sector (building) scored higher on average in almost every category, especially in the environment, workers and governance categories. The study also highlighted that the greatest attention was given to initiatives that involve the community, scoring at 32.72 and workers, scoring at 21. In general, the highest scores were found to be in the community overall impact area, revealing the high interest of B Corps in their community and community-related activities, while a

relatively low score for governance overall impact reveals low involvement on the managerial, board and decision-making side.

Table 2: Results by Industry

	B-Impact Assessment Score						
Industry	**N°**	**Environment**	**Workers**	**Customers**	**Community**	**Governance**	**SIA Index**
Building	14	39.43	23.43	3.50	29.50	19.07	55.36
Business Products & Services	129	15.33	22.28	17.87	32.19	13.57	49.98
Consumer Products & Services	108	25.12	19.65	5.05	36.52	13.42	50.13
Education & Training Services	19	9.37	20.16	20.42	35.58	13.89	49.68
Energy & Environmental	28	30.61	21.11	10.07	25.43	15.14	50.96
Financial Services	36	8.33	22.81	31.83	31.92	14.94	54.56
Health & Human Services	27	11.26	16.44	26.69	32.33	13.44	48.67
Management Consulting	39	11.34	16.26	26.97	32.13	13.53	48.88
Mean		**18.25**	**21.00**	**16.33**	**32.72**	**13.92**	**50.65**

Table 2 compares the Benefit Impact Assessment scores per category obtained by B Corps in each sector. The table highlights the number of B Corps evaluated, the Industry they are part of and the various scores obtained per each Benefit Impact Assessment category. The mean is underlined at the bottom.

Although not all companies declared their founding year on their website (leaving us with a sample of 173/400), from Table 3 it can be evinced that the companies founded in the 90's perform better than the newly founded ones, in particular with supporting the environment, workers, and their external community. Younger B Corps, on the other hand, were found to be giving greater attention to customers.

Table 3: Results by Year

	B-Impact Assessment Score						
Year of Foundation	**N°**	**Environment**	**Workers**	**Customers**	**Community**	**Governance**	**SIA Index**
Up to 1990	30	23.63	26.17	10.30	34.90	15.67	56.48
Between 1990 to 2000	25	22.76	25.96	10.96	31.92	16.48	53.32
From 2001 to 2005	28	22.93	23.54	14.11	30.68	14.57	51.32
From 2006 to 2010	39	18.87	19.56	19.31	30.82	12.36	49.36
From 2010 to 2017	51	11.47	13.73	15.00	21.96	9.51	35.76
Mean		**19.8**	**22.08**	**16.54**	**31.84**	**14.01**	**51.69**

Table 3 compares the Benefit Impact Assessment scores per category obtained by B Corps considering their foundation year. The table highlights the number of B Corps evaluated, how long they have been operating in the market and the various scores obtained per each Benefit Impact Assessment category. The mean is underlined at the bottom.

Finally, the differences in performance between Europe and the US were analysed for each category of assessment. Table 4 shows how US companies perform better on environmental impact and governance, while European companies get better results in the worker and customer categories.

Table 4: Results by Country

B-Impact Assessment Categories	EU	USA	Mean
Environment	15.94	20.55	18.25
Workers	21.23	20.76	21.00
Customers	19.09	13.48	16.33
Community	32.33	33.11	32.72
Governance	11.33	16.52	13.92

Table 4 compares the Benefit Impact Assessment scores per category obtained by B Corps considering their country of origin. The sample of US B Corps and European B Corps was evaluated as a whole, portraying the different performances through the various scores obtained per each Benefit Impact Assessment category.

In order to highlight any positive correlations between the two indices, the Pearson correlation index was calculated on the EU and USA companies and over the entire sample, and it is reported in Table 5. The results show that a positive correlation is evincible in all of the analysis. Notwithstanding, the correlation among the indices is low and not significant for the EU companies, while for the US companies and over the entire sample it is higher and significant at the 0.01 level (2-tailed).

Table 5: SIA and SIA-COM Correlations

	Index Correlation		
	SIA-COM (Total Sample)	**SIA-COM Index (EU)**	**SIA-COM Index (USA)**
SIA index (total sample)	0.254**		
SIA index (EU)		0.065	
SIA index (USA)			0.387**

Table 5 shows the Pearson correlation index calculated on the EU and USA companies and over the entire sample. What emerged is that a positive correlation is evincible in all of the performed analysis, however it is low and not significant for the EU companies, while for the US companies and over the entire sample it is higher and significant at the 0.01 level (2-tailed).

Figure 2 shows how EU and US companies are positioned according to their SIA and SIA-COM indices, allowing us to analyze their distribution and, consistently, their behaviors.

In order to analyze these results, a 2x2 matrix has been developed, using the mean of the two indices as variables to measure and compare EU and US results. The developed matrix is portrayed in Figure 3, and has served as a conceptual framework where companies are analyzed according to their position in four identified areas. Each area corresponds to a specific behavior: best practice, overexposed, newbies and undervalued. Each quadrant corresponds to a different communication behavior according to the corresponding level scored by the two indices:

the "best practice" area is characterized by B Corps with a high score on both indices. Companies within this area should work on maintaining their performance.

the "overexposed" area is characterized by B Corps whose communication does not reach an adequate equal level of social impact. Companies in this area should improve their social impact activities.

the "undervalued" area is characterized by B Corps with a low level of communication and high level of social impact. Companies within this area should enhance their social benefit communication strategy.

the "newbies" area is characterized by B Corps with a low score on both indices. Companies within this area should work first of all on augmenting their social impact and afterwards on improving their ability to communicate it effectively.

Figure 2: SIA and SIA-COM Index Scatterplot

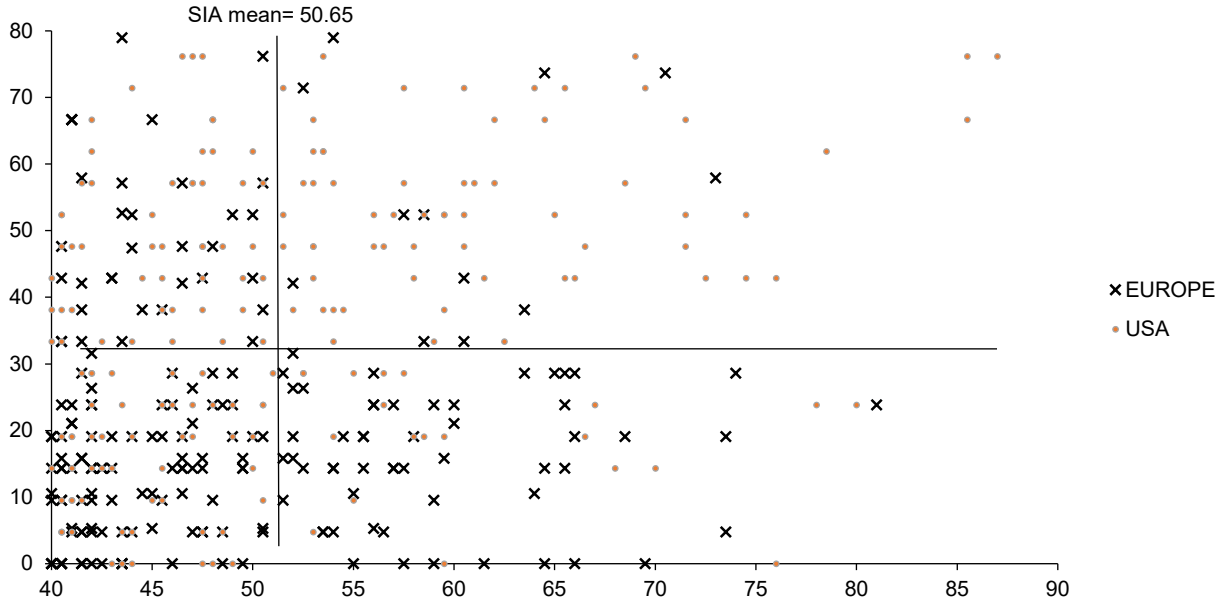

Figure 2 shows the distribution of the sample according to the SIA index and the SIA-COM index. Two different symbols have been used to distinguish EU companies from US ones. The way in which they are positioned allows an interesting insight on their behavior in terms of generated social impact and the extent to which they communicate it externally.

The analysis of the positioning of companies on the matrix highlights some noteworthy facts. Firstly, 39.25% of firms are newbies, indicating that these companies are still not fully engaged in the social sphere and have not mastered the potential of communication strategies. This figure rises to 49% in the EU, indicating that in this context, companies seem to be even more in the initial phase of the process. The actions recommended in this quadrant are to primarily increase social impact and to then develop adequate communication activities. The second quadrant is that of the overexposed (22.75%), where the percentage of US companies (27.5%) is higher than their European counterparts. This area is characterized by companies that demonstrate a level of inconsistency between what they do in the field of social impact and how they communicate it. In fact, companies that belong to this area have a low level of social impact but a high level of communication. The recommended action for companies that belong to this area is to improve their social impact. In the best practice quadrant lie 19.25% of the companies, of which 32.5% are in the US. This figure shows that in the US context a consistent number of companies have reached full maturity regarding their social impact assessment and communication. Finally, the undervalued quadrant consists of 18.75% of the companies, a figure that rises to 27% if we consider only those in the EU. The companies in this quadrant have a high social impact but should enhance their communication strategies to make the most of their certification. The data highlights that the high number of businesses in the newbies quadrant shows how companies, especially in the European context, have not yet fully understood the potential of this tool, and that there is room for improvement.

Figure 3: The SIA-COM and SIA Index Matrix

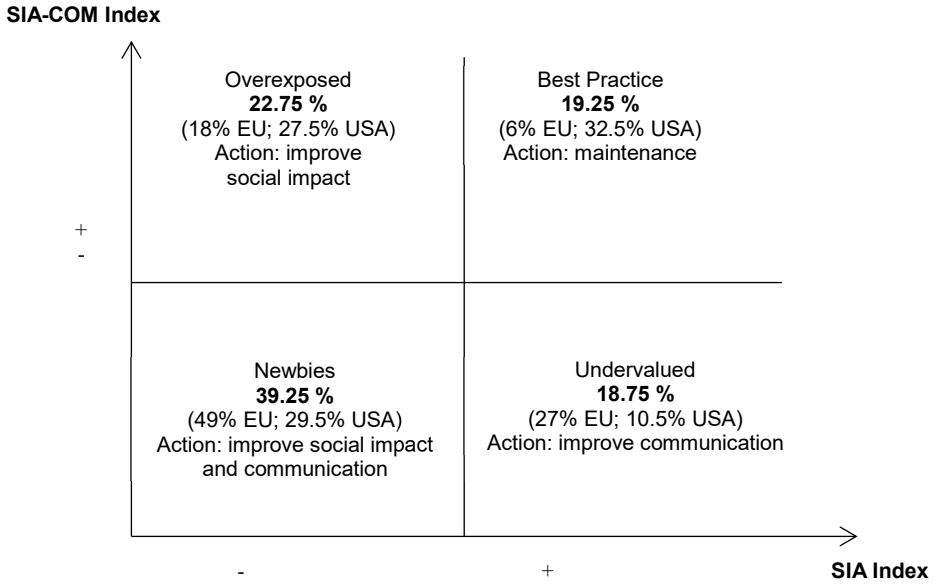

Figure 3 shows the positioning of B Corps in the SIA/COM Index matrix. B Corps can fall into 1 of 4 categories: upper left (high communication skills/low actual impact), upper right (high communication skills/high impact levels), lower right (low communication skills/high actual impact), lower left (low communication skills/low actual impact).

Finally, we can analyse how the different clusters of companies (classified by industry and year of foundation) are positioned in the matrix. Table 6 shows the indices by industry. What we can see is that the building sector has the highest score for social impact assessment, since the impact of these organizations is measurable and goes across all categories except for customers, with whom they do not generally communicate directly while management consulting organizations, on the other hand, have the highest communication index score since they promote social impact activities for themselves and other companies. Curiously enough, the health and human services sector has the lowest social impact score due to the fact that these organizations are already so focused on doing good that they do not find it necessary to report on their activities in this area, while the education and training services sector scored lowest in the communications index because they tend to prioritize their academic communication over their impact communication.

Table 6: Indices by Industry

Industry	SIA Index	COM Index	Quadrant
Building	55.36	35.75	Best Practice
Business Products & Services	49.98	28.79	Newbies
Consumer Products & Services	50.13	31.93	Overexposed
Education & Training Services	49.68	23.55	Newbies
Energy & Environmental Services	50.96	33.25	Best Practice
Financial Services	54.56	29.78	Undervalued
Health & Human Services	48.67	23.75	Newbies
Management Consulting	48.88	32.27	Overexposed

Table 6 highlights which B Corps according to sector fall in which SIA and SIA_COM Index Matrix quadrant (Figure 3) according to their SIA index score and COM Index score. The column on the left portrays the industry, the central columns list the scores obtained when calculating the indices and the last column underlines the quadrant.

Also, in Table 7, the indices are presented by year. Once again, the companies founded between 1999 and 2000 scored better in both their social impact and communications index scores, while the companies with the newer certifications scored the lowest.

Table 7: Indices by Year of Foundation

Year of Foundation	SIA index	COM index	Quadrant
Up to 1990	56.48	42.11	Best Practice
Between 1990 to 2000	53.32	44.06	Best Practice
From 2001 to 2005	51.32	34.36	Best Practice
From 2006 to 2010	49.36	24.99	Undervalued
From 2010 to 2017	35.76	24.28	Newbies

Table 7 highlights which B Corps according to year of foundation fall in which SIA and SIA-COM Index Matrix quadrant (Figure 3) according to their SIA index score and COM Index score. The column on the left portrays the year of foundation, the central columns list the scores obtained when calculating the indices and the last column underlines the quadrant.

CONCLUSION

This paper aims to provide a framework for assessing the relationship between the level of social impact and the level of online communication in B Corps, and to measure the relationship among EU and US B Corps in order to pinpoint differences in behaviour. The first contribution to the field we provide in this study was the development of two indices useful to evaluate the level of SIA and how it is communicated online. In particular, by analysing previous literature on the communication of CSR and sustainability (Montecchia *et al.*, 2016), the main variables have been identified and applied in the B Corp context. Secondly, we provide advancement in the field of B Corps and SIA by drawing a matrix where four main typologies of B Corps are identified: newbies, overexposed, undervalued and best practice, the matrix was then applied to analyse the behaviour of EU and US B Corps. In this sense, the distribution of the companies within the identified quadrants allows some interesting observations to be drawn.

Companies falling in the best practice quadrant seem to fully exploit the benefits that could come from the obtained certification in terms of strengthening the organizational identity (Glynn and Navis, 2013) and offering a way to differentiate themselves from non-certified competitors (Gehman and Grimes, 2016). It sounds quite straightforward that certified companies would take every opportunity to promote this achievement, however scholars have recently shed light on a sort of discrepancy between certification and communication that is consistent with the percentage of companies in the undervalued quadrant. What these companies might experience can be referred to as *promotional forbearance* (Gehman and Grimes, 2016), which means that they refrain from publicizing the obtained certification even if it takes an effort to do so. Gehman and Grimes (2016) tried to analyse the motivation behind this behaviour and hypothesized that the context in which B Corps operate has a strong influence in determining the promotion of the certification, and this could partially explain the difference between EU and US companies. Where the generated social impact is low, what might be lacking is experience on the one hand (newbies), and motivation on the other (overexposed). In the latter case there is a consistent incoherence that is reflected in the accountability towards the stakeholders. The high level of communication does not have an equally high level of generated social impact, which is witnessed by the score obtained in the certification. This mismatch can possibly be strategic for companies, but it might also be understood by stakeholders as a lack of transparency, with a negative effect on the overall reputation of the firm. The need to highly promote a lower score can be due to the fact that evaluating and communicating social impact is still often seen as a marketing tool rather than a management one, thus the fear of being judged is stronger than the interest in finding out what is not working in order to improve it. This becomes even more true when companies feel pressured to prove their impact and shift their focus

from the original goal, spending more time demonstrating and communicating evidence of their social performance (Andrè and Pache, 2014, Bucaciuc, 2015).

The managerial implications of the study are twofold. Firstly, the identified matrix can provide an overall frame of reference for understanding the behaviour of EU and US companies related to their levels of social impact and communication. Moreover, companies can adopt the matrix as a benchmarking tool for a self-evaluation of their position, and identify the required actions to improve their performance. This study is not without limitations. The selected sample comprised a wide but not comprehensive set of B Corps and it is limited to two countries. Also, the methodology employed requires a certain discretion on the part of the researcher, and consequently introduces the potential for partiality in conducting the analysis. The limitations of this study can be addressed in future research. It might be useful to develop a qualitative analysis to better investigate companies that belonging to the "best practice" area to pinpoint drivers of excellence. Through additional research, it will be possible to build a deeper understanding of the critical factors necessary for a successful implementation of the social impact communication strategy.

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