Volume 3, Number 1

ISSN 1944-656X H
ISSN 1944-6578 O

BUSINESS STUDIES JOURNAL

Gary Schneider
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The official journal of the
Academy for Business Studies,
an Affiliate of the Allied Academies

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LOCATION DECISION MAKING FOR ECO-INDUSTRIAL PARKS IN NONMETROPOLITAN ILLINOIS: THE USE OF STOCHASTIC INPUT-OUTPUT MODEL AS DECISION AID

Adee Athiyaman, Western Illinois University

ABSTRACT

This paper presents a statistical tool that could aid in location decision making for eco-industrial parks. Sixty-six nonmetropolitan counties in Illinois were assessed for their structural correlates relevant for locating eco-industrial parks. The product-portfolio analysis was used to visualize the structural facets of the counties. Data inputs to the portfolio analysis were derived from a stochastic input-output model for scrap, used and second hand goods (input-output transactions table code 0002). Results of the portfolio analyses suggest that Coles County would be an ideal location for developing an eco-industrial park.

INTRODUCTION

One of the generalizations in ecological economics is that we could no longer maintain economic growth without exhausting our finite resources. This has resulted in the concept of eco efficiency: delivering more value for less environment burden, as an objective for most businesses in the world (Ehrenfeld, 2005; Ring, 1997). Business strategies related to eco efficiency deal with waste and pollution reduction.

A tactical method for reducing waste and pollution at the community level is the development of eco-industrial parks (Gibbs, 2005). This methodology co-locates seemingly separate industries to facilitate physical exchange of materials, energy, water, and by-products, leading to economic and environmental quality gains and equitable enhancement of human resources for the business and local community (Cote 1998; Dunn, 1998).

The definition of eco-industrial parks suggests that its development requires one or more industries that export their waste to one or more industries that can utilize this waste (Ayers 2002). Since an input-output (I/O) transactions table shows the market relationships among all sectors / industries in the economy (Kurz & Lager 2000), we construct a stochastic I/O model for I/O code 0002 (scrap, used and second hand goods) to glean insights into nonmetropolitan locations in Illinois that would be conducive to developing eco-industrial parks. The focus on expected multiplier and its variance accommodates the risk-averse management style of

policymakers (Edwards, 2005). Put differently, risk-averse management pays attention to the economic impact / profit variance which can be interpreted as a risk measure (Duncan, 1979)

The Stochastic I/O Model

Given a square input technical coefficient matrix A of size p, and its associated final demand vector y, the output vector x is found by the product (Bold-faced letters are used to denote matrices, capitals, and vectors, lower-case representations. Scalars are italicized.):

$$x = (I-A)^{-1} y$$

The technical coefficients are point estimates and the readers are expected to assume that the coefficients are reliable. This kind of analysis is common practice in most applied or consulting assignments (see for example, the IMPLAN, and the EMSI websites for implementation of the static I/O model).

Now consider the scenario where the elements of A (a_{ij}) are stochastic; measurement error could be the source of this randomness (Quandt 1958; West 1986). This suggests that the true multiplier are computed from $(I-A-\Delta)^{-1}$ where the Δ denotes deviations from observed A. If $|I-A-\Delta| \neq 0$, we can develop a stochastic I/O model as follows:

Let M denotes the observed multiplier $(I-A)^{-1}$. We make use of the equality,

$I-A-\Delta = (I-A)(I-M\Delta)$ to deduce the pdf of the multipliers.

Specifically,
$$\begin{aligned} I-A-\Delta &= I-A-(I-A)(I-A)^{-1}\Delta \\ &= I-A-(I-A)M\Delta \\ &= I-M\Delta-A+AM\Delta \\ &= (I-A)(I-M\Delta) \end{aligned}$$

Therefore,
$$\begin{aligned} (I-A-\Delta)^{-1} &= [(I-A)(I-M\Delta)]^{-1} \\ &= (I-M\Delta)^{-1}(I-A)^{-1} \\ &= (I-M\Delta)]^{-1} M \end{aligned}$$

Given
$$\begin{aligned} (I-M\Delta)^{-1} M &= M+E \\ E &= (I-M\Delta)^{-1} M - M \end{aligned}$$

Specifically,
$$\begin{aligned} (I-M\Delta)[(I-M\Delta)^{-1} M - M] &= (I-M\Delta) E \\ M-(I-M\Delta) M &= (I-M\Delta) E \\ M-M+M\Delta M &= (I-M\Delta) E \\ M\Delta M &= (I-M\Delta) E \\ (I-M\Delta)^{-1} M\Delta M &= E \end{aligned}$$

Since the elements of E denote deviations from the observed multipliers, algebraically, the element

$$e_{pk} \triangleq \frac{\sum_{ij}^{n} m_{pi}\Delta_{ij}m_{jk}}{1-\sum_{r,s}^{n} m_{sr}\Delta_{rs}} \qquad \text{if } \sum_{r,s}^{n} m_{sr}\Delta_{rs} < 1 \tag{1}$$

Summing over p results in:

$$O_k = \sum_{p}^{n} e_{pk} = \frac{\sum_{i,j}^{n} \Delta_{ij} m_{jk} o_i}{1-\sum_{r,s}^{n} m_{sr}\Delta_{rs}} \tag{2}$$

To derive the density function of the multipliers, we assume that the a_{ij} are normally distributed, ~ N (μ_{ij}, σ^2_{ij}). Since the CDF requires integrating over n multipliers, we focus on a hypothetical situation that involves two variables. For computational efficiency, we utilize the following notations: $x_i = \Delta_{ij}$; $a_i = m_{jk}\, o_i$; $b_i = m_{sr}$, and $y = \Delta_{rs}$ and rewrite Eq. 2 as:

$$y = \frac{\sum_{i=1}^{k} x_i a_i}{1-\sum_{i=1}^{k} b_i x_i} \tag{3}$$

When k =2, and $x_i \sim N(o, \sigma_i^2)$, the joint density of x_1 and x_2 is:

$$g(x_1, x_2) = \frac{1}{\prod_{i=1}^{2}(\sigma_i^2\sqrt{2\pi})} \exp\left[-\frac{1}{2}\sum_{i=1}^{2}\left(\frac{x_i}{\sigma_i}\right)^2\right] \text{ for } -\infty < x1, x2 < \infty \tag{4}$$

Integrating $g(x_1, x_2)$ over y gives:

$$F(y) = \int_{-\infty}^{\infty}\left\{\int_{-\infty}^{y} \frac{a_2+x_1(a_1b_2-a_2b_1)}{\prod_{i=1}^{2}(\sigma_i\sqrt{2\pi})(a_2+b_2y)^2} \exp\left[-\frac{1}{2}\left(\frac{x_1}{\sigma_1}\right)^2 - \frac{1}{2}\left(\frac{y-yb_1x_1-a_1x_1}{(a_2+b_2y)\sigma_2}\right)^2\right] dy\right\} dx_1 \tag{5}$$

The derivative is the density function

$$f(y) = \frac{\exp\{-\frac{1}{2}[y^2/\sum_{i=1}^{2}\sigma_i^2(a_i+b_iy)^2]\}}{\sqrt{2\pi}[\sum_{i=1}^{2}\sigma_i^2(a_i+b_iy)^2]^{3/2}} \sum_{i=1}^{2} a_i\sigma_i^2(a_i+b_iy) \tag{6}$$

The moment generating function of the pdf is given by:

$$O_k^{\,r} = \left(\sum_{i,j}^{n} \Delta_{ij} m_{jk} O_i\right)^r \left[1 + r\sum_{i,j}^{n} m_{ji}\Delta_{ij} + \frac{r(r+1)}{2!}\left(\sum_{i,j}^{n} m_{ji}\Delta_{ij}\right)^2 + \ldots\right] \tag{7}$$

The first moment is:

$$E(O_k) \doteq \sum_{i,j}^{n} m_{jk} O_i \sigma_{ij}^{\,2}\left[1 + 3(m_{ji}\sigma_{ij})^2 + 15(m_{ji}\sigma_{ij})^4 + \ldots\right]$$

$$= \sum_{i,j}^{n} \frac{m_{jk} O_i \sigma_{ij}^{\,2} m_{ji}\sigma_{ij}^{\,2}}{(1-7m_{ji}^{\,2}\sigma_{ij}^{\,2})^{3/7}} + R1 \tag{8}$$

where

$$\mathrm{R1} = 20 \sum_{i,j}^{n} m_{\mathrm{jk}} O_i {m_{\mathrm{ji}}}^7 {\sigma_{\mathrm{ij}}}^8 [1 + \frac{87}{4} (m_{\mathrm{ji}} \sigma_{\mathrm{ij}})^2 + \ldots]$$

and will be zero to 14+ decimal places if $\sigma_{\mathrm{ij}} = 0.01$ and $m_{\mathrm{jk}} O_i {m_{\mathrm{ji}}}^7 = 1$.

The second moment is:

$$V(O_k) \doteq \sum_{i,j}^{n} (m_{\mathrm{jk}} O_i \sigma_{\mathrm{ij}})^2 [1 + 8((\mathrm{m_{ji}} \sigma_{\mathrm{ij}})^2 + 69(\mathrm{m_{ji}} \sigma_{\mathrm{ij}})^4 + \ldots]$$

$$= \sum_{i,j}^{n} (m_{\mathrm{jk}} O_i \sigma_{\mathrm{ij}})^2 [1 + \tfrac{59}{16} (\mathrm{m_{ji}} \sigma_{\mathrm{ij}})^2]^{128/59} + \mathrm{R2} \qquad (9)$$

where

$$\mathrm{R2} = \frac{157}{10} \sum_{i,j}^{n} (m_{\mathrm{jk}} O_i)^2 {\mathrm{m_{ji}}}^6 {\sigma_{\mathrm{ij}}}^8 [1 + \frac{7}{10} (\mathrm{m_{ji}} \sigma_{\mathrm{ij}})^2 + \ldots]$$

Finally, the confidence interval is given by:

$$O_i - Z_{\alpha/2} \sum_{i,j}^{n} (m_{\mathrm{jk}} O_i \sigma_{\mathrm{ij}})^2 \Big/ \Big(\sqrt{\sum_{i,j}^{n} (m_{\mathrm{jk}} O_i \sigma_{\mathrm{ij}})^2} + Z_{\alpha/2} \sum_{i,j}^{n} m_{\mathrm{jk}} O_i m_{\mathrm{ji}} {\sigma_{\mathrm{ij}}}^2 \Big) \leq O_i^* \leq$$

$$O_i + Z_{\alpha/2} \sum_{i,j}^{n} (m_{\mathrm{jk}} O_i \sigma_{\mathrm{ij}})^2 \Big/ \Big(\sqrt{\sum_{i,j}^{n} (m_{\mathrm{jk}} O_i \sigma_{\mathrm{ij}})^2} + Z_{\alpha/2} \sum_{i,j}^{n} m_{\mathrm{jk}} O_i m_{\mathrm{ji}} {\sigma_{\mathrm{ij}}}^2 \Big) \qquad (10)$$

DATA AND STATISTICAL ANALYSES

We approximated the variances of the elements in the Leontief inverse using the input-output accounts data published by the Bureau of Economic Analysis (BEA; see http://www.bea.gov/industry/io_annual.htm). Specifically, we constructed input-output matrices for 16 sectors, for each of the 10 years, 1998 to 2007. Scrap, a commodity, was treated as the 16th sector using information gleaned from make and use tables. Appendix 1 illustrates this procedure using the 2003 input-output accounts data.

The technical coefficients related to scrap (a_{i16}), for each of the 16 industries, for a 10 year period, are given in Appendix 2. The a_{ij} were bootstrapped 1000 times and a (16 x 16) matrix of standard errors was derived for use in Eq. 6 (Appendix 3). Since the procedure assumed structural stability in the scrap industry, the hypothesis of null growth of technical coefficients was assessed using a t-test (Appendix 4).

To highlight plausible location of eco-industrial parks, 66 nonmetropolitan Illinois counties identified by the Office of Management and Budget (OMB) were examined for scrap-industry's forward linkages (FL) - forward linkage refers to demand for scrap outputs by other sectors (Sonis, Hewings & Guo, 1997). The analytical procedure relied on sector-level, output data for each of the 66 nonmetropolitan counties derived from the 2007 IMPLAN tables, the technical coefficients given in Appendix 2, and interval estimates of output-multiplier values (see Eq. 11, and Table 1 in the results section).

Algebraically,

$$FL = \sum_{i=1}^{16} 2007\ Output_i \times a_{i16} \times m_i \quad (11)$$

where $output_i$ refers to sector i's output; a_{i16} indicate sector i's technical coefficient related to scrap, and m_i is $\sum_{j=1}^{15} m_{ij}$.

In addition, to assess the market potential for scrap in the counties, sector-level employment data from EMSI was combined with sector output to predict potential in 2012 (Appendix 6).

Finally, the attractiveness of geographical locations for eco-industrial parks was evaluated using the product portfolio framework (Wind, Mahajan & Swire 1982). Two dimensions were used in the model: size of the scrap sector, and sector growth rate. As mentioned earlier, size was measured using FL, and growth rate was based on difference between forecasts of scrap use in the counties during 2012 and their actual use in 2007. Equal importance ratings were assigned for the dimensions.

RESULTS

Output Multipliers

Table 1 provides the 2007 output multiplier values, which are point estimates, and the corresponding first and second moments (standard errors). In general, the expected values are higher than the observed values. The difference ranges from a low 0.003 for retail to a high 0.04 for manufacturing. Manufacturing has the largest multiplier followed by information and agricultural sectors. Retail and wholesale sectors possess the lowest multipliers.

The large standard error for scrap validates a commonly held belief that national statistics about scrap are often unreliable (Swisko, 2000). Also, the low correlation between multiplier values and std. errors ($r = .33$; $p > .10$) challenges the commonsensical notion that large expected values produce large standard errors.

Finally, the confidence intervals are asymmetrical about the point estimate of the expected value. The numbers in parentheses beside each confidence limit show the distance

from expected value in standard errors units. These intervals provide the basis for us to assess the forward linkages of the scrap industry under the most likely scenario (expected value).

Table 1
OUTPUT MULTIPLIER VALUES – 2007

Sector	Observed	Expected*	Std. Error*	95% Confidence Interval	
				Lower^	Upper^
Agriculture	2.12015	2.13497 (3)	0.0133079(7)	2.09384 (-3.1)	2.14645 (.86)
Mining	1.79954	1.81338 (8)	0.0143406 (5)	1.77122 (-2.9)	1.82786 (1.00)
Utilities	1.73151	1.73791 (11)	0.0238787 (2)	1.68461 (-2.2)	1.77841 (1.71)
Construction	2.06772	2.07906 (4)	0.00895485 (10)	2.05 (-3.2)	2.08544 (.74)
Manufacturing	2.38513	2.42072 (1)	0.023607 (3)	2.33833 (-3.4)	2.43194 (.5)
Wholesale	1.53475	1.53897 (16)	0.00440808 (16)	1.52604 (-2.9)	1.54345 (1.02)
Retail	1.57726	1.58112 (15)	0.00455633 (15)	1.56827 (-2.8)	1.58624 (1.13)
Transportation	1.87767	1.88707 (7)	0.0162606 (4)	1.84566 (-2.5)	1.90969 (1.40)
Information	2.12135	2.13832 (2)	0.0138639 (6)	2.09393 (-3.2)	2.14878 (.72)
Fin. & Ins.	1.633	1.64639 (14)	0.00951053 (9)	1.61416 (-3.3)	1.65185 (.6)
Pro. Services	1.69957	1.70589 (13)	0.00598733 (13)	1.68774 (-3.1)	1.7114 (.89)
Education & Health Care	1.72546	1.73144 (12)	0.00497169 (14)	1.71563 (-3.2)	1.7353 (.76)
Arts & Entertainment	1.88473	1.8929 (6)	0.0111785 (8)	1.8627 (-2.7)	1.90676 (1.27)
Other Services	1.9196	1.92825 (5)	0.00671349 (12)	1.90631 (-3.2)	1.93289 (.71)
Government	1.76128	1.76783 (9)	0.00773146 (11)	1.74603 (-2.8)	1.77654 (1.12)
Scrap	1.74638	1.75352 (10)	0.0336306 (1)	1.68035 (-2.2)	1.8124 (1.76)

Note: * Numbers in parentheses denote ranks;
^ Numbers in parentheses represent distance from expected value in std. errors units

Scrap Landscape: Nonmetropolitan Illinois

Of the approximately $9 billion worth of scrap used in the region in 2007, 99% was consumed by the manufacturing sector (Table 2). Finance & insurance sector, and the information sector consumed the remaining 1% ($54.7 million).

Viewed from the perspective of economic impact, the scrap sector generated ~$21 billion for nonmetropolitan Illinois in 2007 (Appendix 5). Of this, the majority (approximately $11 billion or 52%) was nested in twelve counties (see the first 12 listings in Appendix 5).

2012 Market Potential: The Most Likely Scenario

Table 3 shows the 2012 market potential for each of the three user sectors. The forecasts are based on the assumption that sector output is in direct proportion to sector employment. The

employment projections reveal that manufacturing, and information sectors in nonmetropolitan Illinois will shed jobs at the rate of 6% per annum. Some of the counties that defy this negative trend include Scott (15%), Moultrie (9%), and Putnam (8%). In all, 14 of the 66 nonmetropolitan counties are expected to add more people to their manufacturing workforce (Appendix 6). As regards the economic impact of scrap, it is expected to be around $15 billion in 2012, roughly $6 billion less than the 2007 value (Table 3).

Table 2
SECTOR-WISE SCRAP CONSUMPTION IN 2007: NONMETROPOLITAN ILLINOIS ($ MIL)

Sector	Total Output (Derived From Implan 2007)	Input Requirements (Based On A_{IJ})
Agriculture	7331	.121405
Mining	2855.8	2.54612
Utilities	3621.8	.1600684
Construction	8069.5	0
Manufacturing	60592.9	8451.4
Wholesale	338.9	0
Retail	1003.7	0
Transportation	5882.9	.006899
Information	4119.9	23.828
Fin. & Ins.	1980.2	30.9024

Table 3: 2012 MARKET POTENTIAL

Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Manufacturing	20, 786	110, 381	.18831	79, 082	14, 892
Information	51	14, 563	.0034	10, 667	37.27
Finance & Insurance	51	35, 680	.0014	41, 588	58. 83
Total	20, 888	160, 624		131, 337	14, 988.1
Note: Employment projections were obtained from EMSI Complete Employment – 1st Quarter, 2010					

Sector Growth Rate: The Most Likely Scenario

Fifteen nonmetropolitan counties (23%) are expected to increase their scrap utilization in 2012 (Table 4). The growth in scrap use, as measured over the 2007 to 2012 time period, ranges from a high 35% per year for Pope County to a low 0.14% for Coles. In monetary terms, the 15 counties account for more than $3billion (20%) of the scrap industry's 2012 market potential (Table 4).

Table 4 **PER CAPITA GROWTH RATE: SCRAP UTILIZATION AND IMPACT**			
County	Total Impact, 2007	Total Impact, 2012	Growth Rate
Pope	12.66597	73.84016	0.352597
Scott	26.96498	58.08813	0.153484
Brown	89.06712	142.278	0.093679
Putnam	158.6345	242.9346	0.085238
Pulaski	48.11541	60.64547	0.046289
Fulton	154.3403	180.7165	0.031554
Schuyler	59.86911	66.49478	0.020993
Johnson	40.65067	44.63936	0.01872
Hamilton	40.52213	43.62549	0.014759
Cumberland	88.98604	95.67188	0.014489
Christian	362.1436	388.1239	0.013857
Cass	443.8423	469.7979	0.011367
Edgar	239.5968	251.5932	0.009771
Warren	329.2026	339.8607	0.006372
Coles	621.6174	625.874	0.001365
Note: Growth rate was calculated as follows: $\text{Growth Rate} = \ln\frac{m_{i,16\ 2012}}{m_{i,16\ 2007}} \times \frac{1}{5}$			

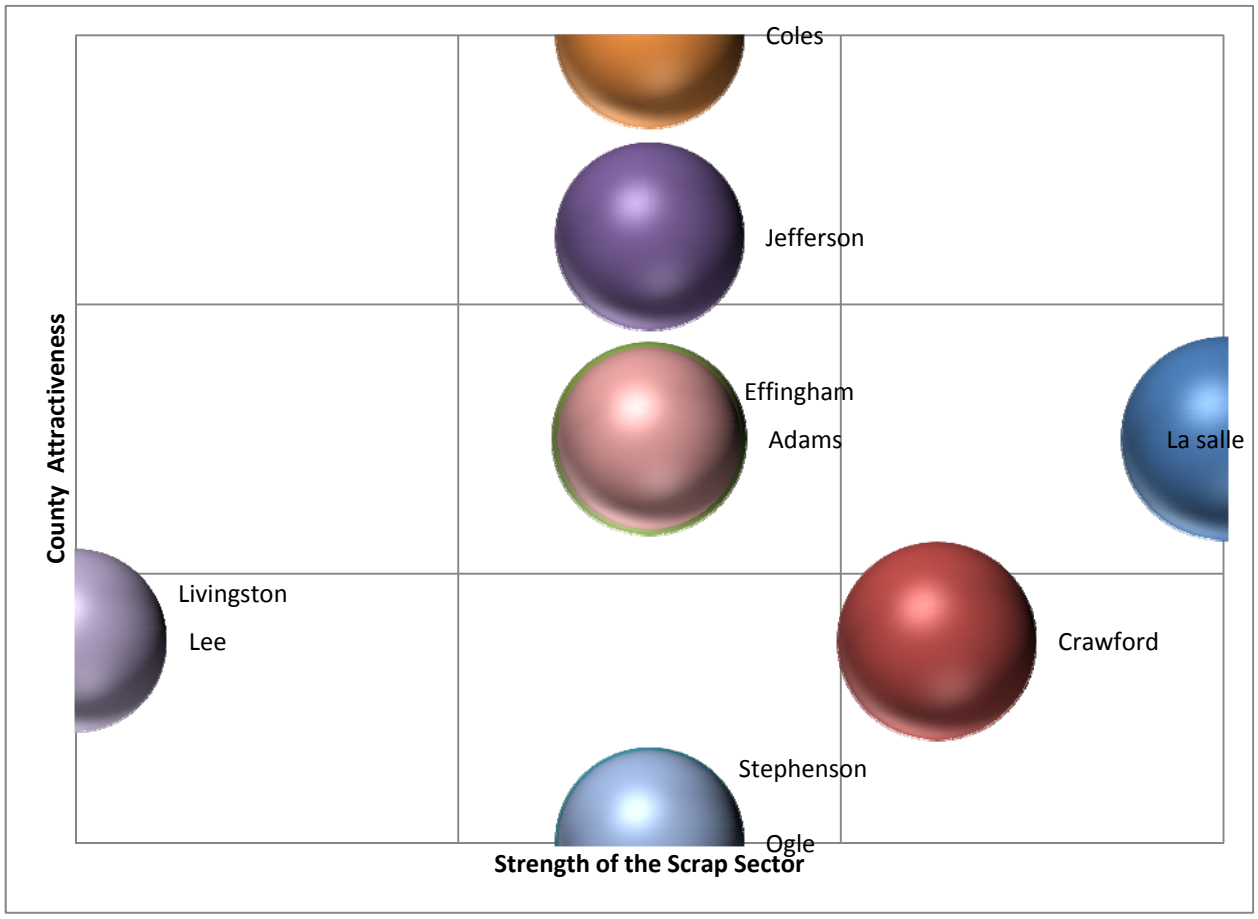
Ideal Location For Eco-Industrial Parks

The Portfolio approach evaluates a county on the basis of two dimensions: county attractiveness and strength. County attractiveness is assessed using sector or scrap industry's growth rate. Similarly, county strength is defined as the relative size of the county's scrap industry in 2012 (market-share computed across all nonmetropolitan counties). We assigned each county a rating for each factor and a weight to each factor (see Table 5 for illustrations). Multiplying the factor ratings by the weights produced a position for each county on the strength/attractiveness matrix (Figure 1).

Figure 1 reveals that the most desirable locations are those that are large enough and ideally those in the upper, middle-to-the-right corner of the matrix. Consider the Coles County's position in the strength/attractiveness map. It has a positive growth rate (.14%), and commands a $650 million scrap industry which could sustain an eco-industrial park. Jefferson County is also a viable location albeit with a forecast negative growth rate for scrap (-.7%). Finally, while La

Salle County is the largest user of scrap in nonmetropolitan Illinois, its manufacturing sector is expected to shrink by approximately 2.5% per annum making it a less attractive location.

Figure 1
STRENGTH/ATTRACTIVENESS MATRIX



DISCUSSION

The motive for developing eco-industrial parks is to reduce the environmental burden of industrial production processes. Our focus was on locations that have a large, growing scrap sector that could facilitate physical exchanges of scrap materials among firms.

The portfolio analyses suggest Coles and Jefferson counties as potential locations for eco-industrial parks. Coles County has 68 manufacturing establishments. The same figure for

Jefferson County is 41 (EMSI Complete Employment – 1st Quarter 2010). These are the scrap sector's forward-linkage firms, which would benefit from an industrial park.

Table 5
An Example Of Data Table Used To Construct The Strength/Attractiveness Matrix

Horizontal Axis Strength, Based On Market Share, Rated On A Scale From 1 To 5, To Be Used With A Weight Factor Of 3										
	La Salle	Crawford	Adams	Jefferson	Ogle	Coles	Stephenson	Effingham	Lee	Livingston
Market Share	5	4	3	3	3	3	3	3	1	1
Vertical Axis Attractiveness, based on Market Growth Rate, rated on a scale from 1 to 5, to be used with a Weight Factor of 5										
	La Salle	Crawford	Adams	Jefferson	Ogle	Coles	Stephenson	Effingham	Lee	Livingston
Market Size	20	19	18	17	17	17	16	16	16	16
Note: Ratings were linear interpolations; re-scaled measures of market share and market growth rate variables.										

Efforts to achieving linkages among these firms require a planned process of policy making such as, for example, specifying process innovations required for a company to be part of the sustainability initiative. In fact, research on firm-specific factors in Coles and Jefferson counties is needed to distill strategies for the development of eco-industrial parks. There is some evidence that large industrial firms are better equipped to achieve symbiosis and utility sharing (Deppe et al 2000; John, 2008). The theory is that these firms have large and stable waste flows and hence search for new possibilities for re-use of waste, including searching for firms that could accommodate their waste flows. Table 6 lists industries with large firms in the Coles and Jefferson counties that could be potential targets for eco-industrial parks development.

Table 6: Potential Targets For Eco-Industrial Parks

County	Naics Code	Description	No. Of Establishments	No. of Jobs at 2009
Coles	3322	Architectural and structural metals manufacturing	3	150
	3324	Boiler, tank, and shipping containers mfg.	2	334
	3351	Electric light equipment mfg.	5	239
Jefferson	3331	Ag., construction, and mining machinery mfg.	3	94
	3336	Power transmission equipment mfg.	1	67
	3344	Semiconductor component mfg.	1	109

SUMMARY AND CONCLUSION

This paper has shown how portfolio methods and stochastic I/O analysis could [11] combined to aid in decision making for locating eco-industrial parks. While the approach requires manipulation of large data matrices, it does help structure the research problem objectively using the techniques and methods of structural economics and marketing.

A normative prescription of this study is that policy makers should consider both the scrap industry's size and growth prospects before locating an eco-industrial park in a community. Application of this principle to nonmetropolitan Illinois suggests that the Coles and Jefferson counties would be ideal locations for developing eco-industrial parks.

The paper could be strengthened further using policy makers' perceptions about the viability of eco-industrial development in the chosen counties. Location-specific factors such as existing traffic infrastructure, water systems, energy systems, nature development, etc. should be considered in finalizing one or more locations for industrial parks. Finally, and more importantly, the likelihood of eco-cooperation among potential industries, such as those listed in Table 6, should be evaluated.

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Appendix 1: Construction Of Data Matrix: Illustration Using The 2003 Make And Use Tables ($ Mil)

ORIGINAL USE TABLE		1	2	3	4
IOCode	Name	Agriculture	Mining	Utilities	Construction
1	Agriculture	65299.8	0.5	0.4	1373.1
2	Mining	496.3	34471.3	84133.3	6352.9
3	Utilities	5551.1	2617.4	151	3269.6
4	Construction	960.7	60.5	3765.3	1111.3
S002	Scrap, used and secondhand goods	0.3	0	0	8

ORIGINAL MAKE TABLE		1	2	3	S002
IOCode	Name	Agriculture	Mining	Utilities	Scrap, used and secondhand goods
1	Agriculture	277690.3	0	0	0
2	Mining	0	244435.1	0	0
3	Utilities	0	586.4	333196.4	0
4	Construction	0	0	0	0
Total Commodity Output		281792.7	246466.7	416011.4	9953.4

REVISED USE TABLE (WITH SCRAP ADDED AS A NEW SECTOR)

Commodity	Agriculture	Mining	Utilities	Construction	Scrap
Agriculture	65299.8	0.5	0.4	1373.1	0
Mining	496.3	34471.3	84133.3	6352.9	0
Utilities	5551.1	2617.4	151	3269.6	0
Construction	960.7	60.5	3765.3	1111.3	0

REVISED MAKE TABLE (WITH SCRAP)

Industry	Agriculture	Mining	Utilities	Construction
Agriculture	277690.3	0	0	0
Mining	0	244435.1	0	0
Utilities	0	586.4	333196.4	0
Construction	0	0	0	1063132
Scrap, used and secondhand goods	0.3	0	0	8

Note: For illustration purposes, only the first three to four IO sectors are shown. Note that $8 mil of scrap was produced by the construction sector (see the revised make table).

Appendix 2: Technical Coefficients for Scrap; 1998-2007										
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Agri.	1.7E-05	1.7E-05	2.0E-05	1.5E-05	1.5E-05	5.6E-06	1.8E-05	1.4E-05	1.5E-05	1.5E-05
Mining	8.9E-04	9.9E-04	1.1E-03	7.7E-04	5.9E-04	3.7E-04	6.5E-04	6.3E-04	3.8E-04	3.5E-04
Utilities	4.4E-05	5.5E-05	6.3E-05	4.9E-05	5.1E-05	5.8E-05	7.4E-05	7.1E-05	6.4E-05	6.3E-05
Constrn.	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Mfg.	1.5E-01	1.9E-01	2.2E-01	1.7E-01	1.6E-01	9.2E-02	1.9E-01	1.9E-01	1.8E-01	1.9E-01
Wholesale	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Retail	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Transportn.	1.2E-06	1.3E-06	1.6E-06	1.2E-06	1.3E-06	4.0E-07	1.5E-06	1.2E-06	1.6E-06	1.6E-06
Inform.	5.8E-03	6.9E-03	8.5E-03	6.9E-03	6.8E-03	1.1E-03	7.9E-03	7.5E-03	8.7E-03	8.7E-03
Fin. & Ins.	1.6E-02	1.1E-05	1.3E-05	1.0E-05	2.5E-02	2.4E-02	3.5E-02	1.0E-05	2.8E-02	2.6E-02
Pro. Ser.	1.1E-01	1.3E-01	1.5E-01	1.2E-01	1.2E-01	1.6E-02	1.3E-01	1.1E-01	1.3E-01	1.3E-01
Edu. $ HC	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Arts & Ent.	4.4E-03	5.3E-03	5.9E-03	4.7E-03	5.0E-03	2.7E-03	6.8E-03	5.7E-03	5.3E-03	5.2E-03
Other Ser.	2.0E-05	2.4E-05	2.8E-05	2.2E-05	2.5E-05	3.1E-07	3.0E-05	2.6E-05	3.1E-05	3.3E-05
Govt.	9.0E-02	1.1E-01	1.3E-01	9.9E-02	1.0E-01	1.1E-01	1.4E-01	1.3E-01	1.2E-01	1.2E-01
Scrap	1.1E-03	1.1E-03	1.1E-03	1.2E-03	1.1E-03	8.3E-04	9.7E-04	9.4E-04	9.2E-04	9.7E-04
Note: Technical coefficients depict the ratio of value of input (scrap) to the value of total output of the industry. For example, the manufacturing sector utilized $0.145 worth of scrap in 2007 to produce a dollar worth of output.										

Appendix 3: STANDARD ERRORS BASED ON BOOTSTRAP DATA																
	Agri.	Mining	Utility	Constrn.	Mfg.	Wholesale	Retail	Transp.	Inf.	Fin. & Ins	Pro. Ser	Edu & HC	Arts & Ent	Othr. Ser	Govt.	Scrap
Agri.	2.3E-03	3.4E-07	1.3E-06	4.5E-05	6.1E-04	1.8E-05	2.9E-06	1.5E-06	3.1E-06	2.7E-05	4.4E-05	1.2E-05	3.3E-04	2.4E-05	3.2E-05	1.1E-06
Mining	9.4E-05	3.5E-03	1.3E-02	2.6E-04	6.1E-03	1.9E-05	1.5E-05	5.3E-04	2.5E-05	1.1E-05	3.2E-05	3.1E-05	5.1E-05	6.7E-05	3.0E-04	7.7E-05
Utilities	7.1E-04	7.8E-04	6.1E-05	4.4E-05	1.9E-04	6.8E-05	1.3E-04	1.8E-04	5.6E-05	6.5E-04	7.8E-05	6.3E-05	2.2E-04	7.6E-05	2.8E-04	2.9E-06
Constrn.	9.0E-05	1.0E-05	5.3E-04	1.2E-05	3.9E-05	3.3E-05	7.4E-05	4.9E-05	1.1E-04	2.1E-04	6.8E-05	9.3E-05	1.6E-04	7.1E-05	4.5E-04	0.0E+00
Mfg.	2.9E-03	2.0E-03	2.0E-03	2.3E-03	4.0E-03	8.7E-04	6.5E-04	5.2E-03	1.9E-03	4.4E-04	5.7E-04	1.3E-03	3.6E-03	1.3E-03	1.9E-03	1.1E-02
Wholesale	1.2E-03	3.3E-04	2.2E-04	4.9E-04	5.6E-04	1.1E-03	1.7E-04	8.5E-04	2.4E-04	4.8E-05	8.8E-05	6.4E-05	8.5E-04	6.4E-04	4.1E-04	0.0E+00
Retail	8.8E-05	1.1E-04	3.4E-05	1.1E-03	6.5E-05	4.7E-05	1.0E-04	1.8E-04	1.6E-05	7.9E-05	1.3E-04	6.8E-05	8.9E-05	3.2E-04	1.6E-05	0.0E+00
Transportn.	9.2E-04	1.2E-03	2.1E-03	4.0E-04	2.9E-04	2.2E-04	2.2E-04	7.5E-04	1.4E-04	2.7E-04	1.8E-04	3.0E-04	2.0E-04	8.6E-05	1.3E-04	1.1E-07
Inform.	2.4E-04	2.9E-04	2.3E-04	1.5E-04	3.1E-04	3.5E-04	4.8E-04	6.7E-04	3.6E-03	3.7E-04	9.0E-04	5.1E-04	7.4E-04	7.3E-04	6.1E-04	6.5E-04
Fin. & Ins.	1.9E-03	4.9E-03	1.9E-03	3.2E-04	3.9E-04	1.0E-03	1.8E-03	9.6E-04	2.0E-03	3.9E-03	1.6E-03	9.0E-04	2.6E-03	1.7E-03	3.3E-04	4.0E-03
Pro. Ser.	5.5E-04	2.4E-03	1.8E-03	8.1E-04	9.8E-04	1.1E-03	1.3E-03	2.9E-03	3.1E-03	1.5E-03	1.7E-03	4.0E-04	5.0E-04	7.9E-04	2.5E-03	1.1E-02
Edu. $ HC	1.9E-06	3.7E-05	1.2E-04	2.7E-06	1.8E-05	1.3E-05	1.3E-05	1.7E-05	8.6E-05	1.4E-05	1.8E-05	3.8E-05	2.7E-05	3.4E-05	2.0E-04	0.0E+00
Arts & Ent.	6.3E-05	8.1E-05	3.0E-04	3.2E-05	8.9E-05	5.6E-05	7.5E-05	3.7E-04	5.0E-04	1.7E-04	1.9E-04	1.0E-04	1.9E-04	1.4E-04	8.1E-05	3.2E-04
Other Ser.	5.1E-04	6.6E-05	8.4E-05	1.7E-04	2.8E-04	9.0E-05	8.0E-05	7.6E-04	3.3E-04	4.0E-04	1.4E-04	5.1E-05	1.0E-04	1.4E-04	3.7E-04	2.7E-06
Govt.	2.9E-04	3.2E-04	2.7E-04	1.2E-04	1.6E-04	1.8E-04	1.9E-04	3.1E-04	1.5E-04	2.4E-04	2.6E-04	3.4E-04	2.4E-04	1.7E-04	2.9E-04	5.0E-03
Scrap	4.1E-05	2.3E-05	8.1E-06	6.9E-05	7.1E-05	1.0E-05	8.1E-06	5.1E-05	1.5E-05	6.0E-06	8.5E-06	1.6E-05	2.7E-05	3.6E-05	3.1E-05	3.4E-05
Note: The 1998 – 2007 technical coefficients of the sectors were bootstrapped 1000 times and the standard errors were computed using the procedure discussed by Mooney and Duval (1993).																

Appendix 4
STATISTICAL TEST FOR NULL GROWTH IN TECHNICAL COEFFICIENTS: INPUT OF SCRAP NEEDED TO PRODUCE $1 OUTPUT, 1998 – 2007

I/O SECTOR	IO CODE	GROWTH RATE
Agriculture	1	1.60707E-05
Mining	2	0.001045833
Utilities	3	4.93149E-05
Constrn.	4	0
Mfg.	5	0.165531461
Wholesale	6	0
Retail	7	0
Transportn.	8	1.14218E-06
Inform.	9	0.005652002
Fin. & Ins.	10	0.000116913
Pro. Ser.	11	0.107629074
Edu. $ HC	12	0
Arts & Ent.	13	0.004746578
Other Ser.	14	1.5676E-05
Govt.	15	0.101393497
Scrap	S002	0.001155338

RESULTS OF ONE-SAMPLE T-TEST: HO: $M_{GROWTH} = 0$

Mean Growth	Std. Error	t	Sig. (2-tailed)
0.2421	0.1290	1.877	>.09

Note: Growth rate was computed using the following equation:

$$\text{Growth Rate} = \ln\frac{a_{i,16\ 2007}}{a_{i,16\ 1998}} \times \frac{1}{10}$$

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
LaSalle				
Expected Value	1644.82	4.09851	3.55849	1652.48
Lower CI	1588.84	4.01343	3.48882	1596.33
Upper CI	1652.45	4.11856	3.57029	1660.14
Crawford				
Expected value	1647.33	.45	.63	1648.50
Lower CI	1581.27	.44	.62	1592.42
Upper CI	1654.97	.45	.64	1656.06
Adams				
Expected Value	1127.17	2.70843	2.37661	1132.25
Lower CI	1088.81	2.65221	2.33008	1093.79
Upper CI	1132.4	2.72168	2.38449	1137.51
Ogle				
Expected Value	972.427	1.29362	1.23584	974.96
Lower CI	939.33	1.26676	1.21164	941.81
Upper CI	976.934	1.29994	1.23993	979.47
Stephenson				
Expected value	800.548	1.48902	1.41569	803.45
Lower CI	773.301	1.45811	1.38797	776.15
Upper CI	804.258	1.4963	1.42038	807.17
Whiteside				
Expected value	760.245	1.65103	1.63922	763.53
Lower CI	734.37	1.61676	1.60713	737.59
Upper CI	763.769	1.65911	1.64465	767.07
Marion				
Expected value	698.46	1.08	1.02	700.56
Lower CI	674.69	1.06	1.00	676.75
Upper CI	701.70	1.08	1.02	703.81
Jefferson				
Expected value	686.07	1.39	1.44	688.91
Lower CI	662.71	1.37	1.42	655.50
Upper CI	689.25	1.4	1.45	692.1
Livingston				
Expected value	654.242	1.21818	1.10994	656.57
Lower CI	631.975	1.19289	1.08821	634.26
Upper CI	657.275	1.22413	1.11362	659.61
Williamson				
Expected value	641.879	2.40667	2.37147	646.66
Lower CI	620.033	2.35671	2.32504	624.71
Upper CI	644.855	2.41844	2.37933	649.65
Effingham				

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
Expected value	640.043	2.28176	1.42082	643.75
Lower CI	618.259	2.23439	1.39301	621.89
Upper CI	643.009	2.29292	1.42554	646.73
Coles				
Expected value	618.03	1.95	1.62	621.65
Lower CI	597.02	1.91	1.51	600.54
Upper CI	620.9	1.96	1.63	624.53
Lee				
Expected Value	616.624	1.0067	0.860717	618.49
Lower CI	595.637	0.985797	0.843867	597.47
Upper CI	619.482	1.01162	0.863571	621.36
Morgan				
Expected Value	465.055	1.40369	1.42339	467.88
Lower CI	449.227	1.37455	1.39553	452.00
Upper CI	467.211	1.41055	1.42811	470.05
Jackson				
Expected value	455.977	2.63052	2.09398	460.70
Lower CI	440.458	2.57591	2.05299	445.09
Upper CI	458.091	2.64339	2.10093	462.83
Cass				
Expected value	443.191	0.265896	0.385396	443.84
Lower CI	428.107	0.260376	0.377851	428.75
Upper CI	445.245	0.267197	0.386674	445.90
Knox				
Expected value	438.811	2.02947	1.17417	442.20
Lower CI	423.876	1.98734	1.15119	427.01
Upper CI	440.845	2.0394	1.17807	444.06
Douglas				
Expected value	429.45	0.633204	0.55497	430.64
Lower CI	414.834	0.620059	0.544105	416.00
Upper CI	431.441	0.636302	0.55681	432.63
Bureau				
Expected value	419.454	1.05245	0.791346	421.30
Lower CI	405.178	1.03061	0.775854	406.98
Upper CI	421.398	1.0576	0.79397	423.25
Randolph				
Expected value	383.178	0.670306	1.24354	385.09
Lower CI	370.136	0.656391	1.2192	372.01
Upper CI	384.954	0.673585	1.24767	383.87
Christian				
Expected value	360.254	0.797689	1.09195	362.14
Lower CI	347.992	0.781129	1.07058	349.84

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
Upper CI	361.923	0.801591	1.09558	363.82
Warren				
Expected value	328.145	0.587445	0.470183	329.20
Lower CI	316.977	0.57525	0.460978	318.01
Upper CI	329.666	0.590319	0.471742	330.73
Jo Davis				
Expected value	292.011	1.07595	0.706559	293.79
Lower CI	282.072	1.05362	0.692727	283.82
Upper CI	293.364	1.08122	0.708902	295.15
Clay				
Expected value	275.586	0.243635	0.560108	276.39
Lower CI	266.206	0.238578	0.549143	266.99
Upper CI	276.863	0.244827	0.561966	277.67
Montgomery				
Expected value	269.969	0.803873	0.914672	271.69
Lower CI	260.781	0.787185	0.896766	262.46
Upper CI	271.221	0.807805	0.917705	272.95
McDonough				
Expected value	262.375	1.165	0.981474	264.52
Lower CI	253.445	1.14081	0.962261	255.55
Upper CI	263.591	1.1707	0.984729	265.75
Logan				
Expected value	260.009	0.969594	0.778499	261.76
Lower CI	251.159	0.949466	0.763259	252.87
Upper CI	261.214	0.974337	0.781081	262.97
Washington				
Expected value	260.009	0.377202	0.323732	260.71
Lower CI	251.159	0.369371	0.317395	251.85
Upper CI	261.214	0.379047	0.324806	261.92
Iroquois				
Expected value	252.803	0.707408	0.891548	254.40
Lower CI	244.199	0.692723	0.874095	245.77
Upper CI	253.974	0.710868	0.894505	255.58
Edgar				
Expected value	238.709	0.427908	0.459905	239.60
Lower CI	230.585	0.419024	0.450902	231.46
Upper CI	239.815	0.430001	0.461431	240.71
Edwards				
Expected value	210.275	0.112542	0.238945	210.63
Lower CI	203.118	0.110206	0.234268	203.46
Upper CI	211.249	0.113093	0.239738	211.60
Lawrence				

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
Expected value	206.177	0.310418	0.452197	206.94
Lower CI	199.16	0.303974	0.443345	199.91
Upper CI	207.133	0.311937	0.453697	207.90
Carroll				
Expected value	197.7	0.396989	0.490737	198.59
Lower CI	190.971	0.388748	0.48113	191.84
Upper CI	198.616	0.398931	0.492364	199.51
Franklin				
Expected value	192.472	0.969594	1.05855	194.50
Lower CI	185.921	0.949466	1.03783	187.91
Upper CI	193.364	0.974337	1.06206	195.40
Perry				
Expected value	188.763	0.524372	0.757945	190.04
Lower CI	182.339	0.513487	0.743107	183.60
Upper CI	189.638	0.526937	0.760458	190.92
Shelby				
Expected value	182.511	0.447695	0.501014	183.46
Lower CI	176.299	0.438401	0.491206	177.23
Upper CI	183.357	0.449885	0.502676	184.31
Fayette				
Expected value	180.215	0.617127	0.668019	181.50
Lower CI	174.081	0.604316	0.654942	175.34
Upper CI	181.05	0.620146	0.670234	182.34
Clark				
Expected value	174.952	0.466246	0.488168	175.91
Lower CI	168.998	0.456567	0.478611	169.93
Upper CI	175.763	0.468527	0.489787	176.72
Moultrie				
Expected value	173.857	0.301761	0.308316	174.47
Lower CI	167.94	0.295497	0.302281	168.54
Upper CI	174.663	0.303238	0.309339	175.28
Richland				
Expected value	171.596	0.434091	0.436782	172.47
Lower CI	165.756	0.42508	0.428231	166.61
Upper CI	172.392	0.436215	0.43823	173.27
Wayne				
Expected value	170.855	0.304235	0.62691	171.79
Lower CI	165.04	0.297919	0.614638	165.95
Upper CI	171.647	0.305723	0.628989	172.58
Saline				
Expected value	162.4479	0.74327	0.52413	163.71
Lower CI	156.9189	0.72784	0.51387	158.16

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
Upper CI	163.20086	0.74690	0.52587	164.47
Putnam				
Expected value	158.351	0.0779138	0.205544	158.63
Lower CI	152.961	0.0762964	0.201521	153.24
Upper CI	159.084	0.0782949	0.206226	159.37
Fulton				
Expected value	152.416	0.765534	1.15876	154.34
Lower CI	147.229	0.749642	1.13607	149.11
Upper CI	153.123	0.769279	1.1626	155.05
Massac				
Expected value	146.906	0.580025	0.534415	148.02
Lower CI	141.906	0.567984	0.523953	142.00
Upper CI	147.587	0.582862	0.536187	148.71
Dewitt				
Expected value	140.089	0.416777	0.608925	141.11
Lower CI	135.321	0.408125	0.597005	136.33
Upper CI	140.738	0.418816	0.610944	141.77
Hancock				
Expected value	103.565	0.364834	0.596078	104.53
Lower CI	100.041	0.357261	0.58441	100.98
Upper CI	104.045	0.366619	0.598055	105.01
White				
Expected value	103.565	0.529	0.380257	104.47
Lower CI	100.041	0.518331	0.372813	100.93
Upper CI	104.045	0.531908	0.381518	104.96
Union				
Expected value	96.0417	0.358651	0.619202	97.02
Lower CI	92.7729	0.351205	0.607081	93.73
Upper CI	96.4869	0.360405	0.621256	97.47
Pike				
Expected value	91.8384	0.452642	0.518999	92.81
Lower CI	88.7126	0.443246	0.508839	89.66
Upper CI	92.264	0.454856	0.520721	93.24
Brown				
Expected value	88.6593	0.117489	0.290331	89.07
Lower CI	85.6418	0.11505	0.284648	86.04
Upper CI	89.0703	0.118064	0.291294	89.48
Cumberland				
Expected value	88.4474	0.222611	0.316024	88.99
Lower CI	85.4371	0.21799	0.309838	85.96
Upper CI	88.8574	0.2237	0.317072	89.40
Greene				

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
Expected value	76.6144	0.178089	0.274915	77.07
Lower CI	74.0068	0.174392	0.269534	74.45
Upper CI	76.9695	0.17896	0.275827	77.42
Mason				
Expected value	73.8946	0.387096	0.287762	74.57
Lower CI	71.3795	0.37906	0.28212	72.04
Upper CI	74.2371	0.388989	0.28871	74.91
Wabash				
Expected value	73.2234	0.322786	0.362272	73.91
Lower CI	70.7312	0.316085	0.35518	71.40
Upper CI	73.5628	0.324365	0.363473	74.25
Jasper				
Expected value	63.9689	0.247345	0.359703	64.57
Lower CI	61.7917	0.242211	0.352661	62.39
Upper CI	64.2654	0.248555	0.360895	64.87
Schulyer				
Expected value	59.483	0.180562	0.205544	59.87
Lower CI	57.4585	0.176814	0.201521	57.84
Upper CI	59.7587	0.181445	0.206226	60.15
Gallatin				
Expected value	56.1274	0.110069	0.174713	56.41
Lower CI	54.217	0.107784	0.171292	54.50
Upper CI	56.3875	0.110607	0.175292	56.67
Pulaski				
Expected value	47.3321	0.505821	0.277485	48.11
Lower CI	45.7211	0.495321	0.272053	46.49
Upper CI	47.5515	0.508296	0.278405	48.34
Johnson				
Expected value	40.2323	0.176852	0.241515	40.65
Lower CI	38.8629	0.173181	0.236787	39.27
Upper CI	40.4187	0.177717	0.242315	40.84
Hamilton				
Expected value	40.1263	0.12862	0.267208	40.52
Lower CI	38.7606	0.12595	0.261977	39.15
Upper CI	40.3123	0.129249	0.268094	40.71
Henderson				
Expected value	40.0557	0.162011	0.285193	40.50
Lower CI	38.6923	0.158648	0.27961	39.13
Upper CI	40.2413	0.162804	0.286139	40.69
Alexander				
Expected value	39.7377	0.0618363	0.339148	40.13
Lower CI	38.3853	0.0605527	0.332509	38.78

Appendix 5 **Economic Impact Of Scrap Usage: 66 Nonmetropolitan Counties Ranked By Size Of Impact**				
County	Sectors That Account For Most Of The Impact			Total Impact
	Mfg	Information	Fin & Ins	
Upper CI	39.9219	0.0621388	0.340273	40.32
Hardin				
Expected value	27.4809	0.0346284	0.22096	27.74
Lower CI	26.5455	0.0339095	0.216635	26.80
Upper CI	27.6082	0.0347977	0.221693	27.86
Scott				
Expected value	26.8097	0.0704934	0.084787	26.96
Lower CI	25.8973	0.06903	0.0831272	26.05
Upper CI	26.934	0.0708383	0.0850682	27.09
Pope				
Expected value	12.4688	0.0173142	0.179851	12.67
Lower CI	12.0444	0.0169547	0.17633	12.24
Upper CI	12.5266	0.0173989	0.180448	12.72

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Adams					
Manufacturing	1127.17	5,510	0.204568	4,406	901.3269
Information	2.70843	1,131	0.002395	707	1.693068
Fin. & Ins	2.37661	1,999	0.001189	2,977	3.539354
Alexander					
Manufacturing	39.7377	167	0.23795	132	31.40944
Information	0.0618363	18	0.003435	23	0.079013
Fin. & Ins	0.339148	77	0.004405	110	0.484497
Brown					
Manufacturing	88.6593	10	8.86593	16	141.8549
Information	0.117489	10	0.011749	10	0.117489
Fin. & Ins	0.290331	95	0.003056	100	0.305612
Bureau					
Manufacturing	419.454	2,191	0.191444	1,631	312.2453
Information	1.05245	116	0.009073	127	1.152251
Fin. & Ins	0.791346	778	0.001017	808	0.821861
Carroll					
Manufacturing	197.7	932	0.212124	659	139.79
Information	0.396989	49	0.008102	46	0.372684
Fin. & Ins	0.490737	396	0.001239	477	0.591115
Cass					
Manufacturing	443.191	2,190	0.20237	2,317	468.892

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Information	0.265896	78	0.003409	129	0.439751
Fin. & Ins	0.385396	377	0.001022	456	0.466155
Christian					
Manufacturing	360.254	1,844	0.195366	1,975	385.8469
Information	0.797689	188	0.004243	266	1.128645
Fin. & Ins	1.09195	774	0.001411	814	1.148382
Clark					
Manufacturing	174.952	1,566	0.111719	1,211	135.2917
Information	0.466246	61	0.007643	56	0.428029
Fin. & Ins	0.488168	318	0.001535	406	0.623259
Clay					
Manufacturing	275.586	2,221	0.124082	1,403	174.087
Information	0.243635	93	0.00262	107	0.280311
Fin. & Ins	0.560108	291	0.001925	355	0.683293
Coles					
Manufacturing	618.037	2,703	0.228649	2,727	623.5246
Information	1.95403	2,305	0.000848	539	0.456929
Fin. & Ins	1.62637	1,045	0.001556	1,216	1.892503
Crawford					
Manufacturing	1647.33	2,312	0.712513	1,783	1270.411
Information	0.451405	72	0.00627	69	0.432596
Fin. & Ins	0.634618	367	0.001729	400	0.691682
Cumberland					
Manufacturing	88.4474	398	0.22223	427	94.89206
Information	0.222611	11	0.020237	10	0.202374
Fin. & Ins	0.316024	191	0.001655	349	0.577447
De Witt					
Manufacturing	140.089	666	0.210344	525	110.4305
Information	0.416777	62	0.006722	33	0.221833
Fin. & Ins	0.608925	322	0.001891	385	0.728063
Douglas					
Manufacturing	429.45	3,628	0.118371	2,145	253.9058
Information	0.633204	82	0.007722	90	0.69498
Fin. & Ins	0.55497	408	0.00136	548	0.745401
Edgar					
Manufacturing	238.709	1,591	0.150037	1,670	250.5619
Information	0.427908	97	0.004411	88	0.388205
Fin. & Ins	0.459905	472	0.000974	660	0.643088
Edwards					
Manufacturing	210.275	1,906	0.110323	1,137	2167122

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Information	0.112542	24	0.004689	31	744
Fin. & Ins	0.238945	157	0.001522	210	32970
Effingham					
Manufacturing	640.043	4,035	0.158623	3,152	499.9791
Information	2.28176	1,443	0.001581	341	.53921
Fin. & Ins	1.42082	867	0.001639	1,083	1.774796
Fayette					
Manufacturing	180.215	1,077	0.167331	576	620352
Information	0.617127	99	0.006234	84	8316
Fin. & Ins	0.668019	297	0.002249	358	106326
Franklin					
Manufacturing	192.472	1,519	0.12671	745	94.39871
Information	0.969594	263	0.003687	356	1.312454
Fin. & Ins	1.05855	416	0.002545	555	1.412248
Fulton					
Manufacturing	152.416	285	0.534793	334	178.6209
Information	0.765534	189	0.00405	166	0.672374
Fin. & Ins	1.15876	517	0.002241	635	1.423235
Gallatin					
Manufacturing	56.1274	71	0.790527	16	12.64843
Information	0.110069	46	0.002393	53	0.126819
Fin. & Ins	0.174713	59	0.002961	61	0.180635
Greene					
Manufacturing	76.6144	271	0.28271	248	70.11207
Information	0.178089	37	0.004813	27	0.129957
Fin. & Ins	0.274915	330	0.000833	318	0.264918
Hamilton					
Manufacturing	40.1263	98	0.409452	106	43.40192
Information	0.12862	36	0.003573	28	0.100038
Fin. & Ins	0.267208	292	0.000915	135	0.123538
Hancock					
Manufacturing	103.565	1,806	0.057345	704	40.37085
Information	0.364834	78	0.004677	60	0.280642
Fin. & Ins	0.596078	456	0.001307	538	0.703267
Hardin					
Manufacturing	27.4809	53	0.518508	43	22.29582
Information	0.0346284	10	0.003463	16	0.055405
Fin. & Ins	0.22096	59	0.003745	84	0.314587
Henderson					
Manufacturing	40.0557	36	1.112658	20	22.25317

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Information	0.162011	15	0.010801	10	0.108007
Fin. & Ins	0.285193	179	0.001593	249	0.396721
Iroquois					
Manufacturing	252.803	1,038	0.243548	747	181.9305
Information	0.707408	138	0.005126	156	0.799679
Fin. & Ins	0.891548	804	0.001109	948	1.051228
Jackson					
Manufacturing	455.977	1,273	0.358191	934	334.5503
Information	2.63052	533	0.004935	529	2.610779
Fin. & Ins	2.09398	1,061	0.001974	1,234	2.435411
Jasper					
Manufacturing	63.9689	328	0.195027	168	32.76456
Information	0.247345	112	0.002208	75	0.165633
Fin. & Ins	0.359703	148	0.00243	165	0.40102
Jefferson					
Manufacturing	686.07	2,764	0.248216	2,670	662.7377
Information	1.39	444	0.003131	224	0.701261
Fin. & Ins	1.44	1,057	0.001362	1,239	1.687947
Jo Davies					
Manufacturing	292.011	1,924	0.151773	1,317	199.8849
Information	1.07595	70	0.015371	94	1.444847
Fin. & Ins	0.706559	513	0.001377	645	0.888364
Johnson					
Manufacturing	40.2323	64	0.62863	70	44.00408
Information	0.176852	16	0.011053	32	0.353704
Fin. & Ins	0.241515	211	0.001145	246	0.281577
Knox					
Manufacturing	438.811	4,043	0.108536	987	107.125
Information	2.02947	405	0.005011	704	3.52777
Fin. & Ins	1.17417	904	0.001299	1,178	1.530058
La Salle					
Manufacturing	1644.82	6,167	0.266713	5,459	1455.987
Information	4.09851	873	0.004695	813	3.816825
Fin. & Ins	3.55849	2,426	0.001467	2,462	3.611295
Lawrence					
Manufacturing	206.177	675	0.305447	516	157.6109
Information	0.310418	72	0.004311	43	0.185389
Fin. & Ins	0.452197	600	0.000754	503	0.379092
Lee					
Manufacturing	616.624	2,771	0.222528	2,135	475.0964

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Information	1.0067	94	0.01071	145	1.552888
Fin. & Ins	0.860717	579	0.001487	591	0.878556
Livingston					
Manufacturing	654.242	3,158	0.20717	2,289	474.2115
Information	1.21818	1,673	0.000728	1,153	0.839547
Fin. & Ins	1.10994	871	0.001274	1,149	1.464203
Logan					
Manufacturing	260.009	1,608	0.161697	912	147.4678
Information	0.969594	100	0.009696	99	0.959898
Fin. & Ins	0.778499	587	0.001326	645	0.855421
Marion					
Manufacturing	698.466	3,465	0.201577	1,918	386.6256
Information	1.08337	275	0.00394	242	0.953366
Fin. & Ins	1.02001	544	0.001875	420	0.787508
Mason					
Manufacturing	73.8946	460	0.16064	212	34.05577
Information	0.387096	85	0.004554	57	0.259582
Fin. & Ins	0.287762	332	0.000867	375	0.325032
Massac					
Manufacturing	146.906	632	0.232446	341	215512
Information	0.580025	38	0.015264	31	1178
Fin. & Ins	0.534415	280	0.001909	212	59360
McDonough					
Manufacturing	262.375	1,522	0.172388	1,294	223.0705
Information	1.165	359	0.003245	201	0.65227
Fin. & Ins	0.981474	667	0.001471	674	0.991774
Montgomery					
Manufacturing	269.969	1,340	0.201469	623	125.5154
Information	0.803873	149	0.005395	153	0.825453
Fin. & Ins	0.914672	667	0.001371	789	1.081973
Morgan					
Manufacturing	465.055	3,420	0.135981	2,042	277.6732
Information	1.40369	238	0.005898	244	1.439077
Fin. & Ins	1.42339	985	0.001445	1,212	1.75142
Moultrie					
Manufacturing	1,640	1,022	0.170114	1,640	278.9877
Information	76	47	0.00642	76	0.487954
Fin. & Ins	315	257	0.0012	315	0.377897
Ogle					
Manufacturing	972.427	5,076	0.191573	3,350	641.7712

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Information	1.29362	249	0.005195	159	0.826047
Fin. & Ins	1.23584	1,003	0.001232	1,521	1.87409
Perry					
Manufacturing	188.763	1,636	0.115381	433	49.95989
Information	0.524372	133	0.003943	153	0.603225
Fin. & Ins	0.757945	341	0.002223	357	0.793508
Pike					
Manufacturing	91.8384	200	0.459192	149	68.41961
Information	0.452642	65	0.006964	82	0.571025
Fin. & Ins	0.518999	377	0.001377	481	0.662171
Pope					
Manufacturing	12.4688	10	1.24688	59	73.56592
Information	0.0173142	10	0.001731	10	0.017314
Fin. & Ins	0.179851	21	0.008564	30	0.25693
Pulaski					
Manufacturing	47.3321	134	0.353225	169	59.69496
Information	0.505821	10	0.050582	10	0.505821
Fin. & Ins	0.277485	78	0.003558	125	0.444688
Putnam					
Manufacturing	158.351	401	0.39489	614	242.4626
Information	0.0779138	13	0.005993	19	0.113874
Fin. & Ins	0.205544	66	0.003114	115	0.358145
Randolph					
Manufacturing	383.178	3,436	0.111519	3,250	362.4355
Information	0.670306	100	0.006703	69	0.462511
Fin. & Ins	1.24354	479	0.002596	544	1.412288
Richland					
Manufacturing	171.596	1,110	0.154591	587	90.74491
Information	0.434091	89	0.004877	96	0.468233
Fin. & Ins	0.436782	505	0.000865	578	0.499921
Saline					
Manufacturing	162.4479	513	0.316663	423	133.9483
Information	0.74327	117	0.006353	122	0.775034
Fin. & Ins	0.52413	516	0.001016	564	0.572886
Schulyer					
Manufacturing	59.483	134	0.443903	149	66.14154
Information	0.180562	32	0.005643	17	0.095924
Fin. & Ins	0.205544	135	0.001523	169	0.257311
Scott					
Manufacturing	26.8097	44	0.609311	95	57.88458

Appendix 6: Determination Of 2012 Market Potential					
County And Sector	2007 Impact ($Mil)	2007 Employment	Impact Per Employee	2012 Employment	2012 Estimated Impact ($Mil)
Information	0.0704934	10	0.007049	11	0.077543
Fin. & Ins	0.084787	72	0.001178	107	0.126003
Shelby					
Manufacturing	182.511	1,335	0.136712	931	127.2792
Information	0.447695	32	0.01399	26	0.363752
Fin. & Ins	0.501014	373	0.001343	415	0.557428
Stephenson					
Manufacturing	800.548	5,847	0.136916	3,778	517.2687
Information	1.48902	201	0.007408	221	1.637181
Fin. & Ins	1.41569	2,189	0.000647	2,155	1.393701
Union					
Manufacturing	96.0417	615	0.156165	280	43.7263
Information	0.358651	29	0.012367	31	0.383386
Fin. & Ins	0.619202	270	0.002293	276	0.632962
Wabash					
Manufacturing	73.2234	564	0.129829	217	122388
Information	0.322786	42	0.007685	40	1680
Fin. & Ins	0.362272	235	0.001542	244	57340
Warren					
Manufacturing	328.145	1,689	0.194284	1,745	339.0249
Information	0.587445	94	0.006249	50	0.312471
Fin. & Ins	0.470183	327	0.001438	364	0.523384
Washington					
Manufacturing	260.009	1,583	0.164251	959	157.5165
Information	0.377202	42	0.008981	32	0.287392
Fin. & Ins	0.323732	398	0.000813	453	0.368469
Wayne					
Manufacturing	170.855	1,117	0.152959	700	107.0712
Information	0.304235	63	0.004829	67	0.323552
Fin. & Ins	0.62691	217	0.002889	171	0.494017
Whiteside					
Manufacturing	641.879	5,143	0.124806	2,719	339.3484
Information	2.40667	356	0.00676	261	1.764441
Fin. & Ins	2.37147	1,041	0.002278	1,081	2.462593
Williamson					
Manufacturing	641.879	3,034	0.211562	2,093	442.7992
Information	2.40667	542	0.00444	648	2.877347
Fin. & Ins	2.37147	2,005	0.001183	2,519	2.979418

ACTIVE ENGAGEMENT TO ACTIVE DISENGAGEMENT: A PROPOSED MODEL

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ABSTRACT

This article explorers the nature of workplace engagement. Specifically, we note that the extant engagement literature does not fully capture the dynamic range of behavioral, cognitive, and psychological complexities encompassing disengagement. Existing research describes active engagement, engagement, and then defines disengagement as the absence of engagement. Deviant behaviors are also well established but not viewed as part of the engagement domain. We found a range of behaviors in the gap between disengagement and deviant behavior that when included with deviant behavior, constitute what we have termed active disengagement. We employed qualitative survey research methods utilizing open-ended questions to produce evidence supporting the following continuum: 1) Active Engagement, 2) Engagement, 3) Disengagement, and 4) Active Disengagement.

LITERATURE REVIEW

The notion that workers assume various roles in the workplace has been extensively discussed and explored in the academic literature (e.g., Blauner, 1964; Graen, 1976; 1990, 1992; Katz & Kahn, 1978; Macey & Schneider, 2001; Merton, 1968), and to date, much of this discussion has been focused on the extent to which workers apply themselves to the particular requirements and expectations of their job roles. The extent and presence of the application of an individual to job-related tasks and roles has been debated (Kahn, 1990, 1992; Macey & Schneider, 2001), and in some cases disputed (Dalal, Brummel, Wee & Thomas, 2008). Kahn (1990), in particular, spoke of the lack of contextual (e.g., Brief & Motowidlo, 1986; Motowidlo, Borman, & Schmit, 1997; Motowidlo & Van Scotter, 1994) and emotional considerations in existing research in terms of the evaluation of employee involvement. Numerous research efforts have explored the motivational factors surrounding job involvement (Hackman, 1969; Herzberg, Mausner & Schneider, 2001; Maslow, 1950; Vroom1995), as well as the psychological (Kahn, 1990, 1992; Katz & Kahn, 1978), emotional (Hochschild, 1979, 2003; Maslach, 2003; Maslach, Schaufeli & Leiter, 2001) and extended role-involvement relationships (Dalal, 2005; Grant, 2007; Lee & Allen, 2000; Organ, 1988; Smith, Organ & Near, 1983).

Parallel to the discussion of roles, a discussion has emerged which addresses the importance, different types, and various levels of employee engagement (Kahn, 1990, 1992;

Macey & Schneider, 2008; Pfeffer, 2007), perhaps in part, due to the recent articles in the popular press (Baron, 2005; Gallup, 2001; Krueger & Killham, 2005, 2006). Macey and Schneider (2001) emphasized that with the exception of Kahn's work in the early nineties (1990, 1992) serious treatment of the concept of *employee engagement* is a recent development in the academic literature; and similar to the discussions in the popular press of many early constructs, a lack of a clear definition of employee engagement has hindered its discussion. Kahn (1990) defined the concepts of *personal engagement* and *personal disengagement* to clarify the varying degrees to which people choose to present or absent themselves within the context of self-in-role activities.

Dvir, Eden, Avolio, and Shamir (2002) defined *active engagement* as "the energy invested in the follower role as expressed by high levels of activity, initiative, and responsibility" (p. 737). This definition is derived from the leadership literature (e.g., Barnard; 1938), thus the emphasis on the observed task performance of those in follower roles as it highlights extended levels of activity and responsibility but still defines the follower in terms of *role* follower (Katz & Kahn, 1978). This notion resembles the construct of organizational citizenship behavior as described and developed in the early industrial and organizational psychology research by Smith, Organ and Near (1983) with one key difference: organizational citizenship behaviors focus on the exchanges occurring between the individual and the larger organization. Organ (1988, 1990) explains behavior by focusing on the relationship between the individual and the organization. Engagement then could be described in terms of roles assumed (Kahn, 1990) within an organizational setting, or it could be described in terms of relationships between organizations and individuals (Smith, Organ & Near, 1983). Warren Bennis notes in the foreword of the reprint of *Eupsychian Management* (Maslow, 1998) that Abraham Maslow's conceptualization of synergy, in an organization setting, as the resolution of the dichotomy between organizational interests and individual interests is a profound idea. We note that it is yet another articulation of the idea that there exists a relationship between the individual and the organization.

Engaged employees make greater and more-positive contributions to the success of an organization. Rich, Lepine, and Crawford (2010), drawing upon Kahn's (1990) discussion of personal engagement, emphasized the importance of actively engaged employees in the process of creating competitive advantage in knowledge-based organizations.

Employee engagement clearly now exists in the academic literature, but employee disengagement appears to have received little attention beyond an overall general notion that it represents the absence and withdrawal of an individual from in-role activities, as well as the adaptation of a defensive or protective posture (Gallup, 2001; Kahn, 1990, 1992; Krueger & Killham, 2005, 2006; Macey & Schneider, 2008; Maslach, 2003; Maslach, Schaufeli & Leiter, 2001; Pfeffer, 2007; Rich, Lepine & Crawford, 2010). Building upon Kahn's (1990) definitions of personal engagement and personal disengagement, this paper argues that disengagement is a construct that consists of more than an absence of "self" during the performance of work related roles. Just as Dvir, Eden, Avolio, and Shamir (2002) noted that active engagement is a form of

highly-invested personal energy that allows a worker to perform at higher-than-normal levels of activity and responsibility, this paper proposes that there also exists an equally opposing psychological state of disengagement – *active disengagement*. Further expanding upon Kahn's (1990) definition of personal disengagement, active disengagement will be extended to include not only the absence and defense of an individual's preferred self in terms of the execution of work-related roles, but also the reinvestment of energies into role-avoidance behaviors, as well as the adoption of negative in-role and negative extra-role behaviors that may result in harmful consequences for both the employee and the organization. Given these elements, active disengagement can be defined as a psychological state---including varying degrees of physical, cognitive, and psychological engagement---in which an individual actively and selectively invests time and energy in activities that extend beyond the simple withdrawal of self that has been previously described in the literature, but also includes the willing avoidance of expected in-role behaviors with the potential for extended participation in negative extra-role behaviors that might lead to harmful results for an organization. Unnecessary performance of in-role tasks may also be another manifestation of active disengagement. Active as a modifier to engagement implies extra-role performance. We extend that logic to disengagement and define active disengagement as the performance of extra role tasks but with negative consequences for the organization. Engagement and disengagement would then be limited to in-role task performance. We have now modified the notion that all in-role and extra-role task performance is good for the organization; given an actively disengaged employee, any form of task performance could have negative outcomes for the organization. We assert that given an actively disengaged employee, there will be a dark side to the theory of roles.

PROPOSED MODEL

The continuum of engaged behaviors includes Active Engagement (AE), Engagement (E), Disengagement (DE), and Active Disengagement (ADE). Figure 1 below illustrates this proposed continuum.

Figure 1: Engagement Continuum

Active Engagement (AE)	Engagement (E)	Disengagement (DE)	Active Disengagement (ADE)
High pos. in-role	Pos. in-role	Neg. in-role	Neg. in-role, or
High pos. extra-role			Neg. extra-role
High organizational commitment (OC)		Withdrawal	Low organizational commitment (OC)
High OCB (contextual performance) May be in- or extra-role			High anti-organizational behavior (AOB) May be in-role or extra-role

Active Engagement

We define active engagement as a psychological state in which an individual exhibits all of the qualities of high positive in-role performance, as well as the qualities and behaviors typically associated with organizational citizenship behaviors and organizational commitment. Our review of the extant literature yielded only one definition (Dvir, Eden, Avolio, & Shamir, 2002) where active engagement was described in terms of the energy invested and behaviors observed in relation to a particular situation and moment in time. This description of energy invested in a moment in time closely resembles Kahn's (1990) definition of personal engagement, but as also previously mentioned, goes on to include extended behaviors more closely associated with descriptions of organizational commitment behaviors and behaviors reflective of high levels of organizational commitment.

Engagement

Macey and Schneider (2008) suggested that references to employee engagement are a recent phenomenon in the literature and attempted to delineate a somewhat inclusive list of concepts encompassing engagement as a construct that can be defined in terms of psychological states, traits, or behaviors. Kahn (1990) defined personal engagement as "the simultaneous employment and expression of a person's 'preferred self' in task behaviors that promote connections to work and to others, personal presence (physical, cognitive, and emotional), and active full role performances" (p. 700). This definition encompasses the attributes of both a psychological state and task behaviors and for the purpose of the current research, we agree with Kahn's description and define employee engagement in terms of high in-role performances that encompass positive physical, cognitive, and emotional energies in a manner that contributes to the effective and efficient performance of organizational operations. While this definition of engagement may include elements of higher than normal effort and involvement (e.g., Hackman & Oldham, 1980; Lawler & Hall, 1970), we therefore conclude that any extra- or extended-role activities would be indicative of behaviors more closely related to *active engagement*.

Disengagement

Kahn (1990) defined personal disengagement as the "simultaneous withdrawal and defense of a person's preferred self in behaviors that promote a lack of connections, physical, cognitive, and emotional absence, and passive, incomplete role performance" (p. 701). It is the description of disengagement as an "absence of self" that led to the initial questions being pursued in the current research. We agree with Kahn's assertion that disengagement promotes an overall lack of connection that further leads to an absence of physical, cognitive, and emotional self, and we particularly agree that the process of personally disengaging displays an evacuation

or suppression of energies typically observed during in-role performance (Kahn 1990, p. 701). For our purposes, a disengaged employee exhibits low in-role activities combined with a sense of withdrawal and/or a sense of "just getting by."

Active Disengagement

We consider active disengagement to be a psychological state where employees selectively and actively choose to uncouple (using Kahn's 1990 terminology) their selves from their work roles in ways that, when unnoticed and unchecked, lead to destructive behaviors acted out against the organization. Just as organizational commitment behaviors involve the noticeable and concerted channeling of energies into behaviors that go well-beyond in-role task and job performance (Dalal, 2005; Lee & Allen, 2000; Organ, 1988, 1990), we argue that there is an equally opposite set of negative extra-role energies and behaviors that manifest themselves in the form of anti-organizational behaviors. It is the presence of anti-organizational behaviors that we define as the essential indicator of active disengagement.

Rich, Lepine, and Crawford (2010) expressed their belief that a positive relationship does exist between job performance and job engagement and that "employees who are highly engaged in their work roles not only focus their physical effort on the pursuit of role-related goals, but are highly vigilant and emotionally connected to the endeavor" (p. 619). They go on to state that "employees who are highly disengaged in their work roles withhold their physical, cognitive, and emotional energies, and this is reflected in task activity that is, at best, robotic, passive, and detached" (p. 619). In a similar fashion, we assert that employees who are not highly engaged in their work roles, but who are highly disengaged in their work roles are likewise not highly vigilant and are either emotionally disengaged or else emotionally engaged in a situation other than work. However, we believe that more than a simple withholding of information is taking place, and that physical, cognitive, and emotional energies are in fact being actively applied in a manner that leads to visible job dissatisfaction, and in some cases, to harmful activities acted out against an organization.

SIMILAR CONTINUUMS

Greenberg's Interpersonal Behavior Continuum

Greenberg (2010) offered a model of interpersonal behaviors ranging from those of working with others to those of working against others. On the high end of working with others, Greenberg includes organizational commitment behaviors, and on the opposite low end of working against others, Greenberg includes deviant behaviors, in our case, behaviors we have referred to as anti-organizational behaviors. The middle of Greenberg's continuum of working with or against occupies an area comprising competition. Around a midpoint of competition,

Greenberg places cooperation on the working-with-others side, and he the places conflict on the working-against-others side. In many ways, this representation appears to support our proposed model of active engagement to active disengagement. Individuals who exhibit high levels of cooperation and pro-social behaviors also tend to reflect similar levels of both active engagement and engagement, while those who exhibit certain levels of conflict and deviant behavior show similar characteristics of disengagement and active disengagement. However, while Greenberg's continuum allows us to consider interactions and willingness to work among individuals, it falls short of helping to fully identify characteristics of engagement, especially those characteristics centered on disengagement and active disengagement.

Yukl's Continuum of Responses to Influence Attempts

Yukl (1994), while discussing the nature of leadership and influence attempts, outlined three distinct outcomes of influence attempts: commitment, compliance, and resistance. Commitment is considered the most desirable outcome to reach and describes a situation where an individual receiving an influence attempt agrees with the decision and makes every attempt to carry out the decision. Compliance describes a situation in which the individual receiving the influence attempt agrees to carry out the action but lacks complete commitment or enthusiasm and typically only exerts minimal effort with an overall feeling of apathy. Resistance indicates a situation in which the individual receiving the influence attempt disagrees with the attempt and offers resistance to the influence attempt or request. As with Greenberg's continuum, Yukl provides us with observations that might lead to insight regarding certain aspects of engagement; however, we again feel that this insight falls short of giving us a complete picture in situations with multiply layered dynamics. For example, Yukl's model fails to fully uncover whether or not a compliant individual is fully engaged or disengaged. We believe that our continuum of active engagement to active disengagement should help to better reflect these subtleties in behavior.

The use of a continuum ranging from active engagement to active disengagement, with the two passive states of engagement and disengagement in between, provides a rich description of the psychological states in which we find workers. For instance, using Yukl's continuum: is the compliant worker actually disengaged from his work, passively performing the minimums to avoid being resistant? Could a passively engaged worker be called committed under Yukl's continuum, our study results suggest yes this is probably true. Don't managers who cry the loudest about workers who aren't committed employ management systems merely designed to achieve compliance? In other words, why would anyone expect commitment when the influence tactic is designed to insure compliance? We think all companies should employ management systems designed to produce an actively engaged workforce. We think the four-stage continuum we propose highlights the irrationality of desiring commitment and hoping for compliance if we don't get commitment. For that matter if the influence attempt doesn't achieve compliance, is

resistance the outcome – only if non-compliance and resistance are the same thing – our continuum makes it clear that these outcomes are not equivalent.

METHODS

Sample and Procedure

The selected method for our first study echoed methods adopted by Kahn (1990) in his analysis of a leading architecture firm. However, rather than collecting interview responses in a particular setting, we elected to develop a survey of open-ended questions that was intended to address the emotional, cognitive, and behavioral aspects of engagement through participant reflections on workplace experiences. A total of 47 responses were collected from randomly selected participants. Respondents ranged in age from 18 to 64 and workplace experience ranged from 3 years to 46 years.

Results and Discussion

Our open-ended survey questions asked the respondents to address their own thinking, feeling, and actions in a variety of workplace contexts. The survey questions are in appendix A. We hope to identify attitudes that conform to the extant literature by verifying the existence of active engagement, engagement, and disengagement. Our principal research question is to verify or fail to verify that there is a form of disengagement that is beyond the passive absence of engagement as currently described in existing scholarly literature. If active disengagement exists, we expected to identify survey responses in this study that verify this contention.

Active Engagement (AE)

Our proposed model for active engagement includes high positive in-role performance, high positive extra-role performance, high organizational commitment, as well as high occurrences of either high in-role or high extra-role and organizational commitment. We first asked respondents to consider and record things they *did* when they wanted to perform at a level that was above and beyond the minimum of job requirements. Many in-role and high in-role performance behaviors have been well documented in the literature (Katz & Kahn, 1978; Smith, Organ, & Near, 1983), and our model provided further evidence for these behaviors. High in-role response examples included: "helped other people do their job;" "would work harder for a longer period of time;" and "volunteered to work in other areas." These examples, while not extending beyond the normal role expectations do illustrate solid examples of high in-role performance behaviors (Katz & Kahn, 1978). High extra-role performance examples included: "went out of my way to learn responsibilities of other employees and help them when I had available time;"

"tried to do things that were not required of me;" and "went out of my way to learn responsibilities of other employees." Organizational citizenship behavior examples included: "staying late when everybody else had gone home;" "worked weekends/overtime to complete extra work;" and "took on challenging assignments when others declined." Once again, as might be expected, these behaviors reflected organizational commitment and high organizational commitment behaviors as expressed in earlier research (Katz & Kahn, 1978; Macey & Schneider, 2008; Smith, Organ, & Near, 1983).

Kahn's (1990) study of personal engagement noted that workers tend to consider three engagement-related questions when approaching work situations: 1) How meaningful is it for me to bring myself into this performance? 2) How safe is it? 3) How available am I to do so? (p. 703). Each of these questions approaches the psychological components of engagement, and like Kahn, we also asked participants to express what they were thinking and feeling while they were going above and beyond the minimum requirements of their normal duties. And once again, our findings supported those of earlier findings (Kahn, 1990; Macey & Schneider, 2008). Examples of participants' thoughts included: "think of ways to help other employees;" "determined and focused;" and "wanted to excel and be more than I was." Kahn (1990) also emphasized the inclusion of the full emotional and psychological self as an important aspect in engagement. We noted that individuals who displayed the previously mentioned characteristics of active engagement also displayed feelings that included: "mostly self-fulfillment;" "hopeful and determined;" and "more challenged."

Engagement (E)

Our definition of engagement included those behaviors that were considered high positive in-role behaviors but did not included the added characteristics of active engagement, such as high positive extra-role behaviors, organizational commitment and organizational citizenship behaviors. Examples of high in-role respondent behaviors included: "was extra thorough with my job duties;" "was very detailed and precise;" and "make out Excel spreadsheets to organize the tasks we needed to complete." These in-role behaviors demonstrate what might be referred to as higher than normal levels of performance, but they lack the extended time and effort typically associated with a worker who might be said to be actively engaged as defined under our proposed model.

Disengagement (DE)

As mentioned earlier, our model expands the traditional definition of disengagement to include low-to-negative in-role performance along with a sense of withdrawal or detachment (Kahn, 1990; Macey & Schneider, 2008). Kahn (1990) particularly noted the uncoupling of the self from in-role activities as one of the key indicators for disengagement. We agree with Kahn's

definition and include this along with low in-role performance, as well as the potential for in-role activities that lead to negative reactions on the part of an individual. As indicated below, these characteristics may overlap with those of active disengagement, but we consider the absence of negative action to be one of the distinguishing factors between disengagement and active disengagement. Example responses of negative things that respondents did when they were dissatisfied at work included: "went back to being an average worker;" "haven't been motivated to do my work;" and "wouldn't work as hard." These behaviors fit well within the expectations of our model in that individuals show signs of withdrawing from some aspects of task performance while not entirely withdrawing from overall in-role performance. In other words, workers modified their in-role activities to fit associated perceptions of dissatisfaction. This seems to fit Yukl's concept of compliance.

Active Disengagement (ADE)

As previously mentioned, the concept of active disengagement is one that has not been previously defined in the literature, and given the scope of our model, our initial research survey attempted to uncover evidence of cognitive, emotional, and behavioral elements of active disengagement, as well as evidence of negative in- and extra-role behaviors that might provide additional consideration for the presence of a state of active disengagement.

At first, we were looking for behaviors that might reflect negative in-role performance, and we asked respondents to consider some of the negative and/or non-productive things they did when they were dissatisfied with their job or employer. A few notable responses that reflected negative in-role performance included: "wasted time in one way or another;" "ignore mistakes I made in my work;" and "worked at a slower pace." Each of these responses reflects a performance context that is not in-role under existing models even though they actually did perform the task (Katz & Kahn, 1978). For example, an individual might be performing within the boundaries of an in-role task, but because of perception of dissatisfaction, the individual might extend deadlines or delay completion of a particular task, thus causing the task to ultimately result in a negative consequence for the organization. Additional evidence of the existence of negative in-role behaviors included: "would procrastinate in my work;" "would be lazy and less productive;" and "made no initiative to do more than my required duties."

The next component of our model for active disengagement considered the presence of negative extra-role behaviors or extra-role behaviors that lead to negative organizational consequences. In part, we approached this part of our model by asking respondents to describe how they avoided being caught when they were acting on expressed behaviors of dissatisfaction. A few examples of negative extra-role behaviors included: "pretended like I was working and doing what I was supposed to by bringing up different pages;" "stayed away from my boss and covered my carelessness;" and "avoided seeing my manager/supervisor as much as possible." In this case, these behaviors became examples of negative extra-role behaviors in that individuals

made an effort to conceal behaviors resulting from a sense of dissatisfaction. A key component of our model included the presence of anti-organizational behaviors, or behaviors that demonstrated a level of activity acting against the organization. In this instance, example of anti-organizational behaviors included: "wasted time when I was running errands;" "work on personal interest/matters;" and "come late and leave early because I didn't want to be there." Additional anti-organizational behaviors of even greater severity were also noted, such as: "would not try to sell the customer the added products;" "looked for another job;" and "misprioritized work." Of particular interest is the fact that the noted anti-organizational behaviors all have the particular potential of losing money for the company. In addition to anti-organizational behaviors, we also noted a sharp negative shift in thoughts and feelings about work and employers that further supported the existence of anti-organizational behaviors.

CONCLUSION

Our current investigation began with the idea that existing scholarly research and models have failed to adequately capture the full spectrum and complexity of the continuum of behaviors that range from active engagement to active disengagement. In particular, we noted that many existing conceptualizations of disengagement simply refer to an absence of and withdrawal of the cognitive, emotional, and physical self in the execution of both in- and extra- role behaviors (Kahn, 1990; Macey & Schneider, 2008). Additionally, we also noted that existing models, derived from both the organizational behavior and leadership literatures (e.g. Greenberg, 2010; Yukl, 1994), while addressing some aspects of interpersonal interactions between individuals, failed to fully address the complex and dynamic synergy of the relationship between the individual and the organization as originally articulated by Maslow (1998).

At this stage in our research, we feel that we have been able to demonstrate that disengagement, while certainly including characteristics of withdrawal and defensiveness, is really a concept that can be divided into two concepts of varying intensity—namely disengagement and active disengagement. As reported, we saw that disengaged employees showed both outward and inward signs of dissatisfaction, but that they did not necessarily act on this dissatisfaction in a way that was detrimental to the employer. However, once an employee acted upon his or her dissatisfaction (and thus demonstrated acts of anti-organizational behavior or even deviant behaviors), we were able to show that these individuals adopted signs of an even higher level of disengagement—active disengagement. Actively disengaged individuals were not merely dissatisfied with their jobs, they acted out their dissatisfaction in ways that went well beyond simple withdrawal and defensiveness (Kahn, 1990; Macey & Schneider, 2008), and they tended to engage in behaviors that ultimately depleted time, effort, earnings, and morale. We noted that professional, trade, and consultant reports (Gallup, 2001; Krueger & Killham, 2006) all mentioned the huge amounts of money lost on the part of disengaged employees, but that to date, scholarly research had not really developed a conceptual framework that could examine the

depth, extent, and severity of what it really means to be disengaged. By defining active disengagement in a manner that positions it as an equally opposite concept to that of active engagement, we believe that we have been able to extend and complete a model that already appeared to be developing in, and emanating from, the existing body of scholarly research.

IMPLICATIONS FOR FUTURE RESEARCH

We found no evidence that workers were stuck in the middle, they either reported disengagement behaviors and attitudes or they reported engagement behaviors and attitudes. Additional research with a very large sample size should be performed to verify that workers are either engaged or they are not and that engagement and disengagement each exists in two states, passive and active.

The extant literature supports the notion that self-managed teams function effectively when actively engaged workers are the team members. It would also be interesting to know if self managed work team failure could be linked to actively disengaged workers.

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ARE MEN ENTITLED TO TITLE VII PROTECTION FROM A SEXUALLY HOSTILE WORK ENVIRONMENT? POLICY AND PRACTICE SUGGESTIONS FOR EMPLOYERS

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ABSTRACT

Are men entitled to Title VII protection from a sexually hostile work environment? The short answer to this question is yes, certainly. While historically, the majority of complaints alleging sexual harassment in the workplace have been initiated by females, since 1992, the percentage of complaints filed by males alleging sexual harassment with the Equal Employment Opportunity Commission (EEOC) has increased from 9.1% to 16.4% in 2010 (EEOC, 2011). The number of complaints filed by males has been increasing over time at the same time as the actual number of complaints received by the EEOC alleging sexual harassment has been declining. The purpose of this paper is to examine the reasons for the increase in complaints by males, recent court cases where males have made allegations of being sexually harassed, and to present policy and practice suggestions that employers can utilize to minimize these types of complaints and reduce their exposure to this type of litigation.

INTRODUCTION

Are men entitled to Title VII protection from a sexually hostile work environment? The short answer to this question is yes, certainly. EEOC guidance on this issue is clear: "The victim as well as the harasser may be either a woman or a man. In addition, the victim does not have to be of the opposite sex" (EEOC-A, 2011). While historically, the majority of complaints alleging sexual harassment in the workplace have been initiated by females, since 1992, the percentage of complaints filed by males has increased from 9.1% to 16.4% in 2010 (EEOC, 2011). The number of complaints filed by males has been increasing over time at the same time as the actual number of complaints received by the EEOC alleging sexual harassment has been declining. As shown in Table 1 since reaching a peak of 15,889 in 1997 the actual number of complaints received by the EEOC and state and local Fair Employment Practices (FEP) agencies around the country that have work sharing agreements with the EEOC alleging sexual harassment, has fallen to 11,717 in fiscal year 2010 (EEOC, 2011).

Table 1: Sexual Harassment Charges EEOC & FEPAs Combined FY 1997 - 2010														
FY	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Complaints	**15,889**	**15,618**	**15,222**	**15,536**	**15,475**	**14,396**	**13,566**	**13,136**	**12,679**	**12,025**	**12,510**	**13,867**	**12,696**	**11,717**
% Males	**11.6**	**12.9**	**12.1**	**13.6**	**13.7**	**14.9**	**14.7**	**15.1**	**14.3**	**15.4**	**16.0**	**15.9**	**16.0**	**16.4**

A number of reasons have been identified as causing the increase in the number of complaints and lawsuits by males alleging sexual harassment. The first court case alleging sexual harassment of a male dates only to 1995. In that case, the EEOC sued Domino's Pizza in Tampa Florida alleging that a female supervisor sexually harassed a male store manager. The male store manager alleged that the female supervisor would caress his shoulders and neck and pinch his buttocks. He was eventually fired and awarded $237,000 in damages (EEOC v. Domino's Pizza, 1998). As more females have moved into positions of power in organizations, "unfortunately men don't have a corner on the rude-behavior market", these types of situations were bound to occur (Tahmincioglu, 2007). Additionally, often cited rationale for the increase in male complaints includes the fact that males are more informed with respect to their rights today because of organizational training efforts to combat harassment in the workplace and it has become "more socially acceptable today for a man to file sexual harassment charges" (Craver, 2010).

Others report that the recent economic downturn in which more men than women lost their jobs may be driving some of the increase. In the past, according to Greg Grant an attorney with Shulman Rogers in Washington, D.C., male victims of sexual harassment "might have voted with their feet" rather than utilizing the legal system (Mattioli, 2010). Today, though, with jobs harder to find, more males are willing to "risk the potential stigma of speaking out" and are utilizing the legal system (Mattioli, 2010).

Overcoming the common stereotype that "no real man rebuffs sexual attention" has been cited as one of the reasons even more men have not come forward over the years (Voss, 2010). A *Marie Clare* article reports that only 5 to 15 percent of sexual harassment incidents get reported, a contention also made in the Mattioli article (Voss, 2010). EEOC spokesman David Grinberg asserts that many of the allegations made by males rarely get reported unless a lawsuit is filed (Voss, 2010). Celebrity lawyer Gloria Allred is also quoted in the Marie Clare article and believes that "most complaints are mediated and resolved, and you'll never hear about them" – "you won't even see a piece of paper" (Voss, 2011). Allred also represented James Stevens in a Simi Valley, California lawsuit against Vons in 2006. In that case, Stevens, a black male with 25 years experience with the supermarket, alleged that a female manager sexually harassed him on numerous occasions. His complaints to the company were not acted on and he was eventually fired. A jury award of $18.4 million in compensatory and punitive damages was initially awarded to Stevens but was reduced by the trial judge to $2.4 million. The award was upheld through the California Supreme Court (James Stevens vs. Vons, 2009).

The purpose of this paper is to examine the reasons for the increase in complaints by males, recent court cases where males have made allegations of being sexually harassed, and to present policy and practice suggestions that employers can utilize to minimize these types of complaints and reduce their exposure to this type of litigation.

RECENT COMPLAINTS BY MALES

A factor influencing more males to bring sexual harassment claims was the United States Supreme Court's decision in Oncale v. Sundowner Offshore Services, Inc. in 1998. Prior to that decision, a number of federal courts "held that a male couldn't file a sexual harassment claim against another male" (Ford & Harrison, 2010). In that decision, the court ruled that nothing in Title VII of the 1964 Civil Rights Act necessarily bars a claim of discrimination merely because all involved are of the same sex (Oncale v. Sundowner Offshore Services, Inc. 1998). While the EEOC does not track the sex of the alleged harasser, according to EEOC Senior Attorney Advisor Justine Lisser, the agency "has observed an increasing number of men alleging sexual harassment from other male co-workers – and not as many cases of men accusing female bosses or co-workers of sexual harassment" (Mattioli, 2010). EEOC press releases dating back to 1999 highlight this type of allegation (See Table 2).

Table 2 EEOC Press Releases and Same-Sex Sexual Harassment Settlements
1999 EEOC v. Long Prairie Packing Company, Inc. $1.9 Million Settlement of Sexual Harassment Allegations
2002 EEOC v. Ron Clark Ford, Inc $140,000 Settlement of Same-sex Harassment Allegations
2005 EEOC v. Carmike Cinemas $765,000 Settlement of Male-on-male Teen Sexual Harassment Case
2007 EEOC v. United HealthCare of Florida $1.8 Million Settlement for Same-sex Sexual Harassment/Retaliation
2009 EEOC v. Lowe's Home Improvement Warehouse $1.7 Million Settlement in Sexual Harassment Case
2009 EEOC v. Cheesecake Factory $345,000 Settlement in Same-sex Sexual Harassment Case

The Long Prairie Packing Company case was the EEOC's first class action challenging a pattern of harassment by men against men and retaliation for complaining about the alleged harassment EEOC-B, 1999). In this case, "one male worker said in court documents that he was jumped by groups of men who held him down, sometimes in a bin of raw meat or a trough of blood. The worker said the sometimes daily occurrences involved simulated sex acts on him" (Meat Industry News, 1999). The worker also said, "at least one supervisor took part and another threatened to fire him when he complained" (Meat Industry News, 1999).

In the Ron Clark Ford case, the EEOC had evidence that the plaintiffs were subjected to lewd, inappropriate comments of a sexual nature and had their genitals and buttocks grabbed against their will by male managers. In addition, Bill Backhaus, the senior trial attorney for the EEOC of the Agency's Dallas office learned during litigation that "the dealership either laughed

at or ignored what was going on at the dealership" (EEOC-C, 2002). The dealership attempted to defend the behavior of the managers arguing that the sexual conduct was "harmless horseplay", a defense associated with what the EEOC called "the stereotypical premise that boys will be boys" (EEOC-C, 2002).

In the Carmike Cinemas case, the EEOC filed suit alleging that 14 young men working at Carmike were subjected to unwelcome sexual touching, egregious sexual comments, sexual advances and requests for sexual favors from their male supervisors over a nine month period (EEOC-D). This case was adjudicated shortly after the EEOC began its national Youth@Work initiative, a comprehensive outreach and education campaign designed to inform teens about their employment rights and responsibilities (EEOC-E, 2004).

In the United HealthCare settlement, the organization agreed to pay $1.8 million to settle a same-sex harassment and retaliation lawsuit that alleged that a male former regional vice president had subjected a male former top senior account executive to repeated verbal sexual harassment in Sunrise, Florida. In this case, after the senior account executive complained several times to upper management, United HealthCare retaliated against him by subjecting him to discipline and denying him stock options and commissions (EEOC-F, 2007).

In the Lowe's case, the EEOC alleged that the three employees involved were subject to over six months of physical and verbal abuse including one instance of sexual assault. The EEOC also alleged that Lowe's "not only failed to take prompt remedial action to stop the sexual harassment, but also fired the three victims in the case (EEOC-G, 2009).

In the Cheesecake Factory settlement, the agency noted a company's claim that it was a place to create "lasting memories with family and friends" (EEOC-H, 2009). The EEOC alleged that Cheesecake management knew about and tolerated repeated sexual assaults against six male employees by a group of male kitchen employees. The EEOC had evidence showing that the abusers directly touched the victims genitals, made sexually charged remarks, grinded their genitals against them, and forced victims into repeated episodes of simulated rape. The agency also asserted that managers witnessed employees dragging their victims kicking and screaming into a refrigerator (EEOC-H, 2009).

POLICY AND PRACTICE SUGGESTIONS

In virtually all of the settlements obtained by the EEOC described above, there are several common threads. First and foremost is what appears to be a lack of adequate training on the issue. In all of the consent decrees that settled complaints, the EEOC specifically calls for the organizations to specifically train their employees and managers about sexual harassment. In the Cheesecake settlement, the company was required to institute an ombudsman to field and address sexual harassment complaints by employees (EEOC-H, 2009).

Court decisions and EEOC guidelines have been consistent over the years on how organizations can provide a work environment that is free of harassment and reduce their

exposure to litigation. While no organization can eliminate all harassment from their workplace, organizations that model their efforts consistent with the Faragher defense (Faragher v. City of Boca Raton, 524 U.S. 775 (1998), are in a good starting position to reduce their exposure to litigation and minimize their liability. Under the Faragher defense, employers must take reasonable care to prevent and promptly correct the harassing behavior of the supervisor and the alleged victim must take advantage of the preventive or corrective opportunities provided by the employer (Johnson, 2010). EEOC enforcement guidance on preventive and remedial action is clear and provides more detail as to the affirmative defense cited in the Faragher decision. Table 3 contains the EEOC's recommended preventive and remedial actions.

Table 3 EEOC Recommended Preventive and Remedial Action – Sexual Harassment
An explicit policy against sexual harassment.
Policy should be clearly and regularly communicated.
The employer should affirmatively raise the subject with all supervisory and non-supervisory employees, express strong disapproval, and explain the sanctions for harassment.
The employer should also have a procedure for resolving sexual harassment complaints. The procedure should be designed to "encourage victims of harassment to come forward" and should not require a victim to complain first to the offending supervisor.
The policy should ensure confidentiality as much as possible and provide effective remedies, including protection of victims and witnesses against retaliation.
When an employer receives a complaint or otherwise learns of alleged sexual harassment in the workplace, the employer should investigate promptly and thoroughly.
Take immediate and appropriate corrective action by doing whatever is necessary to end the harassment.
Disciplinary action against the offending supervisor or employee, ranging from reprimand to discharge, may be necessary.
Source: EEOC Enforcement Guidance - # N-915-050.

SUMMARY AND CONCLUSIONS

The EEOC and the courts have made it clear that an employer will not tolerate harassment based on sex (with or without sexual conduct), race, color, and religion, national origin, age, disability, and protected activity (*i.e.*, opposition to prohibited discrimination or participation in the statutory complaint process). This prohibition should cover harassment by anyone in the workplace – supervisors, co-workers or non-employees. Management should convey the seriousness of the prohibition. One way to do that is for the mandate to "come from the top*,"* i.e.*,* from upper management (EEOC-I, 2010). With respect to sexual harassment complaints from men, overcoming the stereotyped perceptions about men with respect sex will be a difficult challenge. Training must emphasize that all complaints of harassment regardless of the sex of the individual making the allegation must be taken seriously. Organizations where

male locker room behavior has been encouraged and complaints about it ignored in the past are setting themselves up to be added to the list of EEOC press releases or court dockets.

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BEAUTY PREMIUM AND GRADE POINT AVERAGE A STUDY OF BUSINESS STUDENTS AT A KOREAN UNIVERSITY

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ABSTRACT

Researchers have tried to apply the 'Beauty Premium' to a spectrum of studies. Identifying and compensating for perceived deficiencies in previous research, this study surveyed the beauty premium as applied to students' GPA in a Korean university. Employing questionnaire data obtained from business students as well as beauty ratings from a panel of professors, statistical analysis was performed to determine the correlation between the beauty premium and GPA, taking socio-economic and self-perception factors into account. Although no significant amount of beauty premium was found, beauty did have a slight positive impact on female student grades and was negative for men.

Key Words: Beauty Premium, discrimination, appearance, university grades

INTRODUCTION

The study of discrimination in neoclassical economic theory has expanded considerably since the 1950s when G.S. Becker (1957) published his initial groundbreaking study. Since then, researchers have greatly increased both the scope and depth of what discrimination encompasses and its various manifestations. One form of discrimination that has been receiving a considerable amount of attention in recent years is known as the "Beauty Premium". From a definitional standpoint, the beauty premium is a condition where individuals with the same economic or cognitive characteristics receive higher wages, evaluations or opportunities and the differences are systematically correlated with the above average physical attractiveness of the individual (Graham et al 2010; Hamermesh 2006; Andreoni & Petrie 2005; Sachsida et al 2003; Hamermesh et al 2002; Biddle & Hamermesh 1998; Hamermesh & Biddle 1994). In addition to attractiveness receiving a premium, recent labor market research also shows that physical plainness receives a penalty (Tietje & Cresap 2005; Hamermesh & Biddle 1994). Although a trend for employers is to hire based on looks, Tietje and Cresap (2005) argue that institutions that have traditionally been aimed to subordinate appearances, such as the church and universities,

are trying to adapt to a generation with a historically unprecedented visual receptivity, prompting the need to look critically at "lookism".

To better explore the impact and dynamics of physical attractiveness within these new areas, researchers have tried to apply the beauty premium to a number of studies using beauty in quantifying university professor evaluations to even estimating the likelihood of criminal tendencies using a wide range of methodologies and achieving very mixed results. In particular, as related to this topic, researchers have studied the influence of physical attractiveness and its effect on academic evaluations (See table 1 in the Literature Review.). As part of the research, various theories have been considered in determining the cause of the phenomenon. Rosenblat (2008) states that researchers, in trying to explain the existence of the beauty premium, have found it to be caused by either pure Becker-type, taste-based discrimination (Becker 1957, 1961; Becker & Watts 1999) or potentially greater levels of real or perceived productivity (Arrow, 1973) by using data that are primarily focused on the target subject's physical appearance and dimensions that were found to be positively affected by physical attractiveness such as wages or GPA (Fletcher 2009; French et al 2009; Mocan & Tekin 2006, 2009; Markus & Rosenblat 2006; Brunelo & Cappellari 2005). Other moderating variables, such as gender, race, personality, grooming, ability, socioeconomic factors, and past performance, were also examined by past researchers (Berggren et al 2007; Pfan et al 2000; Budesheim & DePaola 1994; Ritts et al 1992; Buck & Tiene 1989).

Aims and Objectives

Compensating for perceived deficiencies in previous research, this study will be conducted with the specific goal of surveying the beauty premium and penalty as applied to students' GPA in a Korean university. Employing questionnaire data obtained from business students as well as beauty ratings from a panel of five professors, statistical analysis will be performed to determine the correlation between the beauty premium and students' GPA, taking socio-economic and self-perception factors into account.

Contribution to Knowledge

This study can contribute both to the overall body of knowledge and to the development of university policy. As will be discussed later, there have been numerous studies conducted on the beauty premium. However, solutions to deficiencies in many of the previous works have been identified and implemented so as to provide a more robust model that can be used to improve the results of future studies. This research, in identifying the existence and extent of the beauty premium in Korean universities, can also assist university policy makers in ensuring grading systems are both fair and equitable. Lastly, no references to physical attractiveness or the beauty premium regarding students' GPA in an Asian university environment have been

found. This study should help bridge the gap between the research that has been done in the West and what can be found in Asia under its unique cultural circumstances.

This paper is organized into four parts. First, theories related to the beauty premium will be reviewed. Data collection and the statistical approach towards student self-perceptions, socio-economic factors and professor-determined beauty ratings of the sample are then outlined and demonstrated in a comprehensive analysis as part of the results. An explanation and implications of any beauty premium or penalty evidence as well as its potential implications for researchers and university policy makers are then discussed.

LITERATURE REVIEW

With prior studies having been applied to a spectrum of research using physical attractiveness to quantify gaps in areas such as wages, voter bias and academic evaluations, there is now a cornucopia of beauty premium literature available to new researchers. Although most of the body of knowledge in this field has come from research linking beauty and wages, a number of studies have been conducted that link physical attractiveness with educational competence or student grade point averages. Some of the papers on the subject report that physical appearance can have a great deal to do with teacher's grades or expectations. For example, Clifford and Walster (1973) argue a child's attractiveness is significantly associated with the teacher's expectations about how intelligent the child was, how interested in education his parents were, how far he was likely to progress in school, and how popular he would be with his peers. Ritts et al (1995) argue that physically attractive students are judged usually more favorably by teachers in a number of dimensions including intelligence, academic potential, grades, and various social skills. They found there was also a potential influence of moderator variables, such as student gender, race, and past performance, on the physical attractiveness bias. Kenealy et al (2002) found teachers' ratings of attractiveness were significantly correlated with their judgments of children's sociability, popularity, academic brightness, confidence, and qualities of leadership. In addition, at an Italian university, Cipriani and Zago (2005) investigated the impact of beauty due to pure discrimination or productivity. These studies provide some evidence against the hypothesis of Becker-type discrimination originating from tastes and in favor of productivity-related discrimination, but also can not completely rule it out. Table 1 shows the primary researches completed in educational settings that provide the linkage between academic and beauty evaluations.

As noted, a number of the studies linking physical attractiveness and scholastic competence have tried to identify the source or type of discrimination. Although many theories have been posited, the two that are primarily used to explain the beauty premium phenomenon are the Discrimination-Preference Model and Statistical Discrimination.

The Discrimination-Preference Trade model is largely based on the early work of Gary S. Becker (1957) and Kenneth J. Arrow (1973) and encompasses a competitive equilibrium model

in which some individuals from one group have a taste or preference for interacting with individuals of a particular group and are willing to sacrifice some amount of income or capital to satisfy their preference (Becker 1957; Arrow 1972a, 1972b, 1973, 1998; Bertrand & Mullainathan 2004; Hamermesh & Biddle 1994). As applied to the current study, this would be to state that Korean teachers might find a higher utility or taste in having only more physically attractive students in their class and will therefore reward or penalize student's grades accordingly to satisfy this preference. Thus, a beauty premium would directly impact students' GPAs.

Table 1: Beauty Premium Research Results for Students' GPA

Author(s)/ Year Pub.	Beauty Eval. Method	Variables	Results – BP (Yes/No)
Cipriani/ Zago (2005)	5-Likert scale; 5 professors (3 male, 2 female); age, sex distrib	High school grade, # of exams, exam type, year born, performance, beauty, gender, resident, university type, exemption	Yes – Researchers found evidence against the Becker-type discrimination stemming from tastes and in favor of productivity-related discrimination.
Clifford/ Walster (1973)	20 educators 2-pt. Scale	High-low physical attractiveness; gender	Yes – Teachers' expectations of children came from school records and appearance.
Doran (2008)	1 interviewer 5-Likert scale	Beauty; cum. secondary school GPA; BMI; personality; grooming; mother's level of education; family annual income; subjective health; height; weight; gender; race	No – Used the U.S. National Longitudinal Study of Adolescent Health to report that BP can be accounted for by correlations between beauty and other ascriptive characteristics.
French/ Robins/ Homer/ Tapsell (2009)	1 interviewer 5-Likert scale	GPA; ability; grade; race; personality; personal/physical appearance; grooming; # of children in house; oldest child; mother's education; social assistance; two parent house; school size and type; school location; ave. class size; dress code; % of kids and faculty White	Yes – Used the U.S. National Longitudinal Study of Adolescent Health to report that when physical attractiveness is the only measure of beauty, it has a positive/statistically significant impact on GPA for female students and a positive/not statistically significant effect for male students.
Hamermesh/Parker (2003)	Six undergraduate students (3 men; 3 women) 10-pt. Likert	Prof.'s beauty; course eval.; instructor eval.; # of students; % evaluating; female; minority; non-native English; tenure track; lower division; # of courses; # of faculty	No - When adjusted for other determinants, beauty affects earnings but it is impossible to untangle productivity and discrimination.
Jackson/ Hunter/ Hodge (1995)	Meta-analytic review	Physical attractiveness; intellectual competence	Yes- Attractive people were perceived as more competent. Attractiveness effect stronger for males than females, and

Table 1: Beauty Premium Research Results for Students' GPA			
Author(s)/ Year Pub.	Beauty Eval. Method	Variables	Results – BP (Yes/No)
			stronger when explicit information about competence was absent than when present.
Kenealy/ Frude/Shaw (2002)	5 Adults (3 women and 2 men) 7-pt Likert scale	Attractiveness (100 mm visual analogue scale); leadership; confidence; popularity; academic brightness; sociability	Yes – Teachers' ratings of attractiveness were significantly correlated with their judgments of student sociability, popularity, academic brightness, confidence, and qualities of leadership.
Ritts/ Patterson/ Tubbs (1992)	Meta-analytic review	Gender; race; conduct; physical attractiveness	Yes – Attractive students are judged more favorably by teachers in a number of dimensions including intelligence, academic potential, and grades.
Schnusenburg /Frohlich (2005)	Multiple evaluators. 2-pt. Likert	Total enrollment; gender; hotness; easiness; helpfulness; clarity; overall quality	No – When regressing the instructor ratings on easiness and hotness ratings from RateMyProfessors.com, easiness is significant, but hotness (professor's sexiness) isn't.

One issue with the application of this form of discrimination is in identifying if the instructors are truly discriminating based on taste or if they are potentially using a student's beauty as a signal of potential productivity. The second primary theory used to explain the beauty premium in this study is that of Statistical Discrimination. This form of discrimination is also known in labor market circles as Imperfect Employer Information (Rothschild & Stiglitz 1973). This model is based on teacher perception of differences in the predictors of a student's academic performance and their expected scholastic achievement. If a teacher believes certain traits are correlated with productive characteristics, their expectations and the grades they ultimately give, will potentially reflect those beliefs. An explanation of how beauty can lead to greater productive characteristics has been justified by theorizing that beauty can be correlated with unobservable productive attributes, such as the assumption that physically attractive students are more confident. This self-confidence is then directly expressed in better grades than those that are less endowed. The general idea behind this theory has received a great deal of attention and support from researchers (Arrow 1972, 1973; Bull & Ramsey 1988; Hamermesh & Parker 2003; Cipriani & Zago 2005; Fletcher 2009).

Like the Discrimination-Preference Model, Statistical Discrimination lacks distinct empirical evidence of its presence in previous research. The most common approach that other researchers have taken is to base their studies on correlating unexplained higher levels in GPA

with characteristics that might be more typically associated with scholastic ability, such as perceived brightness, high school grades, mother's education, and percentage of faculty that are White (with the assumption that this would signify a better quality school) as well as the student's physical attractiveness or grooming (Kenealy et al 2002; Cipriani & Zago 2005; Doran 2008; French et al 2009). Although these two theories most likely do not fully encompass the sources of the beauty premium, nor is it the objective of this study to demonstrate which theory is most applicable to school systems, they do represent a framework that can be applied to the study of the beauty premium in a practical context like Korea's universities.

In the exploration of the other studies relevant to correlating physical attractiveness and student GPAs found in table 1, a comprehensive look was taken at the variables and methodology previously used. In this exploration, two primary areas of deficiency were discovered that might have reduced either the study's quality of the findings or the explanatory efficacy of the data. In response to these findings, the current study was modified to incorporate the learnings.

The first area of deficiency relates to who conducts the independent beauty rating and how it is conducted. Out of the primary studies surveyed, several only utilized the rating of one individual whereas the rest averaged five to six evaluators. Judging beauty from one evaluator's standpoint does not provide an objective, holistic rating of the subject's physical attractiveness. It is suggested that five evaluators should be the minimum number to properly provide an explanatory enough sample. Another issue that can be found with the prior use of evaluators was a lack of potential relevance of the actual people doing the "beholding". The current study was modified to include professors who belong to a range of ages, sexes and national origins that reflect the mix that students would encounter at a Korean university. A third point related to this is the area of deficiency deals with the assessment scale used. The scale of some previous studies ranged from only two levels ("Hot or Not" in Schnusenburg and Frohlich (2005)) to a 10-point scale in Hamermesh and Parker (2003). Although the modal average was a 5-point scale, this scale was used for an initial pre-test class, but it was ultimately rejected due to the lack of enough explanatory information as the modal average for the vast majority of students was a 4. Instead, a 7-point scale was adopted for the study so as to try to further break up the students' self-perception scores.

The second area of deficiency involves the actual variables and variable types used. Existing studies used a number of variables, some of which are socio-economic based and others based on student self-perceptions. Both variable types can provide potential indicators as to the level and source of any beauty premium that may be found. The issue with previous studies is that most of them did not use a comprehensive set of variables that included both types of questions and therefore were not able to provide a solid explanation or reason if a beauty premium or penalty is identified. In addition, several variables, such as student perceptions of the quality of their high school education and whether their background is either rural or urban were deemed missing from previous studies and were added to the current study.

METHODOLOGY

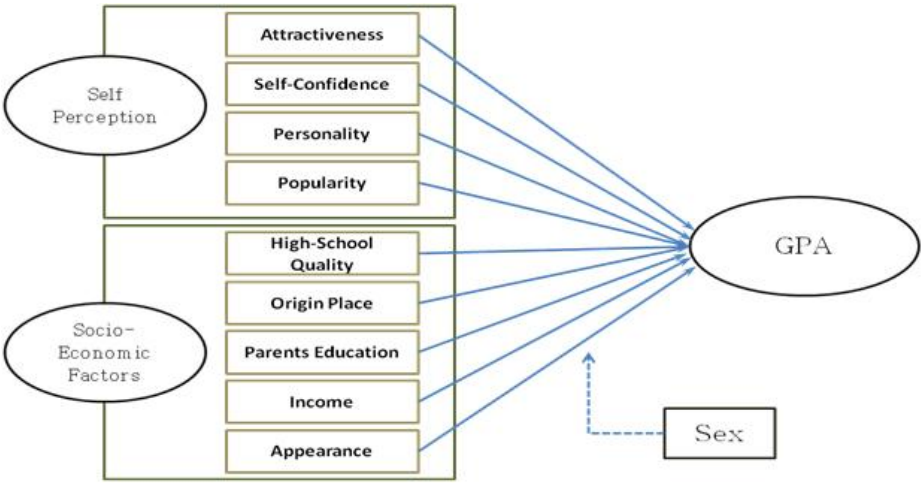
As stated in the introduction, the objective of this paper is to survey the beauty premium as it applies to students' GPA in a Korean university. To begin this study, a questionnaire was developed and circulated amongst participating business students at Korean X University (referred to as University X hereafter). In addition, the participating students' photographs were collected and presented to a panel of five Korean and foreign professors for an outside assessment of the students' physical attractiveness. Both questionnaire and beauty assessments were conducted during March – April, 2010.

Questionnaire Development

This study was conducted by providing a questionnaire to students taking business classes at University X. In designing the questionnaire, the literature from other studies conducted on the beauty premium was surveyed for input on required focal points. Appropriate variables deemed relevant and beneficial to the study were identified and included in the questionnaire. Also, as noted in the literature review, in the process of surveying past studies for relevant variables, a number of prospective deficiencies were identified. Specific issues that could be corrected through adding variables, modifying questions or improving the research methodology were addressed.

Overall, the questionnaire posed ten structured queries regarding two basic attribute types: socio-economic attributes and self-perception attributes. The various attributes can be seen in diagram 1 as they will be statistically correlated to GPA by sex.

Figure 1: Beauty Premium vs. GPA Research Attributes



Socio-economic attributes were collected from questions relating to sex, urban vs. rural origin, student rating of high school educational quality, and educational level of the parents as well as family income. This information was all captured through structured questions that limited the range of responses. For example, sex and rural/urban origin were limited to the possible direct answers. Educational levels were aggregated to 6 choices ranging from a high school diploma to a post-graduate degree. Family income also included four ranges starting at less than 3 million won per month to more than 5 million. The last variable, the self-rating of the student's high school educational quality, was gathered through the use of a 5-point Likert scale.

The second set of information captured by the questionnaire regards attributes pertaining to student self-perceptions and includes questions regarding evaluations on self-perceived attractiveness, self-confidence and popularity as well as introverted/extroverted personality type and perceived popularity which were also gathered through the use of 5-point Likert scales. Perhaps the most important attribute, as it relates to this study, is that of the students' self-perception of their own beauty or physical attractiveness. During the audit of the literature, it was identified that similar studies had also made use of Likert scales, but had used a wide range of points with their scales. Based on the reasoning provided in the Literature Review section on previous study deficiencies, as well as a pre-study test of an initial questionnaire, it was determined that the 5-point Likert scale would provide too little explanatory power; therefore, a 7-point scale was utilized.

Data Collection

A paper survey was employed in the student's questionnaire portion of this study. Recruitment was achieved through visiting business classes taught at University X and having participating juniors and seniors fill out the questionnaire. Students were also requested to submit a color photograph representative of themselves to be used in the professor evaluation portion of the study. Questionnaire results were then inputted into a spreadsheet and double checked for accuracy.

In addition, all GPA information was provided by the university and consisted of each student's final, cumulative GPA for their entire scholastic career at that school at the time of the request.

Five professors from four different universities were then used to evaluate the student provided photographs using 7-point Likert scales: 1 (very unattractive) to 7 (very attractive). The group of professors was comprised of 3 males and 2 females of age groups similar to the demographics of the professors teaching at the university (2 over 50 years old, 1 between 40~50 years old, and 2 between 30 and 40 years old). In addition, none of the professors knew the participating students. To further link the demographics to the reality of Korean universities, one evaluating professor was also a white male.

Survey data was analyzed using SPSS to test the identified hypotheses and determine the level of the beauty premium found at the university as well as identify significant contributing variables.

Final Sample

The final sample of participants consisted of 103 business students, 63 males and 40 females, from University X. All participants fully completed the questionnaires and provided adequate photographs for professor evaluations.

Research Model

The empirical research model used to estimate the influence of the beauty premium on the GPA at University X takes the following form:

(1) $$GPA = \alpha + \sum_{i=1} \beta_i X_i + \varepsilon_i$$

where α stands for constant or intercept, β is slope coefficient and X_i stand for the various socio-economic and self-perception attribute variables that were factored into the equation. The attribute variables can be found below in table 2. Lastly, ε_i stands for the error or residuals term. All unknown parameters, α, β_1, β_2, β_3, ... β_k, are estimated through the use of ordinary least squares. See table 2.

Table 2: Research Model Attribute Variables
X1 = Self-Perceived Attractiveness
X2 = Self-Confidence
X3 = Self-Perceived Personality
X4 = Self-Perceived Popularity
X5 = Self-Perceived High School Education Quality
X6 = Dummy Variable of Origin Place (Urban = 1 / Rural = 0)
X7 = Dummy Variable for Father's Education (More than Community College = 1 / Less = 0)
X8 = Dummy Variable for Mother's Education (More than Community College = 1 / Less = 0)
X9 = Monthly Family Income
X10 = Professor Rated Appearance

FINDINGS AND DISCUSSION

Respondent Demographics and Profile

The demographics of this sample include 63 males and 40 females of whom the majority originally came from fairly affluent households in an urban area and typically possessed

university educated parents. For more information on the students' demographic backgrounds, see table 3.

Table 3: Participating Student Demographics

Variable	Value	Frequency	Percent	Valid Percent	Cumulative Percent
Sex	Female	40	38.8	38.8	38.8
	Male	63	61.2	61.2	100.0
Rural / Urban Origin	Urban	93	90.3	90.3	90.3
	Rural	10	9.7	9.7	100.0
Father's Education	Graduate Degree	27	26.2	26.2	26.2
	Some Grad.	1	1.0	1.0	27.2
	Univ. Degree	43	41.7	41.7	68.9
	Some Univ.	2	1.9	1.9	70.9
	College Degree	2	1.9	1.9	72.8
	HS Diploma	28	27.2	27.2	100.0
Mother's Education	Graduate Degree	5	4.9	4.9	4.9
	Some Grad.	3	2.9	2.9	7.8
	Univ. Degree	46	44.7	45.1	52.9
	Some Univ.	3	2.9	2.9	55.9
	College Degree	5	4.9	4.9	60.8
	HS Diploma	40	38.8	39.2	100.0
Income	More than 5M	62	60.2	60.2	60.2
	From 4M to 5M	19	18.4	18.4	78.6
	From 3M to 4M	10	9.7	9.7	88.3
	Less then 3M	12	11.7	11.7	100.0

Participant Attributes Self-Evaluation

The first step in examining the data for indications of the beauty premium included analyzing the self-evaluating data. It appears that the Korean students from University X have very healthy self-esteems when it comes to perceptions of their own attractiveness, self-confidence, personality and popularity. In each mentioned category, Korean business students considered themselves to possess higher scores than what could be considered the mean average. In self-perceived attractiveness, students perceived themselves as more than 5 on a 7-point Likert scale. Self-confidence, personality and popularity also scored relatively high with 3.84, 3.58 and 3.52 respectively on a 5-point scale. See table 4 for additional information.

Professor Beauty Rating Evaluation

The prior literature has indicated that the beauty premium can come from different sources, including Becker-type discrimination in that more attractive people are preferred or employing statistical discrimination to suggest that more attractive people are perceived to have

higher degrees of productivity based on self-esteem and other contributors. In making this determination, it is important to not only look at student perceptions of their physical attractiveness, but at their professors' evaluations as well.

Table 4: Descriptive Statistics of Student Self-Perception and GPA

Variable	N	Minimum	Maximum	Mean	Std Deviation
Attractiveness*	103	2	7	5.03	.944
Self-Confidence**	103	2	5	3.84	.789
Personality**	103	2	5	3.58	.891
Popularity**	103	2	5	3.52	.752
HS Edu. Quality**	103	1	5	3.80	.856
Prof. Beauty Rating*	103	2.75	5.25	3.70	.509
GPA***	103	1.15	4.42	3.53	.532

* 7 point Likert scales ** = 5 point Likert scales ***Maximum GPA is 4.5

In the case of this study, five professors, fitting the general demographics of Korean university instructors, evaluated each student's photograph on a 7-point Likert scale. The mean average of those professor's rating evaluations was 3.7 as can be seen in table 4. It was also determined that there was a fair amount of variability in the way professors viewed the attractiveness of the students as the standard deviation between the professors was between 0.00 and 2.36. Some students had very similar evaluations between the professors while others did not. These differences in ratings can be attributed to differences between professor sex, age, taste and national culture, and, due to the similarity with the overall demographics found in the university professor population, are assumed to be similar to what is found in reality.

In addition, the interrater reliability for the five professors who evaluated each student's attractiveness was also tested. A Cronbach-A test was performed to determine that the reliability of the professors' evaluations was a 0.602. This result is a little under the normal minimum value of 0.7, but still sufficiently shows that the professor evaluations can be considered valid and reliable.

It should also be noted that the mean average rating given to students was well below the self-perceived beauty of the students. This finding is quite different than what has been seen in other studies from Europe and North America where male students' beauty perceptions were relatively correlated with the perceptions of their instructors (Kenealy et al, 2002; Adams, 1982, 1975, 1977, 1978). In the current study, both men and women students' self-perceptions of their own beauty were well in excess of what their instructors thought of them. The mean average self-rating for male students was 5.047 and 5.0 for female students as compared to 3.78 and 3.56 given by the professors. No direct explanation of this phenomenon can be provided for this discrepancy between student and professor ratings.

Statistical Analysis

Multiple regression was used to investigate the relationship between the dependent variable of student GPA performance and independent variables of self-perception and socio-economic factors. In preparation for the regression, the approach to utilize one of the variables was slightly simplified. Specifically, the two parent's mean education was broken down from six categories to two or higher than or less than a community college education.

Regression for All Student Participants

The regression was first run to find the beauty premium correlation for all participants. The results showed that self-perceived attractiveness, self-confidence, personality, popularity, high school education quality, urban/rural origin, professor rated appearance, parent education, and income do not significantly influence student performance. It can be noted, however, that possession of an urban origin does have a slight positive impact on a student's GPA.

Overall, socio-economic and self-perception factors are insignificant in that the R^2-value only equals 0.074 and the F-value equals 0.712 with a p-value>0.05. See table 5 for further details.

Table 5: Influence of Socio-economic and Self-perception Attributes on GPA: All Students

Dependent	Independent	Non-standardized Coefficients		Standardized Coefficients			
		Beta	Std. Error	B	t	Sig.	
GPA	(Constant)	3.588	.547		6.557	.000	
	Attractiveness	-.001	.073	-.002	-.013	.990	
	Self-Confidence	.126	.099	.184	1.272	.207	
	Personality	.063	.084	.104	.741	.461	R2=0.074
	Popularity	-.145	.118	-.201	-1.222	.225	
	HS Edu. Quality	.036	.067	.058	.537	.593	F=0.712
	Rural-Urban	.329	.199	.185	1.652	.102	
	Father's Edu.	-.118	.176	-.100	-.671	.504	(p=0.711)
	Mother's Edu.	.075	.156	.069	.481	.632	
	Family Income	-.030	.058	-.057	-.506	.614	
	Prof. Beauty Rating	-.144	.114	-.138	-1.268	.208	

Analysis for Female Student Participants

When the regression is taken beyond the general student sample population and is correlated by sex, slightly different results are found. Female students, as shown in table 6, are found not to be subjected to any significant amounts of beauty premium. However, it was determined that beauty, as perceived by the professors, does seem to have a very slight positive

impact on their grades. In addition, possessing an urban background is also found to have a slight positive influence on female students' grades as well.

Table 6: Influence of Socio-economic and Self-perception Attributes on GPA: Female Students							
Dependent	Independent	Non-standardized Coefficients		Standardized Coefficients			
		Beta	Std. Error	B	t	Sig.	
GPA	(Constant)	1.238	1.200		1.032	.311	R2=0.223 F=0.803 (p=0.627)
	Attractiveness	-.107	.149	-.201	-.721	.477	
	Self-Confidence	-.071	.167	-.094	-.427	.672	
	Personality	.178	.165	.276	1.077	.291	
	Popularity	-.002	.247	-.002	-.006	.995	
	HS Edu. Quality	.135	.157	.169	.858	.398	
	Rural-Urban	.803	.481	.377	1.670	.106	
	Father's Edu.	-.107	.236	-.107	-.451	.655	
	Mother's Edu.	.115	.220	.122	.520	.607	
	Family Income	-.004	.088	-.008	-.042	.967	
	Prof. Beauty Rating	.354	.192	.354	1.837	.077	

Analysis for Male Student Participants

Like female students, male students' GPAs are also not greatly influenced by physical appearance. However, as in the case of females, male students are slightly affected by three attribute variables investigated in this research. First, both professor evaluated appearance and student perceived popularity are found to have slight negative influences on men's grades. Self-confidence, though, showed minor positive affects on GPAs. See table 7 for details.

Table 7: Influence of Socio-economic and Self-perception Attributes on GPA: Male Students							
Dependent	Independent	Non-standardized Coefficients		Standardized Coefficients			
		Beta	Std. Error	B	t	Sig.	
GPA	(Constant)	4.135	.689		5.997	.000	R2=0.160 F=0.950 (p=0.498)
	Attractiveness	.006	.091	.010	.067	.947	
	Self-Confidence	.236	.130	.363	1.814	.076	
	Personality	.027	.104	.046	.258	.798	
	Popularity	-.242	.147	-.346	-1.645	.106	
	HS Edu. Quality	.042	.088	.071	.479	.634	
	Rural-Urban	.279	.240	.168	1.166	.249	
	Father's Edu.	-.242	.268	-.186	-.903	.371	
	Mother's Edu.	.119	.231	.098	.517	.608	
	Family Income	.012	.088	.021	.139	.890	
	Prof. Beauty Rating	-.309	.160	-.282	-1.927	.060	

Analysis for Student Participant Beauty Penalty

Another set of correlations were conducted to determine the degree that the students may be affected by the beauty penalty. The beauty penalty, or the "plainness discount as it is sometimes referred to, results when a more unattractive person is penalized for their looks. To analyze for a possible beauty penalty, the data set was split into two parts. The first set was comprised of students whose professor rated beauty scores were over the mean value of 3.7. The second set belonged to those individuals whose rated beauty was less than the mean average. Both data sets were then compared with GPA, self-perceived attractiveness, self-perceived popularity and personality as well as the high school education quality perception. Based on the findings in tables 8 and 9, no significant beauty penalty was found.

Table 8: Beauty Penalty Descriptive Statistics: All Student Participants

	N	Minimum	Maximum	Mean	Std. Deviation
Appearance	101	2.75	5.25	3.69	.509
Valid N (list wise)	101				

Table 9: Beauty Penalty Results: All Student Participants

	App_HL	N	Mean	Std. Deviation	Mean Difference	t-value	df	Sig.
GPA	Low	43	3.61	0.473	0.138	1.28	99	0.203
	High	58	3.48	0.576				
Attractiveness	Low	43	4.95	1.112	-0.081	-0.41	71	0.683
	High	58	5.03	0.772				
Self-Confidence	Low	43	3.65	0.813	-0.297	-1.92	99	0.058
	High	58	3.95	0.736				
Personality	Low	43	3.70	0.887	0.215	1.21	99	0.230
	High	58	3.48	0.883				
Popularity	Low	43	3.49	0.768	-0.029	-0.19	99	0.848
	High	58	3.52	0.731				
High-school quality	Low	43	3.67	1.085	-0.222	-1.29	99	0.201
	High	58	3.90	0.640				

Implications

Five basic implications can be made from the study's analysis. The first and primary implication is that there is no evidence of either a beauty premium or penalty. As shown, despite the slightly positive or negative correlations for several variables, all R^2 and F statistics indicate the general lack of either phenomenon. Therefore, in the case of student GPA in a Korean

university setting, the existence of a beauty premium/penalty must be rejected. Although it is felt that Korean universities need not unduly worry about the implications of the beauty premium on grading within their respective systems, it is recommended that the subject should be revisited to ensure that it will not become a future problem due to continued social developments. An example of the continuing trend of "lookism" in Korea is the continued increase in the numbers of plastic surgery recipients who go through the process to, not only improve their looks and feelings of self-confidence, but also for such reasons as improving their chances in the job market (Yoon, 2010). Such social trends may develop a larger degree of impact outside of the job market in the future.

Secondly, due to the lack of a strong indication of the beauty premium, this study must also reject the existence of Becker-type discrimination. If the class room were truly governed by taste, it is believed that the existence of a beauty premium or penalty would be stronger.

A third implication regards the theory related to Statistical Discrimination that links productivity with certain non-productivity related attributes. The current study is similar to research by Hamermesh and Parker (2003) that concluded that although beauty does lead to differences in productivity and related earnings, it is impossible to untangle productivity and discrimination. It is difficult to prove or disprove the existence of this phenomenon due to the overwhelming majority of students possessing high levels of self-perceived attractiveness. If there was more variability in student self-perceptions then the existence of productivity related discrimination might be more evident.

A fourth implication is the generalized evidence that, despite student perception regarding the quality of their high school educations, urban schools tend to better prepare students for their university academic careers, especially in the case of female students.

The last implication, having a potential cultural basis, is the existence of the slight negative correlations between both professor rated beauty and male student perceived popularity and student GPAs. This negative correlation may indicate that better looking boys may indeed be more popular and place less emphasis on their studies. As this implication lies outside of the scope of the study, further investigation has not been conducted.

CONCLUSION

This study surveyed the beauty premium, as applied to students' GPA in a Korean university, and did not identify the existence of any significant amount of beauty premium or penalty beyond a slight positive impact on female student grades and a negative one on male students. Despite not having identified the existence of the beauty premium, this study has developed a more comprehensive and robust model that potentially makes up for deficiencies in past studies as well as provides a more complete foundation for future researchers.

There are several caveats that might have had negative impacts on the results of this study. The first involves sample size. If larger numbers of students had participated, different

results may have been identified. The second potential issue may have resulted from the questions or organization of the questionnaire. A different questionnaire might have resulted in a different set of answers that may or may not be closer to reality than those received in the initial study.

Future studies could include a comparison of the beauty premium and university GPA between more than one university to further expand the overall sample size testing for this phenomenon. In addition, a further exploration into the cultural reasons for the beauty premium, or lack thereof, could identify significant factors found in specific countries that contribute to its existence.

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THE PAST, PRESENT AND FUTURE OF EXECUTIVE COMPENSATION

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ABSTRACT

Few topics in human resource management are as controversial today as executive compensation. While some argue that executives are entitled to rock star type salaries by virtue of their levels of responsibility, others look at today's generally gloomy economic trends and suggest that not only is no one person entitled to millions of dollars in annual compensation, but that many of today's CEO's are at least partially responsible for the state of the economy today.

This purpose of this article is to peel away the emotional overtones and examine executive compensation as an evolutionary phenomenon with historical, social, and regulatory factors. The progression of trends in executive compensation are explored over time as are the most common theoretical lenses used in evaluating the appropriateness of executive pay. The place of the compensation committee is explored along with specific cases which have led to today's perceptions of excesses and the recent regulatory environment.

While the focus of this paper is to examine trends and attitudes about executive compensation over time, the end goal is to provide a context within which readers can better form their own opinions of this timely issue.

INTRODUCTION

In 1980 a corporate CEO's compensation was approximately 40 times that of the average worker in the United States. By the year 2000, that multiple had escalated to 400 times the average. In 1789 President Washington was paid $25,000 per year, about 1,000 times that of the average worker. By 1983 seven executives earned more than $100 million in annual salary (Ellig, 2006).

Few issues evoke as much controversy in Human Resource Management as executive compensation. This paper will examine the origins of executive compensation, the various components, theories used to determine compensation, and implications for managers. Because of the current economic condition and the publicity of executive compensation abuses, executive compensation has become a much-discussed subject. Recent legislative changes coupled with the government's initiative to strengthen the economy have once again brought executive compensation under the microscope.

OVERVIEW OF EXECUTIVE COMPENSATION

Executive compensation typically consists of total base salary, annual incentive plans, long-term incentives for equity, supplemental benefits (that may include anticipated value of long-term projects), and an employment change-of-control agreement, also known as a "golden parachute" (Tonn, 2008). The base salary is generally a fixed cost that is usually decided by the going rate in the particular industry, but can also be established by performance. Just what exactly is the economic significance of executive compensation? Lucian Bebchuck, an executive compensation expert at Harvard University, reported that during the period of 2000-2003 the total compensation of the five highest paid executives of publicly held companies accounted for 10% of corporate earnings (Nocera, 2006).

The advocates of executive compensation controls are often shouted down by those who compare CEO pay with that of entertainers who arguably might be adding less of value to society. However, the salaries of sports stars, actors, musicians, and other entertainers can be interpreted to be market driven while CEO compensation is more likely determined by a compensation committee or the board of directors whose vested interests are more in line with the interests of the CEO than with ordinary shareholders (Dew-Becker, 2009). Table 1 shows the 10 highest paid CEOs in the United States in 2009.

Table 1: 10 Highest Paid CEOs, 2009

CEO	Company	Cash (in millions)	Stock & Options	Total Compensation
Larry Ellison	Oracle	$6.1	$78.4	$84.5
Ray Elliott	Boston Scientific	$4	$29.4	$33.4
Ray Irani	Occidental Pet.	$6.6	$24.8	$31.4
Mark Herd	Hewlett-Packard	$17.6	$6.6	$24.2
James Hackett	Anadarko Pet.	$6.1	$17.4	$23.5
A.G. Lafley	Proctor & Gamble	$5.6	$17.9	$23.5
Wm. Weldon	Johnson & Johnson	$14.8	$8	$22.8
Miles White	Abbott Laboratories	$6.5	$15.4	$21.9
Bob Iger	Disney	$12	$9.6	$21.6
Samuel Palmisano	IBM	$7.6	$13.5	$21.2

Source: Barr, C. & Goldman, D., 2010

To put a discussion of executive compensation in context, at least three theoretical lenses can be used.

THEORETICAL LENSES

In 1988, O'Reilly proposed four classes of variables that have been determined to be part of the executive compensation process.

1. The size variable infers that the larger the organization the more responsibility is assigned to the executive and the larger firm has a greater capacity to pay.
2. The next variable, performance, states that the executive is responsible for the performance of the organization and should be compensated based on that responsibility.
3. The industry variable asserts that some industries pay higher or lower salaries regardless of size or performance.
4. The final variable is the human capital attribute that dictates that education, work experience, tenure, and time on the job contribute to compensation (O'Reilly, 1988).

Three theories that incorporate these variables to describe the executive compensation process are agency theory, tournament theory, and social comparison theory.

Agency Theory

The dominant theoretical lens applied to executive pay is agency theory (Daily, Dalton, & Cannella, 2003). Simply put, agency theory sees the CEO as an "agent" of the owners of the company, i. e., the shareholders. The challenge is that the personal goals of the agent are not always in sync with the personal goals of the owners.

> *Per agency theory, self-interested agents take actions inconsistent with the best interests of their organization's shareholders when doing so is possible and serves the agents' self-interest. The more divergent the interests of agents and principals, the greater the agency costs* (Wasserman, 2006, 962).

Internal and external governance mechanisms are seen as tools to lessen the divergence of goals so that the CEO is indeed working in the best interests of the shareholders. The most obvious internal control is the Board of Directors, and by extension the Compensation Committee. The executive compensation package should be formulated in such a way that the CEO is motivated to protect the immediate and long-term interests of the owner. Unfortunately, this has not always been the case. While agency theory suggests that independent boards of directors can exert pressure on firm management to increase organizational performance, studies have often shown inconsistent results at best (McDonald & Westphal, 2010) There is even a

school of thought that suggests that increased monitoring of executives leads to them demanding more compensation in order to make up for the stress of the monitoring (Hoskisson, Castleton, & Withers, 2009).

Tournament Theory

This theory is positioned on the assumption that the executives are paid more because they play in the largest tournament. This tournament is a single elimination event with the winner receiving the largest paycheck. Tournament theory explains the large differences in salaries between the CEO and those executives on the next level below (O'Reilly, 1988). The large differentials between top level pay and the next level of senior management are thought to be tournament-like rewards that assure CEO motivation (Henderson & Fredrickson, 2001). Another aspect of the tournament theory is that elevating the top prize in effect lengthens the career ladder for the other senior executives.

Tournament theory is perhaps more easily applied to sports figures or top performers who clearly earn a prize which is way more than the second or third finalist. In golf, it has been shown that when the prizes are higher, player performance improves. Likewise when racers drive for bigger payoffs, they demonstrate positive incentive effects in terms of performance (Lee, Lev, & Yen, 2008).

Social Comparison Theory

The essence of the social comparison theory is that the executive's salary is set by the compensation committee, which is composed of board members who are not members of the management of the company, but are outside directors, or possibly even CEO's of other organizations. The theory suggests that these board members may choose a standard of comparison that is similar to their own. It follows then that in evaluating compensation, these board members will depend on their own experiences and comparisons of their individual compensation in formulating the executive's package (O'Reilly, 1988).

To fully understand how compensation is determined, a close look at the compensation committee is required.

The Compensation Committee

The compensation committee is a separate committee of a board of directors that is charged with determining the compensation level of senior management. The committee's fiduciary responsibilities include the shaping and communicating of the organization's compensation philosophy, approving compensation plans, devising a methodology to review and evaluate the performance of senior executives, auditing and approving incentive compensation

actions, and preparing reports for proxy statements (Bean, 2004). The need to be independent is vital to the success of the committee and is mandated by new stock exchange listing requirements (Dennis, 2004). Research shows that compensation committees have become more independent over time (Conyon, 2006). The compensation committee may require the services of outside consultants to help develop a compensation philosophy and organize pay packages. Using outside consultants has, in itself, led to controversy, and a recent study showed that in keeping with popular belief, use of an outside consultant in the U.S. and the U.K. did positively correlate with higher CEO pay (Conyon, Peck, & Sadler, 2009).

Compensation committees depend heavily on Human Resource functions and soft controls (oversight to detect fraud and abuse) (Bean, 2004). This group meets regularly with an annual agenda and open discussions regarding the issues before them. The foundation for the committee is based on its charter. A good method of determining the purpose, process, and responsibility of the committee is the development of the compensation committee charter. The charter has four necessary components: purpose, compensation, responsibilities and duties, and meetings. The purpose defines the most significant goal of the committee (philosophy) as well as other key elements such as executive development, determining executive compensation, and overseeing employee benefit programs. The composition describes the makeup of the group and its obligation to be independent and transparent. Responsibilities and duties include internal equity analysis and fiduciary and corporate issues. This is the segment of the charter that deals directly with executive compensation in terms of participation, base salaries, target annual incentive awards, performance goals, and actual awards disbursed to plan participants. The meetings section determines who is authorized to call meetings, how much notice is needed, and when the meetings will occur (Bean, 2004). Charters were not always part of the compensation committees, and the committees were not always present to determine executive compensation.

Growing Public Concern

In a recent article in the *Journal of Business Ethics,* Harris (2009) examines five common criticisms of executive pay rates. These include the following: (1) CEO pay is wrong strictly because it is too large to be morally justified, (2) The disparity between executive pay levels and the pay received by the average worker is just too large; (3) CEO pay is not governed by principles of justice and fairness, and (4) CEO compensation does not solve the agency problem and incentive pay does not work. Harris defends the last two criticisms as most meaningful. In the case of principles of justice, Harris finds that "CEO selection and pay determination are far from open, arm's length processes (p. 150)." In terms of the effectiveness criticism, Harris reminds us that according to agency theory, the CEO (agent) should be protecting the interests of the shareholders (owners), but that common executive incentives often put personal interest and shareholder interest at odds. Kandel (2009) agrees, saying,

> *The question is do standard executive contracts make sense? Do they provide the right incentives to exert effort, not to steal, to control risks, and to truthfully reveal information to the shareholders? Or, maybe they provide incentives to hide bad news, make suboptimal investments, and take unwarranted risks with the shareholders' money?* (p. 407)

To better understand the evolution of executive compensation, we need to review its history.

HISTORY OF EXECUTIVE COMPENSATION

The distinct link between the equities market and executive compensation can be traced back to the opening of the New York Stock Exchange in 1792 which allowed for the trading and selling of public companies which in turn would later require a manager (executive) to handle the day-to-day operations of the firm. The setting was on a corner outside a bar where President George Washington liked to drink; he, by the way, was paid $25,000 per year, about 1,000 times that of the average worker of the time. By comparison, our Presidential salary of $400,000 today is much less (Ellig, 2006).

Initially executives were compensated by base salary only, but this would change in the 1890's with the introduction of stock options as a form of incentive compensation. Soon after the initial introduction of stock options, DuPont introduced stock awards (1903), stock purchase plans (1904), and freestanding dividend equivalents (1906) (Ellig, 2006).

This was an interesting time in the formation of executive compensation as there was no personal income tax and the equity market was almost completely free from regulations. Another significant aspect of granting executives stock as compensation was that the equity was viewed as an asset, not income, and the executive was expected to retain any stock received as compensation. This period led to the formation of three basic types of equity plans still in use today; stock options, stock appreciation rights (today called cash bonus plans), and stock awards. Compensation would continue to be offered in different variations due to the lack of oversight, prosperity of the economy, and low tax rates. This would soon change with the crash of the stock market in 1929.

The period between 1913 and the crash of the stock market in 1929 saw several changes in executive compensation. First of all, the public was becoming aware of what seemed to be exorbitant executive salaries. Prior to this time, executive compensation was very secretive, but when railroads came under government management, the high salaries of railroad executives became known. Soon, the compensation of railroad and banking executives was published in the popular press and public interest intensified (Frydman, 2009).

During the same time period that public interest was starting to grow, executive compensation was also growing. General Motors introduced an annual cash bonus plan (1918),

economic value bonus plan (1924), and Bethlehem Steel paved the way for the first $1 million annual salary (1929) (Ellig, 2006). Prior to the crash of 1929, executives enjoyed a period of great growth as salaries increased, stock options flourished, and personal income taxes (top margin of 24%) were low. The crash of the market would not only change some of the processes for paying executives, it would end the lack of regulation oversight in the equity market. Table 2 summarizes key events which figured into the increasing transparency of executive compensation.

Table 2: Key Events in Increasing Transparency of Executive Compensation

Year	Legislation or Regulator	Provisions Affecting Executive Compensation
1933	Securities Act	Established disclosure requirements for stock sales to the public and regulated the primary market
1934	Securities & Exchange Act	Established the Securities and Exchange Commission and regulated the secondary market
1938	Securities & Exchange Commission (SEC)	SEC required firms listed on the Stock Exchange to reveal executive compensation levels.
1942	SEC	Executive pay must be shown in an easy-to-read table
1952	SEC	Pensions and deferred compensation included in tabular requirements
1964	SEC	Expansion of disclosure rules to most OTC firms
1977	IRS	Tax forms required disclosure of "management perks."
1978	SEC	Required summary compensation table in proxy statements
1979	IRS	Expanded Audit Technique Handbook to give increased attention to perks.
1983	SEC	*Reduced* disclosure; perks below $25 not reported

Based on Dew-Becker, 2009

One of the dynamics cited for the crash of the market was inadequate data available to investors (transparency). The ensuing legislation passed by Congress, the 1933 Securities Act and the 1934 Securities and Exchange Act, established disclosure requirements for stock sales to the public, created the Securities and Exchange Commission to handle oversight, and established insider trading rules. Post crash changes in executive compensation, resulting from a stagnant stock market, included stock payouts based on organizational performance and dividends based on underwater stock options (Ellig, 2006). Underwater options have an exercise price that is higher than the current stock price. World War II and the post war years were not friendly to

executives because of various laws that were passed that limited "fringes" (which would be later referred to as perks), top margin income tax rates reached 94% (1944), stock option legislation that placed control on prices, addressed capital gains taxes, and placed time limits on grants (ten years), and the myriad of SEC and IRS provisions shown in Table 2 that made executive compensation more transparent and therefore open to public scrutiny. It was not until 1983 that the movement toward increased transparency and regulation slowed down. During the tenure of President Ronald Regan, government backed off regulations in general and the SEC actually started to back pedal on transparency in 1983.

Further adding to the mix during the mid-century, the country had huge debts due to the war effort, the stock market was still sluggish, and the top marginal tax rate would remain above 70% until 1982. Despite the gloomy tax and economic conditions that surrounded the country's senior executives, there were a number of other noteworthy occurrences in the arena of executive compensation.

1948 – The first survey of executive pay (Ellig, 2006).
1967 – Conoco introduced the single-trigger golden parachute where benefits become payable automatically upon a change in contract or termination (Ellig, 2006).
1995 – Financial Accounting Standards Board (FASB) established regulations for the accounting of executive compensation on a firm's income statements (Kaiser, 2004)

Perhaps one of the more significant influences on executive compensation wasn't an event or regulation, but a management theory by noted management guru Peter Drucker and named Management by Objectives in 1954; this led to incentive plan goal setting (Ellig, 2006). This management practice combined with a rising stock market and increased use of stock options led to quickly rising salaries for senior executives. Exorbitant salaries led to indiscretions that would garner the wrath of the public and the government in a public arena.

TODAY'S PERCEPTION OF EXCESSES

Executive salaries kept rising at an unprecedented rate due to several factors including; the lowering of the marginal tax to 33% by 1987, a bull market that began in late 1982 and lasted 18 years, and a shortage of senior management talent. During this period of time, as long as executives optimized shareholder worth, executive salaries were approved with very few controls (Kaiser, 2004). The public continued wondering whether senior executives were paid too much. Kandel (2009) suggests that the answer to this question is based on at least four benchmarks that relate to pay level. First is one that resonates with the public, i.e., how the chief executive's salary compares to the average worker's pay. Second is the size of the company which seems to correlate with the complexity of the job. Third is how much other CEOs in the same industry are paid and fourth is the relationship to the total value that the CEO generates for the owners over

time. Of course, the latter is problematic in determining initial compensation since you are hiring in a CEO based on his or her track record at other companies,

Nor is this relationship between CEO pay and company value always a positive one. During the late 1990's, as the end of the bull market neared and prior to the dot com bust, shareholder values began to shrink while executive compensation remained static or grew and created tremendous personal wealth for executives (Kaiser, 2004). Three significant cases changed the environment of executive compensation forever, though each in a different way, but together created a perfect storm for executives.

Enron (2001)

This scandal was the granddaddy of them all. It consisted of huge compensation packages for executives ladened with incentives, accounting manipulation, a whistleblower that helped bring the whole scheme down, an accommodating auditor in Arthur Andersen, and a board of directors that ignored their fiduciary responsibilities (Giroux, 2008). At the crux of the case was the use of Enron stock to hedge the acquisitions of new partnerships, which in turn were used to make profits for the investors, namely Enron senior executives, in firms that were losing money. This in turn helped drive up the stock price that benefited senior executives as they began to cash in their options as the company floundered. In the end, over 30 Enron executives and employees were indicted by the Justice Department (Giroux, 2008). The repeated use of related-party transactions and Arthur Andersen's agreement to accept Enron's explanation of accounting problems led to the dissolution of Arthur Andersen as an accounting agency. In the end, an estimated $11 billion was lost by stockholders and a mandate from the public was issued that would culminate in the eventual passing of the Sarbanes-Oxley Act.

Jack Welsh CEO General Electric (2002)

All Jack Welsh wanted to do was quietly retire and enjoy his "stealth compensation" (Naughton, 2002, p. 44) from his employer General Electric. This contract was formulated in an era that lacked transparency and the only reason it became public was because it was revealed in his wife's divorce papers filed in court. The excesses were embarrassing: Red Sox tickets, a Manhattan penthouse ($15 million), country club membership, free use of a corporate jet, use of a helicopter and limousine, and $9 million per year in pension (Naughton, 2002). Coming on the heels of the Enron scandal and with the public watching, Welsh was forced to give it all back (except the pension). But the damage was already done. Compensation professionals were using Welsh's deal to secure similar contracts for their clients. So while Welsh did not benefit from his package, the notoriety it caused forced the SEC and The Conference Board (created by industry to restore the public's faith) to consider tougher disclosure rules and put more pressure on boards when negotiating executive compensation packages.

Trace International Holdings Inc. v. Cogan (2003)

In a case litigated in Delaware state court, the plaintiffs of a holding company sued the directors and officers of Trace International Inc. for violating their fiduciary responsibilities. Essentially the executives were charged with mismanaging the assets of the company by allowing the CEO, Marshall Cogan, to pay himself excessive compensation ($23 million in his last year), make inappropriate loans to himself and other insiders ($13 million), and then default on those same loans. One of the interesting aspects of this case is that the board members were found guilty of the mismanagement of assets of a company that was insolvent (Kaiser, 2004). The court held that individual officers of a private organization can be held liable for violations of their obligations to the stockholders of the corporation. Four senior executives that served on the board of directors were held liable for amounts ranging from $21.4 million to $37.4 million, and compensation committee members were personally liable for $4.2 million (Bean, 2004).

These three cases each had a profound affect on the needs for executive compensation to become transparent and for boards to accept fiduciary responsibility in negotiating compensation and severance packages. The results of these excesses led to the passage of Sarbanes-Oxley, perhaps the most influential legislation ever passed in respect to executive compensation.

SARBANES-OXLEY ACT (2002)

This act, also known as the Public Company Accounting Reform and Investor Protection Act of 2002 or SOX, was essentially legislation created in the wake of the great number of corporate scandals (Enron, Tyco, Adelphia, and WorldCom) that cost investors billions of dollars. The purpose of this act, named for the two legislators who sponsored it, Paul Sarbanes and Michael Oxley, was to restore public confidence in publicly held companies, reassure the securities markets, strengthen corporate accounting controls, and eliminate conflicts of interest for auditing firms that also provide consulting services (Giroux, 2008).

While SOX did not mandate changes in compensation methods, it did place restrictions on personal loans to executives (widely practiced). It also placed a strong focus on corporate governance issues and has become a catalyst for organizations to review their procedures in regards to executive compensation (Dennis, 2004). Because of SOX, both the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) have instituted controls that require the use of independent committees or committees composed of a majority of independent directors when determining executive compensation (Kaiser, 2004). The first executive to be targeted by SOX was HealthSouth CEO Richard Scrushy in 2004. Scrushy was accused by the SEC of encouraging the overstatement of earnings in an attempt to increase his own personal compensation. He was charged with 36 counts and eventually sentenced to seven years in prison.

Further government restrictions have been legislated through the Trouble Asset Relief Program (TARP).

TARP (2008)

The Emergency Economic Stabilization Act established a fund known as TARP and was created to purchase troubled assets from financial institutions to provide some means of stability to the financial sector (Barlas, 2008). Along with the TARP funds came significant restrictions concerning executive compensation.

- TARP restricted firms from paying bonuses to executives that would exceed one third of their salary (Story, 2009).
- Limited golden parachutes to no more than three times the executive's salary (Raab, 2009).
- Denial of benefits to executives that employed unnecessary or excessive risks that threatened the value of the firm (Raab, 2009).
- Firms must subject all bonuses and incentives to clawbacks (monies taken back) if the payments are based on misleading financial statements (Raab, 2009).

Michael S. Melbinger, a lawyer who studies executive compensation, noted that "some of the provisions on the pay restrictions on relief TARP recipients are punitive, intended to emphasize that this is government money and we don't want you giving it to executives " (Story, 2009, p. A.1). In fact TARP restrictions are so strong that ten of the nation's largest banks are repaying $68 billion in loans claiming that restrictions on executive compensation are hindering their efforts to retain key executives.

The restriction that received by far the most attention, however, was the Obama administration's decision to limit TARP-receiving CEOs to a salary of $500,000 a year calling the decision "basic common sense" (Jeppson, Smith, & Stone, 2009, p. 82). Opponents predicted that CEOs would abandon ship rather than give up their lucrative compensation packages. Instead, a 2010 article in the *International Herald Tribune* found that few financial executives actually left, although the restrictions affected just a "handful of the most troubled companies" (Dash, 2010, 14).

FUTURE IMPLICATIONS

The biggest implication for managers can be summed up in one phrase: retention without massive compensation (Scappatura, 2009). Organizations are trending towards greater use of restricted stock to encourage executives to remain with the firm for a defined period of time in order to reap the incentive (Dennis, 2004). Another strategy in using restricted stock is to link

vestment with performance. Compensation committees will be focusing on aligning the key components of compensation (cash and stock incentives) with organizational performance.

Shareholders are also demanding more say in executive compensation and severance packages. Rep. Barney Frank of Massachusetts pioneered legislation that would allow shareholders to vote on "change of control" in respect to compensation packages (Nocera, 2006, p. C.1). As a result, HR 4173, the Wall Street Reform and Consumer Protection Act passed the House in December of 2010. Among other things, it requires a "say on pay" vote at annual meetings for all public companies. Similarly the Dodd bill is working its way through the Senate. It is easy to conclude that there will be some widespread "say on pay" legislation in the very near future. Private firms may benefit from these reforms by luring top talent away because of their continued focus on long-term incentives and flexibility in adjusting compensation packages that are not possible with public organizations (Raab, 2009).

These implications are not just abstract theories; they are in fact real and are starting to be implemented. Say-on-Pay legislation, for example, has already proven effective in other countries including the U.K., Australia, Sweden, Norway, and the Netherlands. In the latter three countries, say-on-pay laws are binding. In all cases, experience has shown that proposed compensation packages are only rarely rejected, the reason being that communication has improved between the board and shareholders. While pay has not noticeably decreased, the link with performance has increased (Dew-Beker, 2009).

In a report on executive compensation released last December (Annual and Long-Term Incentive Survey: Decision 2009), 42% of organizations responding reported planning to implement or are considering changes in executive performance measures. Another 29% were planning or considering more absolute performance measures (Raab, 2009). The message is clear, organizations need to be responsible to their shareholders and be transparent in all their transactions when developing executive compensation and severance proposals.

CONCLUSION

The disconnect between the level of compensation for executives and society's expectation of what is rational is widening (Nocera, 2006). The ratios indicated in the very beginning cannot be justified in an economy that has a stagnant stock market and an unemployment rate approaching ten percent. Recent actions by the federal government, the SEC, and the Treasury Department indicate a frustration with companies in the design of their compensation and severance packages. The Treasury Department is in the process of creating broad guidelines that will encourage financial institutions not to build compensation packages that embolden risk taking through short-term compensation payments (Story, 2009). It is thought that these guidelines will apply to private firms too.

Organizations are moving towards performance-based compensation because of two significant factors; company wide protection and increased morale at every level (Tonn, 2008).

Compensation committees will be under heavy pressure by the government and shareholders to be independent, create compensation policies that create long-term focus, be vigilant in their fiduciary responsibilities, and above all, be transparent. The difference between disclosure and transparency, however, must be emphasized since disclosure in obtuse reports does not help the public assess the CEO pay and performance relationship (Bebchuk & Fried, 2006).

The 2009 TV coverage of the Big Three auto CEOs testifying before Congress after arriving in their individual private jets is fresh in the minds of the American public as is the 2010 image of the BP CEO testifying about the still-flowing oil in the Gulf of Mexico one day and attending a yacht race in Europe the next day. Public opinion is a fickle phenomenon and once awakened, that public opinion can be a powerful force for change. At the very least, we can expect a continued call for transparency and disclosure in the near future.

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RELATIONSHIPS BETWEEN TECHNOLOGICAL AND SOCIETAL CHANGE

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ABSTRACT

The author of this paper discusses how the implementation of technology has affected societal change. The author examines how technologies that are implemented by businesses have a far reaching effect beyond the business organization. A brief history of technology and social change is presented. This historical discussion includes events that drove the growth of technology as well as those that have limited its growth. An example of unintended consequences from the introduction of technology is also examined. The author examines trends in information technology and social change. Telecommunications, enterprise business software, and internet technologies are presented and discussed in terms of how they create borderless business environments and require less personal interaction.

The author concludes with an organizational change perspective on how societal factors should be included in the implementation of technologies as these technologies become more widely available to small businesses as well as large ones. The author calls for more research on the subject of how effective organizational change methods are on technology implementation initiatives.

INTRODUCTION

A major issue in the implementation of new technologies at corporations is how the changes to organizations are identified and executed. Over the past few years, corporations have implemented new enterprise-wide software systems to improve business efficiencies and give themselves competitive advantages over their competitors. The growing popularity of the internet and its business potential has fueled this rush for businesses to increase their ability to do electronic commerce.

As computers perform more tasks in an organization, the need to change the structure of the organization grows. Some departments expand while others are eliminated. Human resources may be eliminated or reassigned. People may be required to change their home environment as the workplace moves to a more virtual model. Changes in business processes often require additional education to allow people to gain new skill sets.

Technology implementers recognize the need to manage these organizational changes. They also recognize that the changes extend beyond the workplace affecting other areas of society. Failure to effectively manage these changes often results in a less-than-expected return

on the technology investment. In the worst cases, the implementation of technology can have a detrimental effect on the business. Hank Bromley (1997) says "Understanding the role of technology requires a nuanced, flexible study, one that does several different things at once, and balances them in ways that cannot be specified in advance" (Brightman & W., 1999, P. 65).

Many technology consultants now include organizational change components to their implementation plans. Specialists are brought into the projects at the beginning to help identify the change effort required and lead that part of the implementation project. These specialists work with the members of the organization to explain the changes and why they are necessary. They help the company and its people work through the cultural barriers to change and deal with the adverse effects to it (Goodwin, 2001).

Max Weber studied how societies and businesses changed with the growth of capitalism. In his theme of rationalization, he described how economic values brought forth a form of calculation in human activity that was more precise than traditional methods of social measurement. This rationalization led to the development of calculable law and the development of that part of the legal system that pertains to commercial activity. The gain spirit that evolved from these developments changed the way economic and religious aspects of society related to each other. These changes in that relationship shaped the way societies evolved. This evolution continues as technological advances bring commerce and the workplace into people's homes. It continues in business organizations as corporate cultures are called into question just as religious traditions were during the industrial revolution (Weber, 1922/1961).

A Historical Review of Technology And Social Change

Technology has always been a part of human civilization and has had a role in its evolution. The wheel, spear, cooking, and every other advancement that has allowed humans to improve their condition are all examples of technology. Each advancement has allowed the society in which it was developed to achieve things that it was not able to achieve before (Temporary National Economic Committee (TNEC), 1999). A report by the Temporary National Economic Committee states:

> *Technology refers to the use of physical things to attain results which human hands and bodies unaided are incapable of achieving. In this sense, technology reaches back to the beginnings of human culture, has always played a highly significant role in social evolution and will remain a mainstay of civilization (TNEC, 1999, p. 138).*

To this point, technological advances are part of the natural development of humans and their societies. Advances in knowledge and technical understanding lead to the production and application of new technology which then causes changes in society (Norman, 1981). Collin Norman describes it this way:

> *Technology development, according to this view, is an evolutionary process, not unlike biological evolution. We even speak of new generations of computers, automobiles, and other high-technology goods as if they were biological descendents of earlier models, and key technical developments are often regarded as the progenitors of a whole range of subsequent innovations (Norman, 1981, p. 20)*

Historically, many social changes have been determined by technology. The introduction of technology changes the way society functions. "This concept lies unstated behind such terms as the Bronze Age, the Machine Age, and the Computer Age" (Norman, 1981, p. 20).

Looking at the evolution of technology and the idea that social change follows technological advancements, one can draw correlations between the development of agricultural technology and the rise of the cities in Sumeria as the land was able to support more people. The development of steam power made the machines of the industrial revolution possible (Norman, 1981).

Like biological evolution, technical evolution is either nurtured or defeated by the forces surrounding it. The ancient Greeks actually invented steam power (Norman, 1981). Norman observes that:

> *Technical evolution, like biological evolution, responds to a variety of forces. Biological evolution is driven by environmental pressures that favor the survivability of some species over others-insects resistant to an insecticide will swiftly predominate in a sprayed area, for example-and the key to the development of living things can be found only by looking at them in relation to their environment. Similarly, the key to technological development lies in the environment in which technological change takes place-in this case, the social, economic, political, and physical environment (Norman, 1981, p. 21).*

Corporations dominate the development of technology in the western industrialized countries and in Japan. This commercial thrust guides much of the pace and direction of technological development (Norman, 1981). One can distinguish between capitalism and technology, but the two have been closely associated during the time of their shared history. Capitalists funded the development and deployment of technology to enhance income and profit (TNEC, 1999). The Temporary National Economic Committee noted that:

> *There was a conflict of interest between the two at times, but since the capitalist was the partner with the controlling resources, his will in the long run had the right-of-way (TNEC, 1999, p. 138).*

Social change, as the result of technological advancements, is not always in the best interest of everyone affected. In the above-mentioned example, the capitalist steers the advancement in the most profitable direction. To examine another, more macro environment, the British established new towns to deal with population migration in areas where intervention by others was limited (Hill, 1997). Michael Hill makes this observation about British societal development:

> *The new towns are examples of successful British innovations of this kind. What is interesting about them is that, while the development corporations acquired powers that gave them a great deal of autonomy within their own territories, there is today a variety of questions to be raised about the extent to which their success was secured at the expense of other policies to which they ought to have related. While the new towns often built up relatively successful, prosperous new communities, they did little to relieve the problems of the least privileged old communities from which they drew; hence, while they have helped to solve some inner-city problems, by providing for 'overspill', they have exacerbated others (Hill, 1997, p. 92).*

As with any change agent, the affect of the introduction of technology on a society is more dependent on that society's current environment and its willingness to nurture the change brought on by the technology. The technology itself is primarily dependent on the social and economic forces that control it. The Temporary National Economic Committee wrote the following about technological neutrality:

> *Technology is relatively neutral; the more dynamic forces lie within the economic system that controls it. If this system is socially wholesome, its employment of technology will be socially advantageous; if it is less than this, its influence will be uneven-rendering benefits here, disadvantages there, as the prevailing cluster of conflicting economic forces may decide (TNEC, 1999, p. 139).*

The capitalistic thrust behind the development of technology and the profit-maximizing agenda contained therein often meets with resistance from the labor force in which the technology is being implemented. Labor feels threatened by the implementation of technology that enhances efficiency. Norman observed the following correlation between technology and labor:

> *In other words, production technologies not only combine energy and raw materials in the manufacture of goods, but they also provide the means by which labor forces are rationalized and controlled (Norman, 1981, p. 23).*

The Temporary National Economic Committee seemed to echo this when it wrote:

> *Americans struggled in the depression years to understand the painful mystery of widespread unemployment. Many blamed technology for displacing workers (TNEC, 1999, p. 137).*

U.S. census information shows, however, that eighteen new industries created since 1879 absorbed almost one-seventh of all labor employed in manufacturing in 1929. These industries included such new technologies as electrical machinery, motor vehicles, gasoline, manufactured ice, refrigerators, phonographs and fountain pens (Committee, 1999). These new jobs did, however require new worker skills than the ones they replaced.

To examine the effect of technology on societies, a study of nine countries was done to examine technological growth between 1900 and 1964. The study found that:

> *The technical status of the world as a whole advances at a roughly constant exponential rate, doubling every twenty years, or in effect, every generation (Gordon & Shef, 1999, p. 279).*

Countries are divided between those that are technologically advanced and those that are underdeveloped. Although there is a wide variance between the technical levels of these two groups, their growth rates are consistent (Gordon & Shef, 1999).

The study's authors also examined what factors might limit technological growth. In terms of the current state of technology, growth would be limited when:

1. When societies know how to do all things.
2. When societies lose interest in the reinvestment process.
3. When societies become non-technological, like the porpoise: intelligent but without machines (Gordon & Shef, 1999).

The authors also examined other limiting factors that could arise in the future.

1. Combined technological and social advancement of a society brings social ills that sometimes require even more technology for their cure.
2. When the technological growth curve progresses to the point that all further technological advancement is devoted to the maintenance of the status quo (Gordon & Shef, 1999).

Catastrophic events such as war could halt or cause technological regression by destroying the minds and media that hold information. An example of this is how the burning of the library of Alexandria destroyed much of the written history of early civilization (Gordon & Shef, 1999).

Sometimes the introduction of technology does not yield the expected results. Given the capitalistic force behind many technological implementations, the ultimate goal of the project is to improve productivity and/or reduce cost. Stakeholders analyze facts to predict outcomes and set expectations. Even though predictive analysis is done prior to implementation, external factors can cause unpredictable results or adverse side effects in other areas. One example involves the introduction of tractors to farmers in Pakistan.

In the late sixties, the government of Pakistan secured a loan for $43 million from the World Bank to import 18,000 large tractors. Large landowners were given the opportunity to purchase these tractors on very attractive credit terms. The farmers who purchased these tractors were able to increase their production as well as their incomes. A study in the early seventies revealed some unexpected results (Norman, 1981).

The powerful tractors allowed the farmers to cultivate larger areas than the oxen they had used before. This allowed the average farmer to double the size of their farm. This forced many

small farmers off their land, and reduced the amount of labor hired by the large farmers. It was found that each tractor resulted in the loss of five jobs. The tractors were introduced to increase agricultural production, but in actuality the tractors were found to have no effect on crop yields or on the number of crops grown. It was found that the distribution of the benefits from this program had been biased in a way that was actually socially regressive due to the loss of jobs, the loss of land by small farmers, and the lack of increased crop production (Norman, 1981).

Because of the ties that technology advancements have to industrialization, scholars often attack the problem of social change in underdeveloped countries in terms of the idea of technological development. Industrialization and technical development are not the same thing. Many technical developments, such as the wheel, the canoe, and the building of ponds are not directly related to industrialization. Many scholars regard industrialization as one form of technical development. It is important to address technology and industrialization separately when looking at social change. The introduction of an industrial system may involve new equipment and methods as technical innovations, but industrialization may introduce new practices to society that are not technical (Blumer, Maines, & Morrione, 1990). Herbert Blumer describes it in this way:

> *Industrialization may bring a rich variety of practices that in careful use of terms would not be regarded as technological, such as the use of female labor, the over employment of workers, the recruitment of an alien managerial class, a given system of factory discipline, minimum wage legislation, the organization of workers, a sales force, and the development of loan associations (Blumer, et al., 1990, p. 19).*

The concept of industrialization as technical development is useful in tracing the history of how manufacturing has developed, since the manufacturing sector is constantly looking to improve efficiencies. It does not, however, help in the study of how the development of manufacturing systems affects group life (Blumer, et al., 1990).

Trends in Information Technology And Social Change

J.C.R. Licklider commissioned research for the U.S. Defense Department that led to the internet. In his 1968 report, he described an environment of telecommunications that would allow people to work at computer terminals and share information. His prediction said:

> *When people do their informational work at the console and through the network, telecommunication will be as natural an extension of individual work as face-to-face communication is now. The impact of that fact, and of the marked facilitation of the communication process, will be very great - both on the individual and on society (Licklider, 1999, p. 277).*

Today, computers touch most aspects of people's work lives. Personal computers at desktops are networked with each other and departmental computers. These departmental

computers are networked with large corporate computers. These chains of corporate computing power are linked to the internet where they are networked with computers from other companies and those in the homes of individuals. Business transactions, electronic mail, and personal entertainment all flow through the world-wide web of the internet. This change has happened quickly over the past ten or so years. Technology is one of the major drivers of change in the ways that people work, seek information, communicate and entertain themselves (Drake, 2000).

The work place has been greatly affected by this technical change. This change has caused a ripple effect into the home life of employees. More people are working away from their offices. Many work at home. A 1995 survey showed that 18 percent of Americans worked at home one day per week (Lipset & Ray, 1996). A 2009 study showed that telecommuting had increased to 77 percent of Americans in 2006 but dropped to 72 percent in 2008 (WorldatWork, 2009).

This change in the workplace and the global systems access has led to organizational restructuring. One fallout of this IT-based reengineering has allowed companies to restructure and focus on core business functions with small essential staffs and activities. Companies are adopting processes which emphasize international coordination. Technology has changed the context of workplace relationships and made them more virtual with less physical contact (Kouzmin, Korac-Kakabadse, & Korac-Kakabadse, 1999). Online capabilities greatly expand computer usage into actual interpersonal interaction (Lundberg, 2000). However, in some cases this lack of personal interaction has distorted human perceptions and produced a transparency of individual contributions to the organization (Kouzmin, et al., 1999).

This ability to work from home is dependent on employers implementing computer systems and business processes that facilitate it. One of the ways that companies accomplish this change is by implementing an Enterprise Resource Planning (ERP) system.

ERP systems allow companies to integrate various pieces of departmental information within their business computer systems. This information can then be made available through telecommunications to virtually anywhere in the world. Home access is actually a byproduct of this electronic integration. The promise of ERP implementations is the efficiencies derived from this integration (Gupta, 2000).

Almost all computer application systems are data acquisition, storage, manipulation and display tools. In older systems, the tools used by the various functional areas of a company were not integrated. An ERP system does the same thing as these traditional systems except that the tables containing the many data elements are linked together. Business transactions that use cross-departmental data are able to access that data through the use of these linked tables. As a result, the information is not confined by functional or departmental boundaries. The same data elements can be used by different people for different functions regardless of their physical location or discipline (Gupta, 2000).

Early forms of ERP software were only available to large companies. Advancements in information technology and the drastic reduction in computer prices have made ERP systems a possibility for even small companies (Gupta, 2000).

CONCLUSION

Companies introduce new technologies to give themselves a competitive advantage. Technology often represents more efficient and accurate ways of performing business tasks, especially in the industrial sector. This explains the capitalistic force behind much of the new technology that is developed.

The introduction of technology is often plagued by problems. Unexpected social changes can sometimes have a negative effect on the societies in which technology is introduced. Changes in the workplace spill over into home and community life. The intrusion of the workplace into the home, the displacement of workers by new tools and methods, and the tradeoffs between the comfort of the status quo and the turmoil associated with technology implementations all take a toll on the people and societies in which they occur.

The implementation of information technology can improve operational efficiencies in a company and give it a competitive advantage. The move to such technologies has proven to be disruptive to the business in terms of financial performance and the organization of its people. Both of these disruptions introduce a level of business risk. To minimize this risk, the organizational change aspects of these implementations are beginning to be addressed as part of technology implementation projects.

ERP systems represent a large segment of the new technologies being introduced in large and small corporations. The implementations of these software packages often require major changes in business processes and organizational structures. In some cases these technologies become the driving force behind business process reengineering.

Some studies dispute the idea of changing business processes to implement technology. Those who subscribe to this school of thought believe that software should be adapted to current business processes and that flexibility should be required more of the technology than the organization.

Organizational change efforts add cost to a technology implementation. In some cases, not doing organizational change has been very costly, also. Additional research should be done to address the question of the effectiveness of organizational change efforts in a technology implementation project.

With the number of ERP implementations that have occurred over the past few years, there should be enough examples of varying levels of organizational change efforts from company to company. A study of the level of organizational change effort and the attainment of expected outcomes of technology implementations could be done. Measurements of financial performance, before and after the implementations, and the organizational change budgets along

with departmental headcount changes would be one way of assessing the relationship between project performance and organizational change.

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