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It is our pleasure to present the *Proceedings of the 8th Annual Appalachian Research in Business Symposium* from the 2021 conference. The conference was held virtually on March 26, 2021, hosted by the College of Business at Eastern Kentucky University.

The Appalachian Research in Business Symposium provides a venue for presenting new research, discovering contemporary ideas, and building connections among scholars at Appalachian State University, Eastern Kentucky University, East Tennessee State University, Marshall University, Radford University, and Western Carolina University.

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# Team-Based Learning in Marketing

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**Introduction**

The National Association of Colleges and Employers (NACE) conducts annual employer surveys about the most important resume attributes to employers. Over the last ten years, the "ability to work in a team" has been one of the top three skills employers are seeking ("Key Attributes," 2020); therefore, it is absolutely necessary that university programs assist students in the development of teamwork skills that will enable them to work collaboratively with others in the workplace (Betta, 2016; Pate, 2020). Are professors of higher education adequately preparing marketing students with the teamwork skills to be successful in the workplace? Industry experience through internships and group assignments in the classroom may be utilized to develop effective communication skills and the ability to interact with groups ("The Key Skills," 2017) but is this enough training and development to meet the needs of employers?

The purpose of this case study is to share professional experience using team-based learning (TBL) in a marketing course and to identify best practices reviewed in the literature for enhancing student learning through TBL. As marketing students prepare for careers in the industry, experience working collaboratively in the classroom increases student confidence and the ability to function effectively on teams in the workplace.

## Literature Overview

Group work is expected in schools of business by the Association to Advance Collegiate Schools of Business (AACSB). Accreditation standard 4: Curriculum encourages experiential learning opportunities and active engagement of students in learning ("Guiding Principles and Standards," 2020). This learning model includes team-based projects. The TBL method requires student accountability to the instructor and peers through a grading system made up of multiple components: individual preparation and performance; collective preparation and performance; and peer-assessment and evaluation (Cestone, Levine & Lane, 2008).

Fink (2013) recommended TBL in a "particular sequence of activities that transforms groups into teams and then uses the extraordinary capabilities of teams to accomplish a high level of content and application learning" (p. 148). This method requires that students read the relevant material on their own, come to class to take a test on the material individually and in a group, and then spend a significant amount of time working in small groups on application exercises (Fink, 2013). The TBL strategy contains frequent small-group interaction to increase students' ability to apply course content and to develop self-managed learning teams (Michaelsen, Sweet & Parmalee, 2008). Betta (2016) also found an increased level of interdependence between the team and individual using the TBL method.

## Methodology

Inspired by a workshop conducted at the researchers' university by Dr. Dee Fink on "Designing Courses for More Significant Learning," the authors used the TBL approach to revitalize a traditional lecture-based marketing course with more active learning strategies. At the beginning of the course, the instructor formed heterogeneous teams of 3-4 students. The three phases for each of the ten units throughout the semester were: Phase 1 - independent study to master identified content, Phase 2 - readiness assurance tests, and Phase 3 - application of course concepts.

The instructor posted guided note-taking sheets on the university's online course management system for the assigned chapters before each Readiness Assessment Test. In Phase 1, students were to read the assigned textbook chapters, take notes, and study the material prior to class. In Phase 2, the instructor and graduate assistant administered the Individual Readiness Assessment Test (iRAT) and Group Readiness Assessment Test (gRAT) during class. After each gRAT test, the instructor took time to resolve any queries or misconceptions about the assigned reading materials. Student RAT grades were calculated from individual (iRAT) scores and group (gRAT) averages.

After completing Phase 2, students began the designated group application activity. The Phase 3 in-class or out-of-class application activities (related to the applicable chapter) were due at the end of the class for the date assigned. After completing Phase 1, 2 & 3 for all ten units, students used the skills they had obtained to create and construct two visual displays of apparel products for their final projects. Each group turned in an electronic "scrapbook" photographically documenting the entire process as well as the final displays. Each student also turned in an individual written summary/evaluation of the group displays.

The first year the TBL marketing course was offered, the instructor gathered feedback from students through a written student reflection after unit four, a focus group interview at mid-term, and a survey for student assessment of team-based learning at the end of the semester. The second year, the instructor gathered student reflections after unit four and a survey for student assessment of TBL at the end of the semester.

The Team-Based Learning Student Assessment Instrument (TBL-SAI), used with permission from Heidi A. Menninga, provided student feedback about accountability, preference for TBL learning, and student satisfaction. The TBL-SAI questionnaire employed a Likert-type scale (1=strongly disagree to 5=strongly agree) to assess these constructs. The collected data was input into SPSS for evaluation and assessment.

**Results and Implications**

The first year, the survey participants consisted of fourteen students (n=14), and in the second year there were six participants (n=6), for a total of twenty participants in this case study (n=20). Of the participants surveyed, 80% were female, 75% were Caucasian, 80% were juniors, and 90% were between ages 20-22.

Notable findings related to student accountability: 85% of participants indicated that " I spent time studying before class in order to be more prepared" and that "I feel I have to prepare for this class in order to do well." Similar data were not collected from traditional lecture classes to compare to this study, but the TBL learning method used in this case study is believed to have significantly increased student preparation. In addition, 90% of respondents reported, "I contribute to my team members' learning." This can be used as one indication of teamwork effectiveness.

Notable findings related to student preference for TBL learning include: 80% of participants agree or strongly agree with the statements, "I remember information longer when I go over it with team members during the gRAT used in team-based learning" and "I easily remember what I learn when working in a team." Similarly, 80% of participants reported that TBL activities helped information recall. In contrast, 70% of respondents indicated, "It is easier to study for tests when the instructor has lectured over the material." The researchers infer from the data that the students recognize the value of the TBL environment but might prefer when the instructor lectures because the it does not require as much of them and it is easier or faster to take notes during lectures. Further investigation is needed to understand exactly why students think that studying for tests is easier when the instructor lectures.

Related to student satisfaction, 80% of respondents indicated "I enjoy team-based learning activities" and 60% indicated "I learn better in a team setting" yet only 55% of respondents indicated they strongly agree or agree to "I had a good experience with team-based learning." These responses indicate that participants may need additional tools or more assistance from the instructor on effective group interaction and participation.

Only five students provided written comments about the TBL learning experience. These written comments included both positive and negative feedback. One student stated, “Team-based learning is incredibly frustrating to me. I would rather work by myself. It has affected my learning this semester as well as my grade.” Another student commented, “I thoroughly enjoyed the iRATs and gRATs. They were a good, exciting, and more fun way to learn.” Fifteen participants did not provide any written comments. In future studies, written comments to support the Likert-type survey evaluations could be required.

## Conclusion

The TBL approach the researchers used in this marketing course required a drastic revision of course exams and activities causing the instructor and the students to grow from the experience. In the future, the instructor will work to explain the value of the TBL course structure more thoroughly and discuss its application to industry. The instructor will also assist groups with effective group communication tools and provide additional time for out-of-class activities and assignments.

Limitations of this case study include the small sample size and the fact that data were collected at only one university. In addition, the effect of TBL on student grades could not be measured because this course was previously taught by another professor who has since retired and student grades were not available. Suggestions for further research studies include applying the TBL structure in additional marketing courses. Results could differ depending on the course content and instructor style of teaching. Another suggestion is to examine student grade improvement in relation to TBL accountability and satisfaction. Finally, researchers could follow these participants into the workplace and seek employer feedback about the effectiveness of student teamwork skills as compared to students without TBL courses.

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# What is the Relationship Between International Trade and Migration?

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Immigration, International Trade, Voter Attitudes, Symmetrical or Inconsistent

## Introduction

There have been few issues that have consistently occupied the attention of policy makers and citizens of most developed countries than in international migration and to a lesser extent, corporate globalization and international commerce. Election campaigning in the US in 2008, 2016 and 2020 has been strongly influenced by the stated position of candidates on migration and asylum policies. In Europe too, once - fringe political parties with strong anti-immigrant or populist views have gained legislative power in several countries such as France, Denmark and Austria.

Although corporate globalization and international trade have pre-occupied the attention of some segments of the labor force international trade, while pervasive in its effects is largely ubiquitous. Nor have the public or policy makers in the US viewed migration and trade and closely related in their effects. In Europe, both trade in goods/services and capital were liberalized along with free mobility of persons, but this was more the result of ideological allegiance to the notion of single European market, rather than articulated economic reasons.
This dichotomized view of trade and migration among policy makers has not been replicated among professional economists, political scientists or public choice theorists. Specifically, and while not initially focused on the relationship between trade and migration, early, classical trade models predict a close relationship of substitutability between trade and migration.[1] Thus,

[1] This can be readily deduced from the simple version of the workhorse Heckscher Ohlin trade model. Basic textbooks in trade do not typically present the model in these terms but the implication of substitutability between trade and migration is very easily deduced. See for example, Krugman, Obstfeld and Melitz (2018), Feenstra and Taylor (2019) among others.

countries may choose to trade goods which leads to convergence of factor prices (wage and rental rates) and reduced incentives to migrate internationally. Alternatively, with free migration ("open borders"), factor prices also converge as do prices of goods, thus eroding the basis for trade. Trade and migration are thus substitutes in these simple models. One may import tomatoes or tomato pickers as one Mexican president famously said.

More complex trading structures embodying monopolistic competition, increasing returns to scale or core-periphery models may complicate or reverse this strict substitutability relationship.[2] I mention some of these extensions below, but that is not the focus of this paper.

In this paper, I inquire into two issues that have been largely underdeveloped in the professional literature. First, what is the relationship between regime type (liberal democracy v autocracy) and the country's chosen migration and trade regimes? For example, are liberal democracies more pro-immigration and/or more pro-free trade or conversely. We discuss this first, from the perspective of the expected relationship based upon socio-economic considerations. Thereafter, I examine whether the predicted relationship between regime type and migration/trade policies is empirically validated, even if indirectly. Second, I turn to a more microscopic examination of expected voter preferences regarding migration and trade in rich v poor countries using interest group analysis. Empirical testing of the predicted relationship is then discussed. There appears to be broad consistency between predicted preferences and those expressed by voters or survey respondents.

**Literature Review**

There is ample literature on trade models/theories which imply a strict substitutability relationship between trade liberalization and incentives to migrate. Most modern textbooks in international trade such as Krugman, Obstfeld and Melitz (2018 and Feenstra and Taylor (2019) etc. discuss the standard vintage models of trade, factor price equalization and the Samuelson-Stolper theorem (dealing with the effects of trade or protection on factor distribution in the country). Modern textbooks also explain the effect of more complex market structures such as monopolistic competition, scale effects and geography and trade on the predicted pattern of trade and the implied effects on incentives to migrate. See for example, Krugman (1992) and Helpman and Krugman (1985).

Our focus in this paper is the type of political regime of a country and its trade/migration regimes. Additionally, we also examine individual voter preferences over trade liberalization and migration restrictiveness in countries with different regime types (democracies v autocracies). The seminal work which codes regime types is by Boix (2002), later updated in Boix, Miller and Rosato (2012) and Decker and Lim (2009). With respect to restrictiveness of immigration policy, Williamson and his colleagues (Timmer and Williamson (1996), Williamson (2002), Hatton and Williamson (2006) have published several articles on the political economy of immigration. Other references include those on economic history by Williamson (2004 and 2006) and some general work related to economic policies and regime types by Wintrobe (1998), Przeworski et al (2000) and Mulligan (2004). A literature search reveals very few papers on regime type and immigration and trade. These are Mirilovic (2005 and 2014) and Collins et al (1997) addressing the historical relationship

[2] See for example, Bhandari (2010) and Del Rio and Thornworth (2009).

between trade and migration policies. Finally, empirical data on voter attitudes is derived from voter surveys or polls. Three are of note: those from the International Social Survey Programme, the World Values Survey and the European Social Survey.[3] There is also the Index of Economic Freedom utilized by some researchers which provides rankings on freedom of trade and investment policies of various countries.[4] A survey of papers utilizing the indices of the Heritage Foundation is contained in Hall and Lawson (2014). Finally, although not strictly related to my topic, an interesting paper dealing with the impact of arriving immigrants in US economic institutions and hence resistance to immigration is by Padilla and Cachanosky (2020.

## Methodology

We (a) investigate the relationship between regime type and the nature of migration and trade policies and (b) deduce the expected preferences over trade and migration at the individual level and (c) compare these preferences with those revealed in the voter surveys referred to above. Deducing the preferences of voters over trade and migration requires an analytical framework. I have utilized the standard classical trade model. This model has the advantage of being well-known and of yielding clear implications for voter preferences. When this baseline Heckscher-Ohlin model is extended to include more complex market structures such as monopolistic competition, increasing returns to scale or specific factors of production, preferences over trade and migration become ill-defined because the underlying relationship between trade and migration is no longer clear-cut.

## Results and Implications

a. Consider first the relationship between regime type (i.e., liberal democracy v authoritarianism) and migration policy (pro-immigration v restrictive). Although, it may initially seem surprising, we should expect that authoritarian regimes (particularly those in rich nations) will adopt more liberal immigration policies than their democratic counterparts. This is so for a number of reasons. First, liberal democratic regimes are more responsive to the preferences of the median voter due to the existence of contested elections. However, the median voter in most countries is only moderately skilled with limited access to resources. Because most migrants happen to be low skilled, the median voter and hence the government in liberal democracies is likely to oppose further immigration which might threaten the median voter. This effect is absent in authoritarian regimes in which meaningful voter franchise is limited.

There is a second reason for the expected pro-immigration stance of autocracies compared with liberal democracies. This relates to the existence of the welfare state. Unskilled migrants require welfare transfers, for example, food stamps, subsidized housing, medical care etc., all of which impose fiscal and tax burdens on the democratic, receiving state. Such fiscal burdens can be more

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[3] For details regarding these surveys see, www.issp.org, www.worldvaluessurvey.org and www.europeansocialsurvey.org.
[4] See https://www.heritage.org/index/about

easily avoided in authoritarian regimes. These factors mean that migration of younger, skilled workers is likely to be encouraged by both liberal democracies and authoritarian regimes.
Are these predictions empirically corroborated? Using Boix's listing of regime types and utilizing the Timmer -Williamson index of restrictiveness of immigration policy at least until 1930, the validity of the principal hypothesis seems to be established, i.e., democratic regimes are more likely to pursue restrictive immigration policies than their authoritarian counterparts.[5] Cross section and panel data tests for the last quarter of the twentieth century also corroborate this thesis.

Consider next the relationship between regime type and protectionism of trade policy. Work in this area is even more limited than with respect to migration.[6] Does broadening the voter franchise lead to more liberal trade policies? The answer depends upon whether the median voter stands to gain or lose from liberalized trade. While the benefits of trade are ubiquitous and widely dispersed, its costs are visited upon the scarce factor whose relative returns fall in the standard trade model through Samuelson-Stolper effects, In advanced countries such as the US and Canada, labor is the scarce factor compared to capital and liberalizing trade is expected to draw opposition from the median voter who has low to moderate labor skills. Thus, expanding the democratic franchise will lead to pressure upon elected governments to restrict trade. Historical analysis by O'Rourke and Taylor (2006) for 35 countries seems to indicate that the extent of democratic franchise is a significant determinant of protectionism.

b. In this sub-section, I briefly conduct a more microscopic examination of individual preferences over trade and migration. Such an exercise is only relevant to democratic liberal regimes, whether rich or poor, since voter preferences are of marginal relevance in authoritarian regimes.
The standard trade model employs only two factors. For ease of exposition, assume these factors to be skilled labor and unskilled labor. By definition, rich countries are abundant in skilled labor and scarce in unskilled labor, while the opposite configuration prevails in poor countries. The Samuelson-Stolper proposition thus yields the following predictions. Trade liberalization (protection) benefits the abundant (scarce) factor everywhere. Hence, skilled labor is expected to be pro-trade in rich countries while unskilled labor would tend to oppose trade liberalization (which would lower wages of unskilled labor). In poor countries, the abundant factor is unskilled labor and symmetrically, unskilled labor would support liberalized trade while skilled labor in such countries would oppose it. Finally, because in the classic Heckscker-Ohlin framework, trade and migration are complete substitutes, the same configuration of preferences over trade and migration will prevail in each country, i.e., skilled labor is also pro-migration in rich countries and conversely for unskilled labor.

These predictions can be conveniently summarized in the following:

| | Rich Country | Poor Country |
|---|---|---|
| Skilled Labor | pro-trade/pro-migration | anti-trade/anti-migration |
| Unskilled Labor | anti-trade/anti-migration | pro-trade/pro-migration |

[5] Timmer and Williamson (1996). Over the period 1850-1930, the index of immigration restrictiveness for the major democracies is only -0.16, while for authoritarian regimes it is much more liberal, i.e., 1.8
[6] A few early exceptions are Morrow et al (1998) and O'Rourke and Taylor (2006).

More complex trade structures such as monopolistic competition etc. can easily disrupt the substitutability relationship between trade and migration. If so, the preference structure deduced above would also be undermined. As of this time, while there is plenty of writing on complex trade models (See Helpman and Krugman (1985) and Krugman (1992), the interest group analysis developed above has not been extended to such models.

c. Are these implied preferences over trade and migration policy validated in practice? The three surveys utilized in this paper are the World Values Survey, European Social Survey and International Social Survey. With respect to migration, there appears to be some support in expressed preferences for the predictions outlined above; the high skilled are less opposed to migration than unskilled migration than the unskilled. However, contrary to the results described in the chart, skilled labor everywhere (i.e. in rich and poor countries) is likely to be more liberal with respect to migration than unskilled labor.[7]

Results with respect to sentiments about trade policy are broadly similar in voter surveys.[8] While nationalist sentiments may play a strong role in explaining voter attitudes toward protectionism, better skilled workers, especially those in rich countries are likely to be pro-trade. Surprisingly, there is robust evidence of a gender gap in both rich and poor countries with respect to trade preferences. Women everywhere appear to be more protectionist compared with men at equivalent skill levels.

## Conclusion

This paper has dealt with the relationship between the type of political regime (i.e., liberal democracy v autocracies) and the predicted posture of trade and immigration policies. We inquire whether trade and migration regimes of democracies are more likely to be more liberal or restrictive than those in autocracies or vice versa. We have also utilized interest group analysis to conduct a microscopic examination of individual voter preferences over trade and migration in rich v poor countries.

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[7] See for example, O'Rourke and Sinnott (2006), Mayda (2006) and Hainmuller and Hiscox (2007).
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# Toward True Price-to-Risk Matching: The Importance of Risk-Based Pricing and Transparent Subsidies in a Sustainable Insurance Market for Inland Flood

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Flood risk, insurance, catastrophe, price, subsidy

**Introduction**

Floods are the most common and destructive natural disaster in the United States, with 90 percent of natural disasters involving floods. All 50 states have experienced floods or flash floods in the past five years (National Association of Insurance Commissioners and Floodsmart.gov), and in every state the majority of these events occurred inland. Inland flooding can result from multiple sources – flash flooding, river flooding, the rainfall that accompanies tropical storms, dam breaks/levy failure, snow melts and debris jams.

Mortgage lenders generally require flood insurance coverage for borrowers on homes that lie in high-risk flood zones. The National Flood Insurance Program (NFIP) has been virtually the only choice for residential flood insurance coverage since the 1960s. Despite significant flood risk, the NFIP experiences low participation rates among homeowners – somewhere between 5 and 15 percent of homes overall and approximately 68 percent of properties located in Special Flood

Hazard Areas (SFHAs) – and remains in a large financial deficit based on its risk (and loss) portfolio of homes it has insured (NCRB, 2019; Insurance Information Institute, 2021). Furthermore, inland communities subject to flooding risk are simultaneously more economically vulnerable to flood losses and less able to pay for flood insurance than their coastal counterparts, as evidenced by significantly lower median (and average) household incomes and property values. We assert at least two changes for development of a healthy insurance system for flood, and more specifically for inland flood: 1) match price commensurate with the risk being insured and 2) provide premium subsidies based on both risk and financial need.

**Literature Overview**

Risk-based insurance pricing is predicated on the same concept as the pricing of other goods and services – that a sustainable market charges prices that cover the "cost of goods sold" and in a private market environment, allows for a reasonable profit. Insurance pricing is made more complex than it might appear on the surface, however, since the "cost of goods sold" is unknown until sometime after the originating insurance transaction. Actuarial and flood loss modeling are employed by private insurers to estimate the losses that will result from underwriting property risks, and these estimates are used for risk aggregation and insurance pricing.

There is ample literature in the fields of disaster risk and insurance economics indicating the price-risk match within the insurance contract is important to optimize insurance availability and reduction of the underlying risk, both broadly (Arrow, 1971; Doherty and Schlesinger, 1983; Cummins, 1991; Harrington and Doerpinghaus, 1993; Harrington and Danzon, 2000; Eeckhoudt and Schlesinger, 2006; and others) and more narrowly within catastrophe insurance contracting (Kelly and Kleffner, 2003; Cole, Macpherson, McCullough, Newman and Nyce, 2011; Nyce and Maroney, 2012; Carson, McCullough and Pooser, 2013; Medders, Nyce and Karl, 2014; Taylor and Weinkle, 2020; among others). Yet there is also a sizable body of work establishing that in cases of catastrophic risk – such as flood – lack of insurance affordability can be a barrier to achieving a critical mass of insured customers and/or achieving societal goals (Viscusi, 1995; Grace, Klein, Kelindorfer and Murray, 2003; Grace and Klein, 2009; Medders and Nicholson, 2018; and others). Insurance premium subsidization, as used in both the private and public risk financing markets, can be used to improve insurance affordability. Yet, it is often used simply to create cost shifts from high-risk to low-risk exposures rather than based on financial need or economic vulnerability, thus resulting in non-optimal market outcomes and negative externalities (Viscusi, 1995; Grace and Klein, 2009; Nyce and Maroney, 2012; Medders, Nyce and Karl, 2014; Medders and Nicholson, 2018; among others).

The increase in the frequency of severe flooding events in the U.S., along with the NFIP's historic use of systematically inadequate pricing and heavy cross-subsidization (Hayes and Neal, 2012; Horn, 2019), highlight the need for improvements in the flood insurance marketplace (Anderson, 1974; Kousky and Kunreuther, 2014; Fan and Davlasheridze, 2016; Born and Klein, 2019; and others). The authors of the current research submit that flood insurance is insurable in the private market today, and that the NFIP coverage (and/or other public insurance program) can be used as a limited market of last resort for high-risk exposures. Furthermore, we assert that a premium subsidy program, based on financial need rather than on flood risk alone, is feasible as a means to enhance participation without underpricing or pricing inequitably.

## Methodology

The research is based on 1) case evaluation of the recently developed North Carolina Rate Bureau (NCRB) Flood Insurance Program (North Carolina Rate Bureau, 2019); and 2) the authors' proposal of a premium subsidy program that could be utilized on a needs basis for either or both of the rating programs evaluated. Narrative analysis and descriptive statistics are used to uncover and illuminate key points of the plan evaluation.

## Results and Implications

North Carolina is a useful laboratory for examining and illustrating flood insurance market options given its significant and increasing flood risk, its new risk-based flood insurance rate plan that is usable by admitted insurers and replicable in states across the nation, its best practice flood mapping efforts, and its socio-economic inequalities. A private market and premium structure have been worked out (NCRB, 2019), showing that at least 94 percent of homeowners would pay less under risk-based pricing than under NFIP pricing.

In the United States, 10.5 percent of households live at or below the federal poverty level of $26,200. The percent is higher for North Carolina households, at 13.6 percent, and approximately 50 percent live at or below twice the poverty level ($51,000). For these households, a flood insurance premium may be unaffordable even if living in a location that is only at moderate risk of flooding. Most inland counties in North Carolina have median household incomes at or below the state median. Take Jackson County for purposes of illustration. This county is a prime example of a locale having 1) relatively high percentage of households living at or below the poverty level, 2) even higher percentage living below the state median income level, 3) most living below the national household income median, 4) significant inland flood risk, and 5) large percentage of its property owners making their living based on the local geography – spanning from agriculture to tourism. In Jackson County, the median household income is $47,252 and 19.3 percent live below the poverty level, while over 64 percent of housing units are owner occupied. (Illustrative statistics taken from current U.S. Census data.)

Flood insurance premiums vary widely within Jackson County. Although it has properties that are at lowest flood risk and are subject to a minimum premium, there are properties at high flood risk and premiums. The median premium for a $200,000 Jackson County home, for instance, is just $200. But high risks closest to water sources and at low elevation result in a much higher average premium of $2,033 for $200,000 coverage in the county, and one $200,000 (insurance value) property with a premium in excess of $26,750. To put Jackson County flood insurance costs in perspective, while 75 percent of homes having $200,000 coverage enjoy the minimum NCRB premium of $200, the top 10 percent of those covered at $200,000 value are subject to a premium above $9,500. Jackson County is an inland county in the state's Mountains region, with median household income below the state median, which clearly does not paint a picture of wealthy coastal villages where homeowners can largely afford to pay whatever the insurance premium may be. (Illustrative statistics taken from NCRB, 2019.)

Flood insurance premiums might be subsidized according to a scale where the subsidy is explicitly used to limit the out-of-pocket portion of the flood insurance premium to some reasonable percentage of household income, subject to a maximum household income and a maximum property value, or policy limit, that are eligible for subsidization. As such, the subsidy program would consider household income as well as insurance premium.

A subsidy formula based on annual income level and the risk-based annual flood insurance premium can be used to ensure that the higher the household income, the lower the subsidy and the lower the risk-based premium, the lower the subsidy. This sort of formula incorporates both components of affordability, such that the poorest households living in the highest risk areas receive the greatest subsidies. The eligible insurance premium would be subject to some minimum and the eligible household income would be subject to some maximum. For example, the subsidy could be used to slide the out-of-pocket flood insurance cost to a maximum of two percent of annual income, commensurate with the typical cost of hazard insurance for homes.

Maximum household income that is eligible for subsidy could be set to some multiple of the poverty line or of median household income. For example, the national poverty line is around \$26,200, so a maximum income could be set at 300 percent of the poverty line, or \$76,500 (or if the median household income as a baseline, a lower multiple would be in order for setting the maximum, such as 125 percent of the median). The NFIP generally limits coverage to \$250,000 per policy, such that a property owner with a more expensive property (in terms of replacement cost value) would be eligible but only be able to insure up to the \$250,000 maximum. Furthermore, if a property's market value exceeds some other standard, say at or higher than the 75$^{th}$ percentile of home values, no subsidy is allowed. The market value is implicit evidence that the homeowner holds sufficient wealth to either afford the risk-based insurance premium or move.

A simple numerical example illustrates how the subsidy program might work. With an average household income of \$20,000 and a maximum premium of two percent (or \$400), for instance, a homeowner facing a \$200 or \$400 flood insurance premium would pay the full amount because these premiums are within the two percent maximum, and nothing is subsidized. That same homeowner, if facing a risk-based premium of \$2,000 dollars, however, would pay only their calculated maximum out-of-pocket cost of \$400, leaving \$1,600 of the premium subsidized. For homeowners, the subsidy phases out as the true premium falls below 2% of household income or once household income reaches a threshold multiple of the state's median income.

One sensible approach to fund the program is to subsidize using a transparent tax, and to do so from a wide, rather than narrow, tax base that can be linked to home ownership. One viable option may be a small additional sales tax on properties, to include only the sale of non-primary residences (i.e., vacation homes) and commercial properties (could either limit to commercial residential properties or to any commercial property). Every taxable transaction within the subsidy program's jurisdiction (e.g. state or nation) would participate, which seems equitable given that economies (and thus also the low-income residents) near water sources benefit the entire nation in important ways (e.g., agriculture, tourism, shipping, etc.). Without a wide tax base, cost volatility may damage the wellbeing for entire local economies. For example, one flood could raise premiums for all local homeowners, and disproportionately so for those who subsidize their neighbors. We estimate the percentage tax necessary to fund the estimated cost of such a subsidy within North Carolina would be well under 0.5 percent, based on the flood insurance premium distribution and estimated real estate transactions from 2019.

## Conclusion

Although the analysis here is limited to North Carolina and offered as a private market solution, it is possible to provide a broader program and utilize it within private and/or public insurance marketplace. The NFIP is phasing out its risk-based subsidies, which will drive up the NFIP's rates. With no needs-based subsidy program in place, the NFIP will become more expensive for the five million or so policyholders it currently has, likely resulting in decreased flood insurance demand. The authors offer an option for state governments to promote private flood insurance using a needs-based subsidy program.

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# MU Access: Accessibility Curricula Collaboration Fostering Employable Student Skills

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## Introduction

*"Industry leaders like Adobe, Amazon, Facebook, IBM, Google, Microsoft, Netflix and Verizon Media are actively recruiting people who can create products everyone can use, but they cannot find appropriately trained talent due to a significant skills gap"* (Teach Access, 2019).

Institutions of Higher Education are more *physically* accessible for students with disabilities in compliance with the American with Disabilities Act. While those efforts promote more inclusion of students with disabilities on campus, the MU ACCESS (**A**ccessibility **C**urricula **C**ollaboration fostering **E**mployable **S**tudent **S**kills) collaborative project was founded to foster *technology* accessibility skills specifically for the future employability of students in the workplace. Current students will be the future employees who will create new technologies and work in a more accessible environment. Students at Marshall University and throughout the Appalachian region need to be prepared for how accessible technologies will impact the workplace of the future, their careers, and this region.

The MU ACCESS project consists of an interdisciplinary team of three faculty members from three different colleges who are committed to incorporating the teaching of accessibility. The choice of using an interdisciplinary approach was not haphazard, as interdisciplinary learning was found to promote academic improvement, retention, develop of general education skills, and high levels of student engagement (Welch, 2011). The MU ACCESS faculty collaboration seeks to increase student knowledge and provide learning experiences with disability perspectives in curriculum and instruction within business, human resources, and technology management. This project aims to encourage and excite students about potential opportunities for creative and innovative problem-solving and providing technology accessibility for everyone now and with their future employers.

## Literature Overview

Accessible technologies incorporate universal design tools and features to assist users, including those with disabilities, access and use technology. However, a 2018 survey conducted by the Partnership on Employment and Accessible Technology (PEAT) found over 60% of respondents reported their organization's employees lacked the needed skills to create accessible technologies. Ninety-three percent projected their needs for those skills will increase in the future. A 2018 Best Practices in Digital Accessibility roundtable acknowledged the skills gap and the lack of an accessibility mindset during the design stage of technology development. "*The educational system should teach students the fundamental concepts and develop the ability to think from perspectives across users*" (Kulkarni, 2019).

Marshall University is a member of Teach Access with the MU ACCESS team serving as university liaisons. Teach Access is "*…an active collaboration among education, industry, and disability advocacy organizations to address the critical need to enhance students' understanding of digital accessibility as they learn to design, develop, and build new technologies with the needs of people with disabilities in mind"* (Teach Access, n.d.). The consortium acknowledges the lack of accessibility experts in the workforce and states, *"Industry requires even those who are not experts to have a working knowledge of the basics of Accessibility"* (Teach Access, n.d.), yet less than 3% of technology course descriptions surveyed from Teach Access university member institutions referenced accessibility skills (Teach Access, 2019). Marshall and the MU ACCESS team took that to heart and developed an Accessibility Awareness certificate with its interdisciplinary accessibility curriculum to expose students to accessibility and potential employment opportunities.

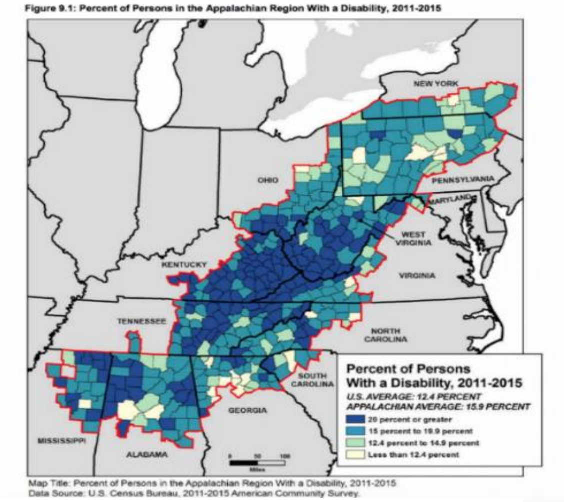


**Figure 1: Percentage of Persons in Appalachia with a Disability, 2011-2016**

Accessible technologies are particularly relevant in the Appalachian region, the disability belt of the United States (ARC, 2020). The Appalachian Region includes 420 counties across 13 states along the Appalachian Mountains from New York through Georgia, Alabama, Mississippi, and all of West Virginia where 7.3% residents receive disability benefits. This is 2.2% higher than the overall US rate (ARC, 2020; PRB, 2020). Disability rates for veterans are even higher in Kentucky, West Virginia, and Virginia, ranging from 38.2 to 100%.

In response to the skills gap and the Appalachian demographic statistics, education appears to be the solution. Organizations may not be familiar with the social identity of individuals with disabilities in working environments (Wright, 2015). As such, it is essential that those entering the workforce command knowledge that enables them to be effective advocates for inclusive environments for those with disabilities (Knight & Oswal, 2018). This knowledge can be best appreciated through observations, analysis of spaces, and understanding how individuals with disabilities perform tasks (Livingston, 2000). Appreciation continues as understanding is built around achieving social justice through integrating accessibility into organizational communications and processes (Wheeler, 2018) and including organizations advocating for individuals with disabilities (Buelow, 2015).

Best practices associated with improving accessibility within organizational environments are to create a deep appreciation and general understanding associated with individuals with disabilities in those entering the workforce. "*When one considers that legislation in many countries now mandates accessibility for a variety of technologies, the lack of developers with appropriate skills becomes apparent. The need is truly urgent.*" (Teach Access, n.d.). Thus, the logical iteration is in education programs (Browning & Cagle, 2017).

**Methodology**

To create accessibility learning and skill-building opportunities, graduate and undergraduate courses among two colleges at Marshall University incorporate accessibility and technology in their curriculum and, therefore, accommodate a broad range of students:

> HON480: Disability Perspectives – This course explores how people with disabilities are portrayed in literature and popular culture and how we can understand the perspectives of people with disabilities.
>
> MGT424: Human Resource Management – This course analyzes the role of human resource managers within strategic decision-making.

HRM632: Human Resources: Special Populations – This course is an introduction to disabilities across the lifespan, focusing on adulthood and employment. It surveys disability laws, disabilities, and workplace impacts including accessibility, accommodations, and service animals.

MGT672: Organizational Behavior – This course covers basic ideas and concepts for the effective management of an organization, emphasizing organizational behavior and theory.

TM610: Management of Innovation and Technology – This course provides a comprehensive introduction to technology and innovation management. It considers issues related to rapidly changing technology, and effective organizational and managerial approaches to technology.

TM615: IT Strategies – This course provides sound principles for managing information technology systems processes and procedures for applying the principles. Topics include ethics, privacy and security, accessibility, collaboration, knowledge management, etc.

TM659: Digital Accessibility Policies and Strategies – This course introduces creating digital accessibility policies and plans for the workplace. It includes strategies to create accessible documents, evaluate web site accessibility, and investigate assistive technologies.

There are two aspects of learning outcomes for the MU ACCESS project: 1) student learning outcomes fostered within these courses; and 2) learning outcomes related to curriculum and methods. Student outcomes for these courses are assessed through both formative and summative assessments. Students in the courses have a project-based learning assignment that uses a rubric incorporating accessibility criteria, a self-reflections essay, and ongoing formative assessments, i.e., class discussions and questioning. The rubric and self-reflections are collected and analyzed.

Student Learning Outcomes:

- Describe the importance of accessibility, including defining accessibility, for all people.

- Explain and describe common disabilities using people-first language and how these disabilities may limit the person’s access to society at-large.

- Analyze an accessibility barrier that a person with a disability may encounter.

- Create innovative technological solutions to address identified accessibility barriers relative to the content of the specific course, e.g., business, human resources management, and technology management.

Project learning outcomes fall within three of the nine domains identified by the Marshall University Office of Assessment and Program Review as important to *“providing students with opportunities to become reflective critical, creative, and ethical thinkers who possess the knowledge and skills to be successful in global society of the 21st century”* (Marshall, n.d.).

While many aspects of the project touch upon various domains, there are three domains specifically addressed:

- Inquiry-Based Thinking – This will be encompassed in inquiry-based thinking projects where students formulate their own questions and solutions, evaluate the solution to the problem of accessibility, and formulate conclusions based on what they learned.

- Integrative Thinking - This is also encompassed in the project-based approach; however, it is also fostered through the interdisciplinary nature of the project. Faculty with expertise in disability, technology, and human resources combine their knowledge to help students see the linkages across disciplines in the area of accessibility.

- Metacognitive Thinking - This is addressed through the collected student reflections essays. Students review their own knowledge about disability and accessibility while composing a reflection about what they learned.

A 12-hour graduate Accessibility Awareness certificate is also available through the Lewis College of Business and the College of Engineering and Computer Sciences.

Required courses:

HRM632 – HR for Special Populations
TM610 – Technology and Innovation Management
TM659 – Digital Accessibility Policies and Strategies

And choice from either A or B:

A. TM698 Internship or TM688 Independent Study
B. MGT671 Internship or MGT660 Independent Study

**Results and Implications**

The curriculum component of this project is working well. A standardized self-reflections rubric was developed and is used across MU ACCESS courses. Self-reflections essays attest that students successfully learn through awareness about stereotypes and misperceptions of individuals with disabilities; the knowledge transfer of information, concepts and ideas challenging stereotypes and beliefs with facts, events, and experiences; and the application of that knowledge through practice to build better environments that foster inclusion of the needs of an individual with a disability.

| Criteria | Not Observed | Emerging | Competent | Exemplary |
|---|---|---|---|---|
| Discussion of Initial Knowledge of Disability | 0-0 points | 1-3 points | 4-7 points | 8-10 points |
| Discussion of Course Objectives | 0-0 points | 1-3 points | 4-7 points | 8-10 points |
| Review of Discussion Posts and Reflection Journal Entries | 0-0 points | 1-3 points | 4-7 points | 8-10 points |
| Analysis of Course Themes | 0-0 points | 1-4 points | 5-11 points | 12-15 points |
| Analysis of Learning | 0-0 points | 1-6 points | 7-15 points | 16-20 points |
| Conclusion "Pulling it Together" | 0-0 points | 1-3 points | 4-7 points | 8-10 points |
| Professional Writing, APA, Spelling, and Grammar | 0-0 points | 1-2 | 3-4 points | 5-5 points |

**Table 1. Self-Reflections Rubric**

The Rubrics Statistics Report provided through Blackboard™ is an easy-to-use tool standardizing results for further analysis. This report from one of the self-reflections assignments indicates the high level of awareness and knowledge transfer in that course.

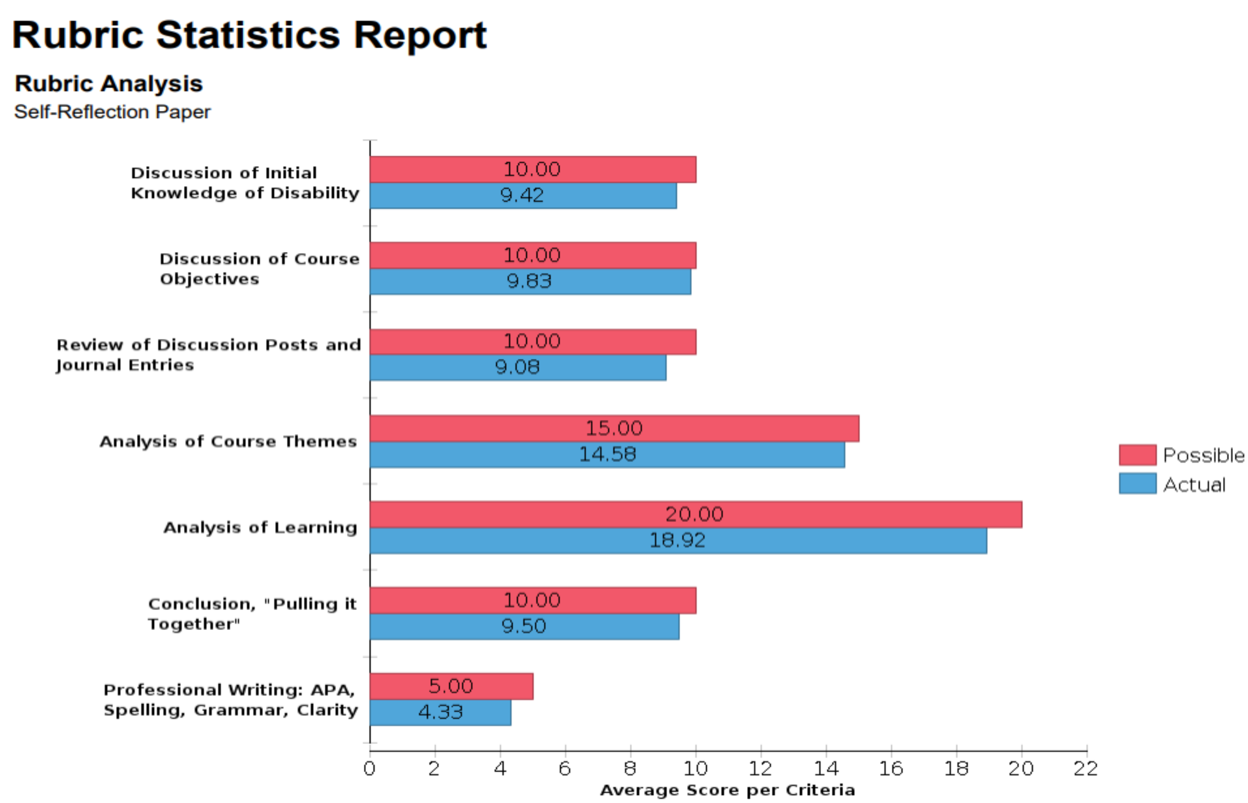


**Figure 2. Self-Reflection Paper Rubric Statistics Report**

Changes in student attitudes and behaviors regarding people with disabilities are also evident through excerpts from some self-reflections essay assignments:

*"I learned that company culture can influence workplace accessibility as much as policies can."*
*"After reviewing some of my own misconceptions from early in the course, I realize now that I, along with most able-bodied people, have been operating under some very incorrect assumptions."*

*"Every business is going to deal with people with disabilities. They might not necessarily be employees but knowing the details of this demographic made me feel more prepared."*

*"Another thing that surprised throughout this course was the number of workplace accommodations that are available with little to no cost to the employer."*

*"The first thing I can do is to educate my own household with the learning received through the class, which include using the correct vernacular, and to focus on the persons and not their disability."*

## Conclusions

The MU ACCESS project is an innovative interdisciplinary approach to the teaching of accessibility and accessible design to students. This project-based approach falls within a high-impact learning strategy that also provides real-world connections for students.

The self-reflections assignment rubric continues to be used and revised so student performance can be compared in a consistent manner across MU ACCESS courses. As a next step, a project rubric is in process of being standardized.

Future integration of accessibility in other aspects of student life, e.g., accessible resumes and working with the Marshall University Center for Teaching and Learning to promote accessibility in writing assignments throughout the university, e.g., communication disorders, nursing, physical therapy, pharmacy, etc. is recommended to further disseminate the need for equal access for everyone, including those with disabilities.

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# Measurement and Tracking of Project Activity Quality Based on Time and Cost Indicators

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Key words:

Quality, schedule, cost, project management, project control

## Introduction

A critical function in project management is the measurement of project status. Measuring the status of the project enables effective monitoring and control. Executives must be given project status updates to facilitate decisions about whether to continue or end a project, and whether actions must be taken to correct a project that may have gone over-budget, behind-schedule, or experienced scope creep. Additionally, measurement of project status reminds project team members what the managerial priorities are, and can serve to align work with organizational goals (McQueen, 2009). The attributes that are measured should reinforce and reflect organizational priorities (Williamson, 2006), and in a typical project, those priorities are represented by the traditional "iron triangle" of cost, schedule, and quality (Atkinson, 1999). Therefore, a project manager must be able to answer whether the quality of the final product will be sufficient, and whether the project quality is currently on track to meet customer expectations (McQueen, 2009).

Unlike cost and schedule, which are comparatively straightforward to measure, quality has been much more difficult to quantify. One reason for this is that quality is more of an abstract concept. The Project Management Institute (2013) defines quality as "*the degree to which a set of inherent characteristics fulfill requirements*." Quality involves a subjective element, rather than being a fixed and inherent property, and reflects an assessment of how well the attributes or features of a good or service meet a user's needs and expectations (Thomson et al. 2003).

Further complicating the matter is the fact that cost, schedule, and quality can all be measured at various levels of abstraction – both at the project level and the activity level. Quality is typically addressed at the project level, however the ability to measure and track quality at the activity level has some important benefits. First, quality is accrued gradually and additively throughout the life of the project as individual activities are completed. As Paquin et al. (2000) explained, quality is not simply "*poured into an end product on the very last day of the project*." Second, by taking an activity level perspective, project managers can better identify quality deviations at the source of the problem, which can facilitate project quality planning, quality assurance, and quality control activities (Liberatore & Pollack-Johnson 2013; 2009; Pollack-Johnson & Liberatore 2006). Third, the measurement of quality at the activity level facilitates mathematical quality-time-cost optimization (Orm & Jeunet, 2018).

**Literature Overview**

Researchers have proposed several different methods for measuring activity quality. Orm and Jeunet (2018) provided a review of the measurement of quality in project management. They pointed to the work of Babu and Suresh (1996) as one of the first examples of an explicit consideration of activity quality when making cost-schedule-quality tradeoffs. Babu and Suresh (1996), followed later by Khang and Myint (1999), used a subjective estimate of activity quality between 0 and 1 in a linear programming model. Another approach to measuring activity quality is to decompose performance attributes into criteria and sub-criteria, and utilize multicriteria decision analysis methods to develop a quality index (Paquin et al., 2000; Pollack-Johnson & Liberatore, 2006).

Liberatore and Pollack-Johnson (2009; 2013) developed an activity quality function based explicitly on activity cost and schedule indicators. They identified desiderata for the behaviors of such a quality function: 1) if one holds schedule constant, quality should be an increasing function of cost, and 2) if one holds cost constant, quality should be an increasing function of schedule. Selecting the bivariate normal distribution as a function satisfying these requirements, Liberatore and Pollack-Johnson (2009; 2013) defined their quality function as follows:

$$Q(t,c) = Ke^{-\left[\left(\frac{t-\mu_t}{\sigma_t}\right)^2+\left(\frac{c-\mu_c}{\sigma_c}\right)^2\right]} \quad (1)$$

where *t* and *c* are the time and cost spent on the activity, $\mu_t$ and $\mu_c$ are defined as the maximum reasonable time and cost values for each activity, $\sigma_t$ and $\sigma_c$ are standard deviation values which define the rate at which quality drops from the maximum to the minimum, and *K* is a scaling constant which defines the maximum quality value (Liberatore & Pollack-Johnson, 2013; 2009). The value of *K* is often set to 100. Fu and Zhang (2016) later extended this bivariate normal model by adding two additional shape parameters.

However, as noted by Collier and Lambert (2018) and Collier et al. (2018), the choice to normalize the quality function based on the *maximum* reasonable time and cost values for each activity results in a quality function which increases with increasing cost and time spent on each activity, effectively rewarding spending more money and time on each activity. This may not be optimal for the project budget and schedule as a whole. Moreover, it is not clear that it is necessary to expend the maximum reasonable amount of money and time to achieve a maximum level of quality. Rather, a reasonable assumption is that the *expected*, rather than the *maximum*, cost and duration are necessary to achieve maximum quality, at which point, additional resources do not further increase quality, and could be more economically expended elsewhere.

## Methodology

The quality function proposed by Collier and Lambert (2018) and Collier et al. (2018) is a piece-wise function that increases linearly up to a point and then is flat. Specifically, for a given activity with currently expended duration *t* and cost *c*, the activity quality can be found by the following:

$$t^* = \begin{cases} \frac{t-O_t}{\bar{t}-O_t} & if\ t < \bar{t} \\ 1 & otherwise \end{cases} \tag{2}$$

$$c^* = \begin{cases} \frac{c-O_c}{\bar{c}-O_c} & if\ c < \bar{c} \\ 1 & otherwise \end{cases} \tag{3}$$

$$Q(t, c) = Z(t^* + c^*) \tag{4}$$

where $\bar{t}$ and $\bar{c}$ are the expected duration and cost, respectively, derived from a three-point estimate (optimistic, most likely, pessimistic), and where $O_t$ and $O_c$ are the optimistic duration and cost estimates. The three-point estimate is a standard procedure used in PERT scheduling activities (Vanhoucke, 2013). The parameter *Z*, similar to *K* above, is a scaling constant. We set *Z* equal to 50 which normalizes the final quality score between [0,100]. Further, for values in which $t < O_t$ and $c < O_c$, we let *Q(t,c)* equal 0 to avoid any negative quality values.

## Results and Implications

Figure 1 illustrates the two different activity quality functions, plotted across values of duration and cost. In Figure 1A, the function based on equation (1) is plotted, and in Figure 1B, the function based on equations (2)-(4) is plotted. For the bivariate normal distribution (Figure 1A), we set the parameters $\mu_t$ = 10, $\mu_c$ = 100, $\sigma_t$ = 5, $\sigma_c$ = 50, and *K* = 100. For the piece-wise function (Figure 1B), we set the parameters $\bar{t}$ = 5, $\bar{c}$ = 50, $O_t$ = 2, $O_c$ = 25, and *Z* = 50. The three-dimensional surfaces were generated using a two-way data table in Microsoft Excel.

As can be seen in Figure 1, the quality function based on the bivariate normal distribution exhibits an upward sloping surface, where quality increases with time and cost. The maximum possible quality (scaled to a value of 100 in both graphs) is only attained when the maximum time and money have been expended, and otherwise is at some level less than 100. For the graph on the right, based on the piece-wise linear function, the surface is again generally upward sloping, with several plateaus. The main plateau is at the top, where once a certain level of *both* time and cost have been expended, no additional quality benefits are expected to accrue. The two plateaus on the sides of the surface show where additional increases in *either* time or cost add no additional benefit, but where additional benefits may be gained from expenditures of the other resource (more cost where time has reached a limit, or more time where cost has reached a limit). The function penalizes spending money and time beyond their expected values for each activity by yielding no additional incremental quality benefits.

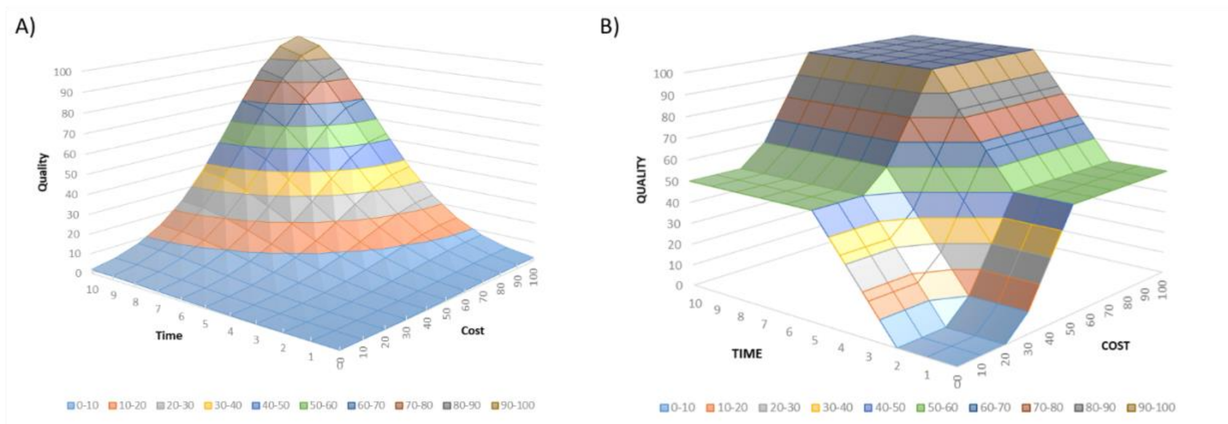


**Figure 1. Project activity quality plotted as a function of time and cost using A) bivariate normal distribution, B) piece-wise linear function.**

The implication of this new perspective on an activity quality function is that it realigns project management incentives. Using the bivariate normal function, by normalizing maximum quality to the maximum (or pessimistic) estimates for activity duration and cost, project teams may be incentivized to spend more time and money on tasks to maximize the activity quality, which may be optimal at a local level, but could have negative impacts on the project schedule and budget as a whole. Using the piece-wise function, by normalizing maximum quality to the expected activity duration and cost, rather than the maximum, there may be less of an incentive to let the work of activities expand to fill the time and budget available, i.e., Parkinson's Law (Filiatrault & Peterson, 2000).

## Conclusion

In this paper, we described the need to track project status at the activity level, focusing especially on the often-overlooked metric of quality. We explored common approaches to measuring and tracking project activity quality, including the leading quality function proposed by Liberatore and Pollack-Johnson (2013; 2009). A new quality function was explored, originally formulated by Collier and Lambert (2018) and Collier et al. (2018), and the two functions were compared.

Future research is needed in the area of project quality measurement in general, especially at the activity level. Other functional forms could be explored which combine the smooth features of the bivariate normal distribution with the plateaus proposed here. Demonstrations and comparative evaluations of quality measurement methodologies, based on real project data, are needed to validate the proposed functions. Finally, a better theoretical understanding is needed of "cumulative quality" (Fu & Zhang, 2016), a concept describing how activity quality accumulates as various activities are completed over the project life cycle.

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# The Progressive Effects of a Robust Supply Chain Ecosystem in Driving Economic Development and Entrepreneurship

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Supply chain, ecosystem, economic development, entrepreneurship

## Introduction

The fields of Supply Chain Management (SCM) and Entrepreneurship (ENT) may initially seem somewhat distant from each other, but they are heavily intertwined. At the very basic level, SCM refers to the processes and systems of managing upstream (towards suppliers) and downstream (towards customers) partners (firms that buy/sell to each other) to efficiently bring products (or services) to the marketplace. ENT—also at a very basic level—refers to the processes of designing, launching, and often running new entities in the pursuit of offering new (or improved) products or services in either a for-profit or non-profit manner. At minimum, then, we can conclude that both SCM and ENT share in the pursuit of helping products and/or services reach consumers.

The Richmond Industrial Development Corporation (RIDC) is an extension of Richmond City Government and reports into the Office of the Mayor and is responsible for enhancing/expanding/retaining economic development for Madison County. Richmond Industrial Development Corporation is a non-profit and non-stock corporation formed in pursuant to the Kentucky Non-profit Corporation Act. The corporation is governed by an eleven-member Board of Directors comprised of industry leaders (banking, manufacturing, utilities, etc.), educators (secondary & post-secondary). RIDC program objectives include the following:

1. To work closely with existing industry in order to encourage expansion and job retention.

2. To promote growth, stability and well-being for all citizens by enticing commercial and industrial development.

3. To maintain a listing of available industrial sites/buildings and provide community information to organizations considering expansions or relocations.

4. To attract industry by purchasing, developing and marketing farmland as industrial parks.

Many progressive counties—both in Kentucky as well as nationwide—have RIDC-equivalent organizations whose aim is increasing economic expansion by driving higher tax bases and bringing more jobs to its citizens. Competition between cities, counties, and states is very competitive, with incentives to prospective employers (and entrepreneurs) including, but not limited to, reduced local and state taxes for a period of years, start-up funding, recruiting fairs for potential employees, availability of commercial property for building construction, etc.

An excellent example of the positive effect of recruiting a prestigious firm to an area is Toyota's selection in 1986 of Georgetown (Scott County, KY) as its site to produce the Toyota Camry. Since its inception in 1986, Toyota Motor Manufacturing Kentucky (TMMK) has grown to nearly 12,000 employees, and is the largest automobile production plant in the world for Toyota. According to Wilbert W. James (2017), President of TMMK, the incentives that the Commonwealth of Kentucky and Scott County extended in 1986 were fully repaid by 1993.

With extreme competitiveness between states, counties, and cities, there is heavy emphasis in highlighting the opportunities and strengths that each locale offers to prospective employers and entrepreneurs. One of the major strengths for Madison County is the county is intersected by Interstate 75 (North/South) while Interstate 64 (East/West) lies just to the north in neighboring Fayette and Clark Counties. As such, one of Madison County's major economic strengths is a geographical advantage of having two of the nation's most-traveled interstate highway systems intersecting less than 10 miles north of the county's northern border.

## Literature Review

Existing research has already begun to explore the relationship between supply chain management and entrepreneurial behaviors. Even more so, the construct of supply chain ecosystems already appears in numerous journals. Per a study by Viswanadham and Samvedi (2013), "a supply chain ecosystem consists of the elements of the supply chain and the entities that influence the goods, information and financial flows through the supply chain. These influences come through government regulations, human, financial and natural resources, logistics infrastructure, and management, etc., and thus affect supply chain performance".

Handfield et al (2009) state that "in the current globally competitive environment, many firms are turning to supply management as a core competency that creates competitive advantage. Firms with proactive and world-class supply management programs are differentiated by hybrid governance structures, where supply managers work closely with business stakeholders to scan the supply market, collect market intelligence, identify opportunities to integrate suppliers with internal requirements, deliver value-added initiates to drive growth, and ensure on-going collaboration with key supplier partners."

Effective supply chain management is essential for firms to operate in today's highly competitive environment. Giunipero et al (2008) shares that "supply chain managers need to become more proactive in seeking out opportunities, identifying new technologies, and introducing these insights into the organization for adoption."

Handfield (2006) states "the evolution of supply management relies on the fact that managers have the core skills, knowledge, capabilities, management authority, and systems knowledge required to not only identify opportunities, but also to act on them. When firms invest in joint, relationship-specific assets, and combine resources through governance mechanisms, a supernormal profit can be derived on the part of both exchange parties".

**Research Opportunity**

Future research will quantifiably assess how a robust Supply Chain ecosystem drives economic development and firm growth. Firm growth can come in one of three primary ways:

1. **Growth by existing firms already located in Madison County:** for example, ***Asahi Bluegrass Forge (ABF)***, a major supplier of automotive parts, established a manufacturing location in Madison County in 2002 (initially less than 20 employees) and has expanded multiple times (including 2019-2020).

2. **Recruitment of established firms that are new to Madison County:** for example, ***TRB Lightweight Structures*** is a British company which recently opened a new facility in Richmond to support components for electric vehicles (major growth industry).

3. **Recruitment of non-established firms that are new to Madison County:** this is perhaps the purest entrepreneurial endeavor from the presence of a non-established firm (or individual) bringing a new product/service/technology to the county. ***AppHarvest***, a startup company revolutionizing the organic vegetable industry, chose Madison County (two locations) in 2020 in part due to access to large-scale land availability and presence of EKU's accredited undergraduate degree program in Global Supply Chain Management.

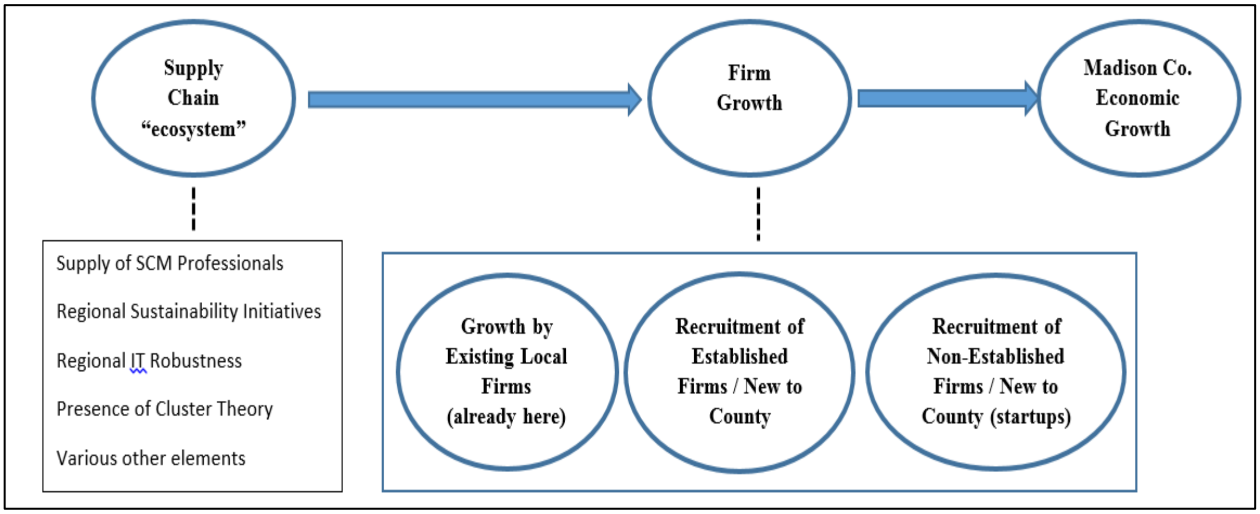


**Figure 1. Firm Growth Opportunities**

Broadly speaking, supply chain capability refers to the ecosystem in which there are sufficient supply chain professionals in the area, the degree to which supply chain tools, systems, and processes (Material Requirement Planning, Just-in-Time, Enterprise Resource Planning, Vendor Managed Inventories, etc.) are actively used, and supply chain infrastructure (roads, exit ramps, utilities, etc.) are established. As such, a key point prospective businesses are seeking is the degree to which regional supply chain capability already exists (and hence a more streamlined startup) vs supply chain capability needing to be developed, and hence a more complicated and time-intensive endeavor to bring products/services to market. Some of the endeavors being undertaken at Eastern Kentucky University to assist in improving regional supply chain capability include the following:

- Establishment of the new **Global Supply Chain Management (GSCM) program**, the first comprehensive (SCOR Model) Bachelor's degree program in supply chain management amongst the Commonwealth of Kentucky's eight public universities

- Establishment of a **Global Supply Chain Management *Executive Speaker Series***, in which executive-level SCM professionals come to EKU in heavily-promoted events to engage students, faculty, administrators, as well as the general public

- Establishment of a **Supply Chain Advisory Council**, comprised of senior SCM executives from Corning, Valvoline, Lexmark, Hitachi, et al, to give executive guidance to EKU faculty/administrators on SCM areas that should be heightened/improved in order to further attract outside investment

- Establishment of a Center for Economic Development, Entrepreneurship, and Technology (CEDET) at EKU which provides a wide range of services including helping businesses transition into Madison County, helping introduce prospective businesses to funding options, providing on-campus/low-cost small offices, and a Small Business Administration (SBA) incubator, etc.

- Launch of APICS "Continuing Education" courses through EKU's Workforce Development program. APICS is the leading association for Supply Chain Management professionals.

- Supporting the upcoming launch of a "pathways" Supply Chain Management program for high school (vocational) students through the Commonwealth of Kentucky's Department of Education.

While traditional incentives have worked in the past and continue to be viable options today, non-traditional incentives are becoming more sought after as businesses transition from looking mostly at tax incentives (traditional focus) to other cost-reduction enables (non-traditional investments). Traditional incentives—from state and local governments for attracting economic development—includes things such as discounted/reduced taxes (property taxes, state and local income taxes, etc.) and upfront money for training, equipment, recruiting, etc. Non-traditional incentives from government entities to encourage economic development include items such as the following:

- Proactive development of major industrial parks with 'build ready' sites.

- Streamlining businesses licenses and coordinating across municipalities (water, sewer, fiber cable, electricity, etc.).

- Developing "Work Ready Communities" with local technical schools to ensure there is an abundance of workers with the basic skills needed for general laborers

- Adding new highways and/or access points to enable more efficient movement of goods/services.

    - Example: Madison County recently worked with Commonwealth of Kentucky Transportation Cabinet and the Federal Highway Commission to add a new Exit (#83) on Interstate 75 to enable easier access to Richmond's largest industrial development site at Duncannon Road

**Conclusion**

This study has far-reaching impacts in that the robustness of a supply chain ecosystem has significant positive effects on the growth of Madison County economic development. Even more so, Kentucky's Cabinet for Economic Development is highly interested in this study as the belief is that the supply chain ecosystem considerations for Madison County applies to all counties throughout Kentucky; hence the survey and results may be of great use from not only a county vs. county perspective, but also from a state vs. state perspective. As such, the results of this study(s) will be shared with RIDC and Madison County officials, as well as leaders within the Commonwealth of Kentucky's State Economic Development Cabinet to assist in how Kentucky evaluates statewide supply chain ecosystems to compete with other regional states.

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# A Comparison of Learning Outcomes From Online and Face-to-Face Accounting Courses at a Four-Year University

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Key words:

Online, Face-to-Face, Student Performance, Gender, ACT, GPA

**Introduction**

Online education continues to evolve and grow dramatically at colleges and universities across the globe. Today's society is comprised of people who are increasingly busy with work and family obligations and who are looking for more flexible and expedited avenues for higher education. Institutions seek to meet these new demands by offering online distance educational opportunities while increasing cash flow for their college. Unfortunately the pitfalls to this rush to meet online demand results in what some researchers assert are inadequate quality content and curriculum (Brazina & Ugras, 2014; Verhoeven & Wakeling, 2011). Others indicate there are not significant differences in the outcomes from online learning compared with traditional face-to-face classes (U. S. Department of Education, 2010). Much of the research has been conducted on non-quantitative courses, quantitative courses with small sample sizes, or large sample sizes that are not controlled for quality of online content, delivery, or verification of learning.

The development and use of online courses for instruction have grown at an incredible pace in recent years enabling students to learn from home or business locations far removed from a brick and mortar campus. The busy lives that individuals lead justify their willingness to pay the added cost that higher education institutions require for online courses. Online learning provides the opportunity for asynchronous time frames in a low distraction, 24-hour-a-day, 7-day-a-week environment, and many students embrace this method of instruction for the convenience.

The advent of online instruction has not been without criticism as a means of increased revenue streams and lower faculty costs at the expense of reduced effectiveness in meeting curriculum learning objectives and student performance measured as grades. The general perception is an online education is not as robust as the traditional face-to-face method of instruction (Brazina et al., 2014; Verhoeven et al., 2011). Online testing for course progress is typically in a non-proctored environment and if monitored at all is within the learning platform's constraints of being time bound. Authenticity by educators is a key concern for students enrolled and completing coursework in an online environment.

According to the U.S. Department of Education (2010), a meta-analysis revealed when used by itself online learning appears to be as effective as conventional classroom instruction, but not more so. Much of the existing research has found mixed results leading to this study of a comparison of quantitative courses, Principles of Accounting I and II, delivered in a traditional face-to-face format and as an asynchronous online format designed by academic technology instructors. The quality of the online content delivered in an asynchronous method of instruction would influence the ability for a student to master the learning objectives and final grade.

There seems to be very little disagreement that rigorous investigative research is needed on quantitative courses such as accounting to determine if a significant difference exists in learning outcomes from an online method of instruction (Schmidt, 2012). The Association to Advance Collegiate Schools of Business (AACSB) expects continuous process and quality improvements and the onus of proving exceptional accounting education rests with the college or university. This study clarifies that students learn more in face-to-face accounting courses than online asynchronous courses based on final grade as a measure of assurance of learning.

## Findings

The purpose of this quantitative research that encompassed a quasi-experimental ex-post-facto design was to compare student outcomes (measured as final grades) from Principles of Accounting courses delivered in two instructional methods: face-to-face (F2F) and a totally online asynchronous format. The relationship of ACT score, GPA, gender, and age to mean final course grade were analyzed. The number of subjects in this study was 557 students from a public university in the Southeast United States enrolled in Principles of Accounting I and II classes. Accounting I is financial accounting and Accounting II is primarily managerial accounting. Archived data were provided by the participating university's Office of Institutional Research. The time frame was summer 2015 through summer 2017. Identical exams were proctored to all students. Each student, who self-selected the course delivery method, was identified by an 8-digit number assigned by the system's data base administrator to protect the anonymity of the students. Two instructors were included in this study with one instructor teaching both modalities of Accounting I and the other instructor teaching both modalities of Accounting II. The rubrics were the same for each instructor across all sections he/she taught.

Research Question 1: Is there a significant difference in composite ACT scores between students enrolled in a face-to-face method of instruction and students enrolled in an asynchronous online format?

An independent-samples *t*-test was conducted to evaluate whether the composite ACT scores were significantly different between asynchronous online class and a face-to-face students. The mean overall ACT score was the test variable and the grouping variable was the method of instruction for the class. The test was not significant, $t(420) = .56$, $p = .574$. The $\eta^2$ index was .01 indicating a small effect size. Students from face-to-face classes (M = 23.22, SD = 3.96) on average scored about the same on the composite ACT as students from asynchronous online classes (M = 22.95, SD = 4.00). The 95% confidence interval for the difference in means was -.68 to 1.23. The distributions of ACT scores for the two groups are displayed in Figure 1.

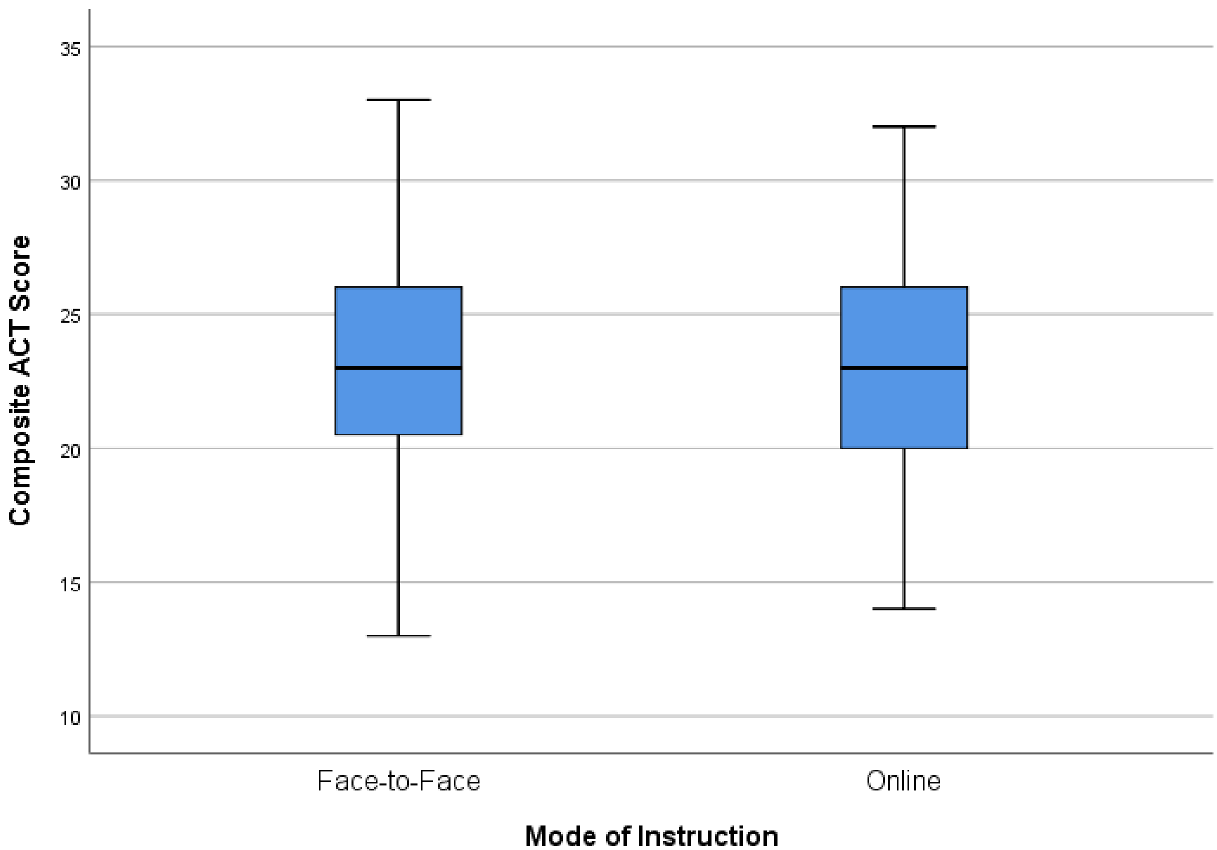


**Figure 1. Distribution of Student ACT Scores in Each Mode of Instruction**

Research Question 2: Is there a significant difference in students' mean final course grades between a face-to-face method of instruction and an asynchronous online format?

An independent-samples *t*-test was conducted to evaluate whether the final mean grade of Principles of Accounting students were significantly different between asynchronous online class and a face-to-face class. The overall course final mean score was the test variable and the grouping variable was the method of instruction for the class. The test was significant, $t(524) = 2.65$, $p = .008$. The $\eta^2$ index was .01 indicating a small effect size. Students from face-to-face classes (M = 2.52, SD = 1.21) on average scored significantly higher in Principles of Accounting classes than students from asynchronous online classes (M = 2.17, SD = 1.29). The 95% confidence interval for the difference in means was .09 to .60. The distributions of final grades for the two groups are displayed in Figure 2.

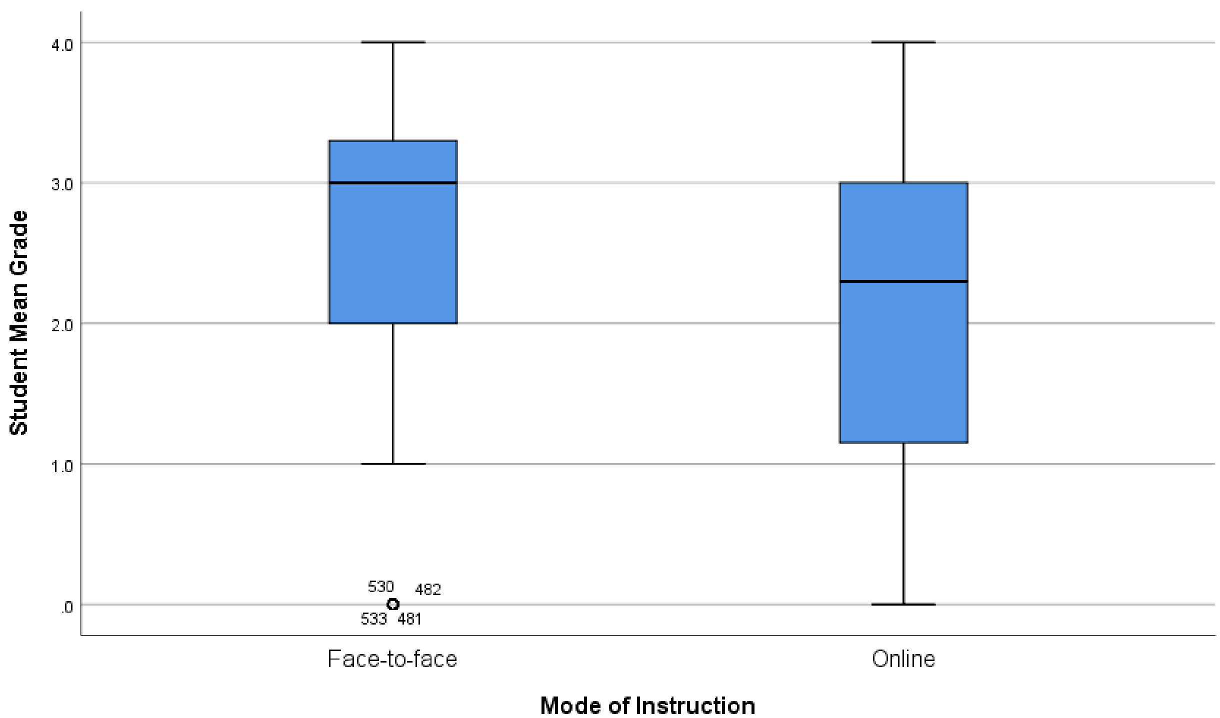


**Figure 2. Distribution of Grades for Students**

It should be noted that female students scored significantly higher than male students in the Principles of Accounting classes for both online and face-to-face instruction. The means and standard deviations for the two groups are displayed in Table 1.

| Method of Delivery | *M* | *SD* | *P* |
|---|---|---|---|
| <u>Online</u> | | | |
| Males | 1.85 | 1.39 | .001 |
| Females | 2.42 | 1.15 | |
| <u>Face-to-Face</u> | | | |
| Males | 2.38 | 1.20 | .003 |
| Females | 2.74 | 1.19 | |

**Table 1. GPA Means and Standard Deviations by Gender and Method of Delivery**

Also nontraditional aged students (25+) scored significantly higher than traditional aged students (18-24) in the online accounting classes but not in face-to-face classes. The means and standard deviations for the two groups are displayed in Table 2.

| **Method of Delivery** | ***M*** | ***SD*** | ***P*** |
|---|---|---|---|
| **<u>Online</u>** | | | |
| **Traditional Aged** | **2.02** | **1.23** | **.038** |
| **Nontraditional Aged** | **2.59** | **1.38** | |
| **<u>Face-to-Face</u>** | | | |
| **Traditional Aged** | **2.51** | **1.20** | **.964** |
| **Nontraditional Aged** | **2.52** | **1.19** | |

**Table 2. GPA Means and Standard Deviations by Age and Method of Delivery**

Research Question 3: Is there a significant difference in mean entering GPAs between online and face-to-face students?

An independent-samples *t*-test was conducted to evaluate whether mean student GPA prior to the class enrollment were significantly different between face-to-face and online classes. The mean GPA score immediately prior to the course was the test variable and the grouping variable was method of instruction. The test was significant, $t(555) = 2.97$, $p = .003$. The $\eta^2$ index was .02 indicating a small effect size. Students' entering mean GPAs in face-to-face classes (M = 3.02, SD = .78) was significantly higher than students' entering mean GPA enrolled in online Principles of Accounting classes (M = 2.78, SD = .85). The 95% confidence interval for the difference in means was .08 to .40. Students entered face-to-face Principles of Accounting classes with a significantly higher GPA than students choosing the online delivery method. The distributions of GPA by method of instruction are displayed in Figure 3.

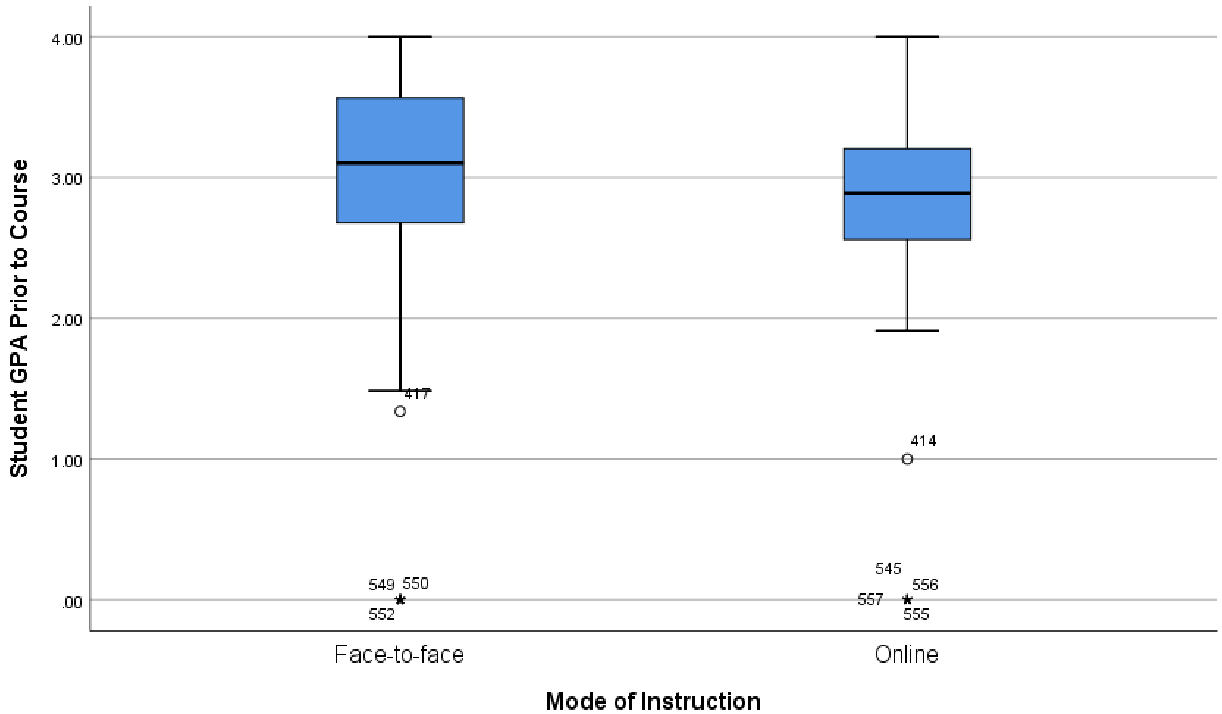


**Figure 3. Distribution of Student GPA Prior to Course**

Research Question 4: How well does the ACT composite score, GPA, age (grouped into 2 segments of below 25 and 25 and above), gender, and method of delivery selected by students predict mean final course grade?

A multiple regression analysis was conducted to evaluate how well the various factors predicted the final course grade. Face-to-face instructional method was coded as 1 and online instruction was coded as 2. The predictors were five variables, while the criterion variable was the final course grade. The linear combination of these factors was significantly related to the final course grade, $F(5, 397) = 30.56$, $p < .001$. The sample multiple correlation coefficient was .53, indicating that approximately 28% of the variance of the student final grade in the sample can be accounted for by the linear combination of these factors.

In Table 3 the relative strength of the individual predictors are displayed. Three of the five bivariate correlations were significant with ACT composite and GPA significant at ($p < .01$). Four of the five partial correlations were significant with instructional method, ACT composite score, and GPA significant at $p < .01$. Age and gender were significant at the .05 level in predicting final course grade. The prediction equation for the standardized variables was as follows:

$$Z_{\text{Predicted Student Grade}} = -.11\ Z_{\text{Instructional Method}} + .31\ Z_{\text{Comp ACT}} + .06\ Z_{\text{Age}} + .31\ Z_{\text{GPA}} + .06\ Z_{\text{Gender}}$$

| Predictor | Correlation between each predictor and final grade | Correlation between each predictor and final grade controlling for all other predictors |
|---|---|---|
| Instructional Method | -.13* | -.13** |
| ACT Composite | .41** | .32** |
| Gender | .11 | .07* |
| Age | .03 | .07* |
| GPA | .42** | .33** |

*$p < .05$ **$p < .01$

**Table 3. The Bivariate and Partial Correlations of the Predictors with Mean Final Grade.**

## Conclusions

The study clearly indicated significantly lower grades in online courses than face-to-face courses. In the present study both instructors of the Principles of Accounting classes required onsite campus exams or proctored exams in bona fide testing centers across the country. Several literature review articles indicated cheating as a concern. Kuzma, Kuzma, and Thiewes (2015) stated more than 50% of students perceived a greater propensity to cheat in online courses. Prince, Fulton, and Garsombke (2009) documented the average score for online exams were 10% higher than face-to-face exams. Verification of learning through proctored uniform exams is a key component of successful measurement and must be considered in robust research designs.

The use of Academic Technology Services at the participating university to create the online content of these courses should also be noted. Both instructors of these Principles of Accounting classes used the university professionals available to develop a diverse curriculum that employs various mediums to engage and motivate students. The use of qualified personnel to guide online course development reinforces the findings that face-to-face class performance is significantly better than online class learning measured as final course grade.

Males made lower grades than females in online classes compared to a face-to-face method of instruction. Females performed better than males in both methods of instruction. GPA was correlated to course performance as was ACT composite and ACT math scores. The findings of GPA as a predictor of final grade performance was consistent with Dotterweich and Rochelle (2012) who found GPA was a significant factor in student success regardless of instructional delivery method. Students with a college ready ACT math score of 22 or higher was a strong predictor with 62% of the participating university's sample designated as college ready. Nontraditional aged students performed significantly better in online Principles of Accounting classes than traditionally aged students. Kimmel, Gaylor, and Hayes (2016) noted adult students were more likely to be employed than younger students. In their study 73% were employed full-time and 20% were employed part-time. Students under 24 years of age were more motivated to attend college because of parental support. Students aged 25 to 34 sought a new career, and students aged 35 and older desired a pay increase, new career, or respect from peers. These facts imply that nontraditional aged learners may be more motivated when taking college classes and understand the value of higher education more so than the average traditionally aged student.

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# Go It Alone: The (Lack of) Impact of the Payroll Protection Plan on Solo Law Practitioners in Rural Kentucky

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Key words:

Payroll protection plan, PPP, business of law, solo practice, rural business

## Introduction

The idea of a small town, solo lawyer in the mold of a Matlock or Atticus Finch is a popular culture trope. However, this business model may be disappearing from rural Kentucky. The Payroll Protection Plan (PPP), was one of the most popular parts of the government's response to the 2020 pandemic. Like all types of businesses, law firms and individual lawyers participated in this program. Even a solo firm in a rural area might have several employees. In addition, such small firms are often the only access to legal services for the businesses and individuals in these communities. This paper reviews data from the Small Business Administration which indicates that and solo practitioners in rural areas of Kentucky may not have benefited from this program on the same rate as did larger law firms.

## Background and Review of Literature

Part of the larger Coronavirus Aid, Relief, and Economic Security Act (CARES Act), PPP offered tax free loans to businesses with less than 500 employees. The loan itself was for up to 2.5 times of monthly payroll expense and was forgivable, provided it was used primarily for payroll. The program provided a sizable, and essentially free, injection of cash into small and large businesses across the nation.

PPP was so well-received that it received a second round of funding in April 2020. Subsequently, Congress voted to make expenses paid with PPP funds tax deductible. According to the Small Business Administration, the 2020 PPP program may have saved or helped fund at least 51 million jobs during the course of 2020 (SBA 2020).

However, the PPP program was not without controversy or criticism. Some public companies such as Shake Shack and the Los Angeles Lakers took advantage of the program, presumably crowding out smaller businesses (New York Times 2020). Banks themselves were criticized for allegedly prioritizing larger clients over small businesses (Ponciano 2020). Ultimately, SBA data showed that as of November 2020, 87 percent of PPP loans were for less than $150,000 which presumably benefited smaller businesses (Hansen 2020).

**PPP and Legal Services**

Like the rest of the economy, legal services businesses also took part in the PPP program. Nationwide over 600 law firms received PPP loans that were in excess of $2 million each. Another 14,000 large law firms received PPP loans in excess of $150,000 each (LexisNexis 2020 and Coe 2020).

For smaller firms, the impact was also significant, if more difficult to measure. In an April 2020 survey of 75 managing partners at small and midsize law firms conducted by a legal consulting firm, "The Remsen Group," 90% of the firm leaders said they had applied for a forgivable PPP loan. In Florida, nearly every eligible large law firm participated in the PPP program, accounting for a majority of the funds loaned to the legal industry. However, over 90% of loans to legal services businesses were for less than $150,000.00 (Roe 2020).

A similar top-heavy dollars pattern appears in study of PPP data from New York. The majority of law firm loans in New York went to individual attorneys or firms with three or fewer employees, while the vast majority of funds went to larger enterprises. Loans of $50,000 or less accounted for two-thirds of all New York law firm loans but represented just 12% of statewide borrowing by law firms and lawyers. Nearly half of all New York loans were for $25,000 or less; those loans accounted for 6% of all New York law firm and attorney loans (Roe 2020).

Some local bar associations, such as the Ohio Bar and Knoxville Bar Association, actively encouraged members to apply and provided guidance to small firms and solo practitioners about participation in the PPP program (Knoxville Bar 2020 and Estell 2020). However, Kentucky's bar did not undertake such efforts.

**Kentucky Legal Community**

History and geography have shaped Kentucky's legal community. Civil and criminal courts, property indexing, and other judicial functions are organized on county by a county basis. And the 120 counties that make up Kentucky are unusually small. Historically, the stated justification was that a county's borders should stretch no further than a round-trip horseback ride to the county seat. Thus despite being a relatively small state, Kentucky has the 4$^{th}$ highest number of counties of any state in the nation (Kleber 1992).

Each of the 120 counties has its own county seat, its own Courts of various jurisdictions, its own property records, etc. Because of this dynamic, the practice of law in Kentucky has traditionally been more localized. Each courthouse in each county supported its own, in many cases insular, ecosystem of legal business. This meant that the smallest and least populous community usually had access to local legal counsel because of this unique dynamic. However, in recent years the small town practice of law seems to be shrinking in favor of firms, even smaller firms which operate across a larger geographic area stretching several counties. Study of PPP data and lending patterns should provide insight into this continuing trend.

Because of this unique characteristic, Kentucky law firms tend to be smaller and the traditional definitions of "small" and "mid-sized" firms used by national organizations do not always fit the reality of Kentucky's fractured legal landscape. For example, a firm of 5 attorneys would be considered small by the measures of the American Bar Association but may well be a larger firm in any Kentucky County outside of Lexington, Louisville, or the Cincinnati suburbs of Northern Kentucky. However, these smaller firms or solo attorney do provide access to legal services to their subject communities.

Many traditional connotations of the practice of law involve the imagery of a small town practitioner, working as an integral part of the local community. However, this model may be vanishing. New methods of communication have blurred practice areas and made multi-county practice more normalized, rather than the exception.

**Methodology**

The data reviewed was from publicly available sources. The SBA has provided information about the PPP program. PPP loan recipients are indexed by zip code and also by NAICS Code (54110 being the code for law firms). In December of 2020, the SBA released business name data, making it possible to determine which specific law firms and solo practitioners had participated, or not participated, in the PPP program (SBA 2020).

The Kentucky Bar Association makes available information concerning licensed lawyers in the state by various means. For purposes of this limited study the Kentucky Legal Directory, the official print publication directory of the Kentucky Bar Association, was used. Keeping in mind the nature of Kentucky's legal system, this directory is indexed by county.

Participation in the PPP Program was widespread by the Kentucky Bar. However, by comparing PPP data with legal directory information on a county by county basis, it could be determined which specific firms and individuals did and did not participate in this program. In addition to primary data from the SBA, third-party searchable databases (www.federalpay.org and www.searchppp.com) were also consulted to confirm results. This initial survey was focused on PPP participation by rural firms and solo practitioners, a survey of roughly 10% of Kentucky's counties. The 10 lowest per capita income counties, by use of 2010 census data, were selected and reviewed, as were a handful of other counties throughout the state. This review did not attempt to compare or consider data from the highest per capita income counties for comparison, although such may be attempted in the future. Nor does this survey consider rates of PPP participation of solo practitioners relative to sole proprietorships in other industries.

**Results and Implications**

According to SBA data, approximately 1,460 Kentucky law firms participated in the PPP program, representing 2% of the state's overall loan totals. The average of these loans was for just over $70,000.00 and involved 6 jobs. The Kentucky Bar Association claims approximately 16,000 members. However, a significant part of this membership is not involved in the active private practice of law. The actual numbers of lawyers in private practice who might participate in the PPP program is much smaller and is best reviewed on a county by county basis.

| County | Per Capita Income | Population (2018) | PPP Part. Firms | PPP Non-Part. Firms | PPP Participating Solo | PPP Non-Participating Solo |
|---|---|---|---|---|---|---|
| Owsley | 10,767 | 4,435 | 0 | 0 | 0 | 2 |
| Wolfe | 11,214 | 7,264 | 1 | 0 | 0 | 3 |
| McCreary | 12,197 | 17,465 | 1 | 0 | 1 | 6 |
| Clay | 12,300 | 20,366 | 4 | 0 | 1 | 5 |
| Lee | 12,983 | 6,570 | 0 | 0 | 0 | 2 |
| Elliot | 13,072 | 7,523 | 0 | 0 | 0 | 2 |
| Magoffin | 13,849 | 12,538 | 6 | 0 | 1 | 6 |
| Jackson | 13,935 | 13,431 | 0 | 1 | 1 | 2 |
| Knox | 14,101 | 31,227 | 2 | 1 | 7 | 8 |
| Casey | 14,252 | 15,750 | 0 | 1 | 0 | 5 |
| Estill | 15,725 | 14,277 | 0 | 0 | 0 | 3 |
| Lincoln | 16,985 | 24,456 | 1 | 2 | 0 | 10 |
| Montgomery | 20,004 | 27,928 | 4 | 2 | 5 | 7 |
| Bath | 15,487 | 12,378 | 1 | 1 | 3 | 4 |
| Garrard | 18,735 | 17,523 | 0 | 1 | 2 | 4 |

**Table 1. PPP Legal Services Participation by County**

All of the counties reviewed are relatively low in population. In many of these economically disadvantaged counties, a number of solo practitioners did not participate in the PPP program. Consider Clay County, which has one of the lowest per capita incomes in the country but which is home to a relatively large legal community in its county seat of Manchester. There, all of the local firms participated in the PPP program. The majority of solo practitioners did not. This was typical as law firms did by and large take advantage of the program in the reviewed areas. This sampling of only 15 counties is too small to draw further conclusions, but it does provide a path and methodology for data review and further research over a wider scope. In addition, it is unclear what this says about the access for legal services and impact on economic development in these smaller communities.

**Conclusion**

This preliminary review of a small data set shows that in the areas reviewed, a significant number of solo practitioners did not participate in the PPP program. The data reviewed consisted of a small sampling of data and no larger conclusions can be drawn beyond the correlation that in the reviewed rural areas, a number of solo practitioners and a handful of small firms chose not to participate in the PPP program. Similarly, the geographic scope of review was limited by design and may not be indicative of other areas of the state. Further review is warranted.

Moreover, the reasons for nonparticipation were not the subject of this project. PPP was essentially a grant program. Seemingly most would have sought to participate given the singular economic situation of 2020. However, it appears many presumably eligible lawyers in rural Kentucky did not.

This review ties in to an upcoming survey of the entire Kentucky Bar Association membership as a whole concerning the impact of the 2020 pandemic on the practice of law as a whole. Data collection is expected to begin in early 2021. This study will gather information directly from Bar Members about the utilization, or lack thereof, of the PPP program. It is hoped that this survey will provide insights into the motivations behind the present data.

Potentially, the situation of more rural, small firm or solo lawyers may be similar to that of urban or minority entrepreneurs, who potentially lack access to or existing relationships with banks to facilitate PPP participation. Unlike other businesses, law firms do not traditionally operate with standing credit lines or debt financing. It may be that smaller firms and individuals did not either have connections with a bank to seek to participate in the program or were simply unaccustomed to applying for loans at all, prior to the pandemic.

Alternatively, there may be cultural or social pressures that dissuaded eligible businesses from participation, perhaps a traditional rural aversion to accepting a perceived hand-out or aid or concern about the public nature of the loan program discouraged participation. It is hoped that the aforementioned survey will give some insights into some of these questions.

Decreased PPP utilization by smaller legal businesses in more rural areas may well be indicative of a larger consolidation of legal services throughout the Commonwealth. The implications of this trend are significant not just for the business of law, but also for the larger communities. If there is an ongoing pullback and consolidation of legal services away from poorer, rural communities, local businesses may lose access to legal services and individuals may lose access to advocacy in the legal system. The larger economic and social justice implications of this for these potentially-underserved communities warrants further study.

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# Employment Challenges for People With Disabilities in Appalachia: A Community Approach

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## Introduction

The Appalachian region has multiple employment challenges. These challenges are complex requiring innovative and collaborative approaches to help identify the problem and possible solutions. An area often overlooked is the lack of employment for people with disabilities**.** This complex problem needs collaborative solutions; therefore, a collaboration between the Lewis College of Business at Marshall University, the American Foundation for the Blind (AFB), and an employment task force comprised of community leaders in Huntington, West Virginia have begun discussing these issues and creating realistic solutions.

## Literature Overview

It has been 30 years since the Americans with Disabilities Act (ADA) was enacted to protect the civil rights of people with disabilities. This law provides a foundation for hiring and supporting employees with disabilities (American with Disabilities Act, 2021). However, there is an employment gap related to both aging employees who may experience a loss of mobility, hearing, and/or vision as part of the aging process, and younger workers with a disability entering the workforce.

It is estimated that between 20-24% of all Americans have some disability limiting life activities including employment (Teach Access, 2019). Rates among the 13 states comprising the Appalachian Region are even higher, where residents receiving disability benefits is 7.3%. This is 2.2% higher than the overall US rate. Disability rates for veterans are even higher in Kentucky, West Virginia, and Virginia, which range from 38.2-100% (ARC, 2021; PRB, 2020). The federal government estimates 14% of all public-school students have a disability, with the largest portion being students with learning disabilities (National Center for Education Statistics, 2020).

While there has been an increased focus on employment for people with disabilities, only about *"1 in 3 (34.9%) individuals with disabilities compared with about 76% of their counterparts without disabilities"* are employed (Bonaccio, Connelly, Gellatly, Jetha, & Ginis, 2019). This employment gap is often attributed to many factors including a general lack of knowledge about disability which creates an inherent bias in the hiring and retention of workers with disabilities; and a lack of awareness/understanding of how to help these employees be successful (AFB, 2020; JAN, 2020).

## Methodology

This paper uses a case study approach in addressing the subject. Informal discussions among community and university partners led to the creation of a task force to collaborate on an innovative comprehensive approach to the problem of disability and employment. Current task force members include Huntington area business leaders, an ophthalmologist, faculty in Marshall University's College of Business, Outreach Coordinators from AFB and Marshall University, vocational rehabilitation representatives, and a representative from the Huntington Regional Chamber of Commerce.

Due to COVID-19, project meetings have been conducted via Zoom. Despite the challenge of remote collaboration, the task force has been meeting twice monthly, with emails and telephone calls, as necessary. They have been able to use accepted group process skills, e.g., identifying members, sharing resources, explaining values, coming to consensus on areas they wished to focus, and meetings to implement agreed upon actions.

## Results and Implications

The task force identified two major focus areas/phases: 1. Employer knowledge and sensitivity to the issues of disability and workplace accommodations, and 2. Potential employees with disabilities increasing their employment skills with a focus on productivity, i.e., technical, and soft skills.

**Phase 1** - Employer knowledge and sensitivity to the issues of disability and workplace accommodations. To begin early 2021.

The task force decided to promote awareness of disability through a Speaker's Series and a micro-credential continuing education program to provide mini workshops for employers and human resource specialists offered through the university partner. Workshops are designed to be virtual until such time face-to-face workshops can be conducted. They will be for one hour and include videos, reading materials, and interactive discussions.

Specific topics for the mini workshops include general disability etiquette for working with employees with disabilities, legal aspects of hiring people with disabilities, employer resources, and the Big A's: Accommodations, Accessibility, and Assistive Technology:

> Accommodations **-** This refers to how an employer can level the playing field for a person with a disability. This might include a large screen monitor, frequent breaks, ergonomic furniture, or any way the employer can help ensure employees with a disability have an equal chance to succeed. Most accommodations are low cost, i.e., less than $500.00, or no-cost (JAN, 2020).
>
> Accessibility **-** This refers to both electronic and physical accessibility. Most people realize curb cuts, ramps, or elevators can be used by everyone, not just those with disabilities. Electronic accessibility should do the same. It refers to making websites and documents accessible to everyone, including those with disabilities. For example, certain color combinations on websites are hard for a screen reader to "see", and closed captioning is used by many to read what is written on a screen. Some devices and software applications already have accessibility features built in.
>
> Assistive Technology - This refers to devices that can assist a person with a disability, although they are often used by others. This can include a smart phone, a magnifier, wheelchair, hearing aid or any device that assists a person with a disability participate in everyday life activities.

During discussions about potential topics, the task force expressed a concern related to the potential cost of accommodations, assistive technology, and accessibility. To address this concern, the MU ACCESS project at Marshall University collaborated with the American Foundation for the Blind to develop a series of accessibility-related videos. One of the videos by a blind person and a person with low vision demonstrates how they use accessible technology built into devices such as a smart phone. (This video is available at https://ensemble.marshall.edu/Watch/Fd68TcGz) This, and other videos in the series, are used in some Marshall University graduate-level courses, which exemplifies the success of collaborative efforts around the issue of disability, technology, and employment.

The task force additionally discussed the importance of resources for employers and employees as an important objective of the continuing education program. Community partners agreed that this education needs to be concrete and promote practical strategies.

Initial Resources for Employers and Employees:

- American with Disabilities Act (ADA) https://www.ada.gov/
  This website is well designed and provides information for both employers and employees about assistive technology, accommodations, and accessibility. It discusses the legal aspects and addresses common concerns.

- American Foundation for the Blind (AFB) https://www.afb.org/
  This website provides a plethora of videos, resources, and general information. It also provides some specific information related to COVID-19 for employers who have blind or visually impaired employees.

- Job Accommodation Network (JAN) https://askjan.org/index.cfm
  This website is designed for both employers and employees. It provides information about specific disabilities, accommodations, and resources. It has a directory of state-by-state resources, and the website has a LIVE chat feature where they encourage telephone calls for individual consultations.

**Phase 2** - Potential employees with disabilities increasing their employment skills with a focus on productivity, i.e., technical, and soft skills.

Just as employers need to have more knowledge about disability to hire and retain employees with disabilities, employees need help with skills development in both technical areas, i.e., software applications, job-related skills; and, soft skills, i.e., communication, problem solving. Mini workshops are being developed with a focus on providing a micro-credential that provides certification for a specific skill. Additionally, the community partners from vocational rehabilitation are discussing how to provide mentoring and job coaching for newly hired people with disabilities, which would facilitate productivity and help resolve any issues in the workplace.

## Conclusion

This collaborative task force has continued throughout the COVID-19 pandemic and shows that a complex employment concern can be addressed when partners bring their talents and resources together to solve a problem. This project is continuing and will likely expand the focus to include more training for any person with a disability. There have been discussions of addressing the issue of military veterans with disabilities and graduating high school students with disabilities who may also benefit from the mini workshops to help them secure their first paid job. There are many aspects of employment and disability that can be addressed as the task force matures, and partners want to continue their efforts on behalf of disability and employment issues.

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# Small Business and COVID-19: A Train Wreck on "Main Street"

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Key words:

Small business, entrepreneurship, economy, COVID-19

**Introduction**[1]

COVID-19's impact on the global social and economic picture has been like watching a train wreck, taking place on "Main Street" in slow motion. There are many questions about where we are going as a nation, and a world at large. "Stores, factories, and many other businesses have closed by policy mandate, downward demand shifts, health concerns, or other factors" (Fairlie, 2020, p. 727). One of the more popular books on Amazon covering the topic of canning and preserving foods was on backorder for at least several weeks (researcher's personal observation). "Doomsday preppers" and at least some of their prognostications and suggestions moved towards the mainstream, having greater acceptance than before. There have been shortages on major Websites of sewing machines, elastic, and other materials – even those that are substitute goods like coffee filters. Toilet paper was "wiped out" from store shelves (Kirk & Rifkin, 2020). Terms such as "social distancing" (Bana, Benzell, & Solares, 2020; Gunay & Kurtulmuş, 2021) have become familiar. One company that has been affected in a positive way by social distancing is Zoom, which has gone from a relative niche player in business communication (i.e., videoconferencing) services to a being a household name (Galgani, 2020). However, a vast majority of businesses have not fared as well. Bad actors are also hard at work, launching scams as they hoarded essential items for resale on websites such as Craigslist and eBay. This research aims to review COVID-19 impacts on entrepreneurs.

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[1] This present paper, while it is a unique work product unto itself, is connected to an ongoing research stream (including literature review databases).

## Literature Overview

A local computer database comprised of items associated with the small business, entrepreneurship, and the "gig" economy generally, pre-COVID-19, has been combined with results from post-COVID-19 searches using library databases current through mid-January 2021. Library database collections including those from ABI/INFORM, Ebsco, and ProQuest have been consulted. Filters have been applied to these library database searches, setting limits as follows: scholarly sources; full text available; English language publications. Most importantly, for the benefit of other future researchers who may wish to discern a breadcrumb trail, a filter was also applied to limit results to business disciplines. The reason for this is that across disciplines and around the globe, there are millions of results relative to scholarship pertaining to all aspects of COVID-19 (medical/health care disciplines being a prime example, as one might easily guess). The software used for the resulting database as a whole (approximately 370 artifacts/records) allows for attachments (e.g., PDF, Excel, and images, most frequently) in association with individual bibliography items. Additional local databases, in support of research on topics such as social entrepreneurship, innovation, and new product development, comprised of hundreds of artifacts have served to inform this present research under a qualitative framework. Multiple search strategies have been used to develop databases like the ones mentioned above, as an ongoing stream of research has been pursued over a period of several years.

## Methodology

Under a qualitative researcher's framework, attachments (as discussed above) are identified as artifacts. All artifacts may be regarded as sources of data, and these may in-turn be analyzed under a qualitative research paradigm (Creswell, 1994; Hodder, 1994; Strauss & Corbin, 1994). The role of the researcher is to ask questions, collect data, and to identify patterns and themes under a qualitative paradigm. Where similar or the same patterns may present themselves through multiple forms or sources of data, confidence in researchers' findings my be increased through triangulation (Caporaso, 1995; Maxwell, 1992). On the other hand, data that is lacking applicability (or credibility) relative to a given phenomenon under study may be dismissed (Caporaso, 1995). From such analysis, the researcher may interpret meaning(s) and report findings. From patterns in data, the qualitative researcher seeks to establish theoretical frameworks while using a constructivist approach (Barry, 1996; Schwandt, 1994). Such frameworks are not intended to be or presented as being generalizable. Rather, where little is known about a phenomenon due to a lack of prior scholarly research or other foundational resources, such qualitative research approaches may be deemed necessary.

## Results and Implications

Gopinath (2020), writing on the International Monetary Fund's blog, declared via a post title that: "The 'great lockdown' has been the 'worst economic downturn since the Great Depression.'" Impulse buying has created major fluctuations in the availability of certain goods (Ahmed, Streimikiene, Rolle, & Duc, 2020). Certain industries and jobs have been affected more than others (Brown, 2020). Travel, hospitality, restaurant, and other industries (which involve higher degrees of personal contact) have been among the hardest hit (Brown, 2020). Sports arenas, movie theaters, amusement parks and other venues that entail large gatherings have been closed, opened under restrictions, and might close again (Gunay & Kurtulmuş, 2021). Small business owners have been threatened with fines, forced closures, and jail time. Education is in a state of upheaval as well as government services of all kinds. Another term, "non-essential" (Cowling, Brown, & Rocha, 2020), is also now in popular use. There are non-essential jobs and non-essential businesses, as well as some argument as to what constitutes the opposite of these, i.e., essential (the same logic is being applied relative to vaccine eligibility and distribution). At the same time, evidence of abundant ingenuity (and resolve) can be found on social media (as they are amplified by traditional media). DIY'ers organized in groups and shared information about how to make breathing masks and other personal protective gear. The aforementioned anecdote about mask-making and community organizing exemplifies social entrepreneurs' efforts, well. Fairlie (2020), extrapolating from CPS (Current Population Survey) data from the Bureau of Labor Statistics, found demographic patterns among small business owners that have been hit the hardest:

> Patterns across gender, race, and immigrant status reveal alarming findings. African-Americans experienced the largest losses, eliminating 41% of active business owners. Latinx also experienced major losses with 32% of business owners halting activity between February and April 2020. Immigrant business owners suffered a large drop of 36% in business activity, and female business owners suffered a disproportionate drop of 25%. (p. 728)

Organizations of all kinds shifted operations, at least in part, to workers' homes (with some inconclusive results in terms of impacts on productivity (Bolisani, Scarso, Ipsen, Kirchner, & Hansen, 2020). Indeed, "the COVID-19 pandemic paralyzed the world and revealed the critical importance of supply chain management — perhaps more so than any other event in modern history — in navigating crises" (Craighead, Ketchen, & Darby, 2020, p. 838). Data are coming in. Although, as observed by Fairlie (2020), "the early effects of COVID-19 on small business and entrepreneurs are not well known because of the lack of timely business-level data released by the government" (p. 727). The U.S. Census Bureau's *Small Business Pulse Survey ("Small business pulse survey," 2021)*, for instance, is shedding some light on business owners' perceptions of the impact as illustrated in Figure 1:

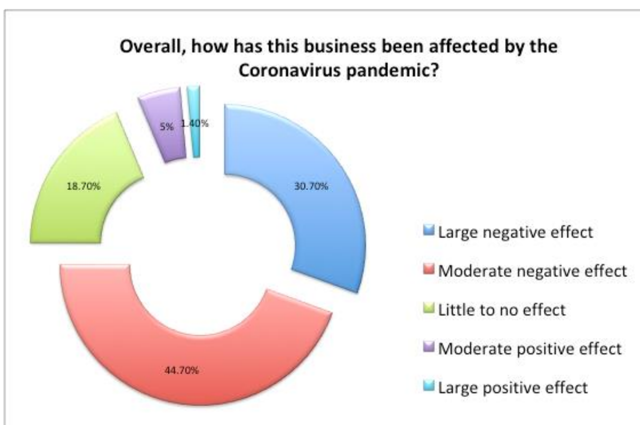


**Figure 1. Coronavirus pandemic's effect on small businesses (national averages)**[2]

[2] Figure developed from data published by The U.S. Census Bureau's *Small Business Pulse Survey* [extracted using pull-down menus; survey data collected 12/28/2020 to 1-3-2021]. Percentages in chart presented are rounded. Retrieved January 15, 2021, from https://portal.census.gov/pulse/data/

As shown, at the end of 2020 and the beginning of 2021, just over 30% of businesses reported a "large negative effect." This percentage is down from earlier in 2020, when just over half of businesses reported significant distress (Brown, 2020). On the other end of the spectrum, only about one-and-a-half percent reported a "large positive effect."

## Conclusion

Freelancing, home-based business pursuits, self-employment, and the "gig" economy had been trending upward, at least, prior to the insertion of COVID-19 into the global social and economic picture. For instance, Dourado and Koopman (2015) utilized IRS 1099-MISC form data and concluded: "The shift toward more contract work is a real and dramatic change in the labor market." Following the Great Recession (Katz & Krueger, 2016; Larrimore, Durante, Kreiss, Park, & Sahm, 2018), small business start-ups had also been rebounding. Finally, as an observation, scholarly research – often with a long publication cycle – has a limitation relative to COVID-19 in terms of providing immediacy. Other kindred sources for small business and entrepreneurship researchers, also have demonstrated themselves to have a similar limitation. For example, the U.S. Small Business Administration's (SBA) Office of Advocacy publishes an oft-quoted FAQs document, updated annually ("Frequently asked questions about small business," 2020); in reviewing the SBA's most recent release, which is dated October 2020, one would likely not even imagine that a global pandemic (crisis) existed until arriving at a footnote at the bottom of the first page and then headings on the second page of the document. The Webpage which hosts the SBA's *December Economic Bulletin* states (a rather apparent lament): "the lack of recent data on business closures makes it difficult to assess the overall state of small business" ("December Economic Bulletin," 2020). Even if popular press sources may be held suspect, they do at least recognize that conditions on the ground for small business and millions of others, such as individuals who are now displaced and unemployed, have drastically changed. Anecdotal as it may be, we've been witnessing a "train wreck on 'Main Street.'"

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# Exploring Moderating Effects of Personality on Satisfaction and Loyalty

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## Introduction

Business practitioners assume there is a positive relationship between satisfaction, loyalty and repurchase intention. Afterall, researchers have found that satisfied customers are likely to express loyalty behaviors (Ranaweera & Prabhu, 2003). Loyal customers tend to pay less attention to competing brands and advertising, are less price sensitive, and create positive WOM (Desai & Mahajan, 1998). While satisfaction was found to have a direct positive influence on loyalty (Heckman & Guskey, 1998; Mittal et al., 1999), this finding is not universal. Arnett et al., (2003) and Reynolds and Beatty (1999) did not find a direct relationship between the two constructs. King and Dennis (2003) assert that one reason for the inconsistency in the findings is because every consumer has a unique individual cognitive process that influences their satisfaction, loyalty, and behavioral intent perceptions. While cognitive processes may be one reason, personality traits could be another reason. Personality traits have been shown to affect consumer complaint behavior (Huang & Chang, 2008), employee retention (Barrick & Zimmerman, 2009), and job satisfaction (Bui, 2017).

Historically, much of the customer satisfaction and loyalty research includes intrinsic attributes such as service quality. Service quality has been an integral part of satisfaction and loyalty research. Service quality has been shown to have a positive influence on customer satisfaction in various industries such as, tourism (Lee et al., 2007), conventional retailing (Cronin et al., 2000), online shopping (Hsu & Lin, 2015) and health care service (Cronin et al., 2000). To a lesser degree, extrinsic attributes have been included in customer satisfaction and loyalty research.

Therefore, using the U.S. airline industry, the objective for this research is to explore the moderating effects of personality traits on satisfaction and behavioral loyalty. This research specifically examines the moderating effects of the “big five” personality traits between service quality and satisfaction (Figure 1) and between satisfaction and conative (behavioral) loyalty (Figure 2). Conative loyalty includes word of mouth, recommendations, and intent to repurchase.

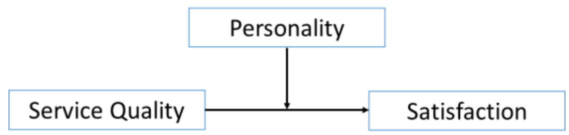


**Figure 1. Conceptual Model 1**

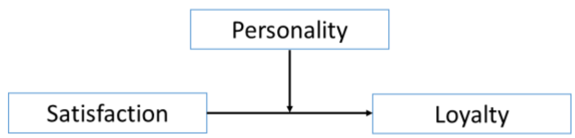


**Figure 2. Conceptual Model 2**

## Literature Overview

Individuals have unique personality attributes that are different from the others. Personality can be described as a dynamic, internal organization of psychological systems that influence a person’s behaviors, thoughts, and feelings (Carver & Scheier, 2004). Personality determines an individual’s disposition and their response to the environment (Mishra & Vaithianathan 2015). There are two schools of thought related to trait theory. One school believes that everyone has the same set of traits, though there is variance in personality because each trait is more or less prominent from one person to another. Thus, the same traits are common among all people but to different extents. The second school believes that every person is different from one another because everyone has a select and limited list of traits. McCrae et al. (1986), a believer of the first school of trait theory, classified the personality traits into five factors. The five-factor model or “big five” personality traits consists of neuroticism, extraversion, openness, agreeableness, and conscientiousness. The five-factor model is a prominent classification of personality and categorizes a large number of traits into five dimensions and has been consistently used to explain individual differences in a variety of empirical settings (McCrae & Costa 1985). This study examines the first school of thought, where individuals encompass all five traits, though at different levels.

While previous consumer personality trait research has been conducted in various areas such as banking (Al-hawari, 2015), retail (Bove & Mitzifiris, 2007), and tourism (Faullant et al., 2011), often, the research does not examine all of the “big five” personality traits, and when they do, they tend to examine direct effects rather than moderating effects. However, when moderating effects are examined, they tend to overlook the moderating effects between service quality and satisfaction and between satisfaction and loyalty.

## Methodology

Data for this research was collected in 2018 using an online survey distributed via Amazon Mechanical Turk (MTurk). The survey returned 708 responses. After screening for incomplete and duplicate responses, and for surveys completed from outside of the United States, 624 usable observations remained. To ensure completion of the survey, to lessen the likelihood of duplicates, and to deter respondents from outside of the United States from answering the survey, respondents were given $1.00US to complete the survey.

Service quality, satisfaction, loyalty and personality constructs are based on a 5-point Likert scale where 1 = "Strongly disagree" and 5 = "Strongly agree." To minimize common method variance, the survey was developed in accordance with the recommendations from Podsakoff et al. (2003). The survey items were constructed as closely as possible to validated items in previous studies, the directions for the survey stated that the survey was anonymous, and respondents were asked to provide honest answers.

The analysis was conducted using IBM SPSS v.25 and SPSS Process 3.5 macro. Items were first analyzed using factor analysis and second, the resultant constructs were analyzed for moderating effects. The latent variables for the analysis included service quality, satisfaction, behavioral loyalty, and five personality traits: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Model 1 and Model 2 were analyzed five separate times, each time with one of the five personality traits.

## Results and Implications

The socio-demographic distribution of the sample consists of fewer females (43.91%) than males. Most of the respondents are in the age groups between 25 and 35 years old (47.76%) and between 36 and 45 years old (22.28%). The educational level of the sample is mostly characterized by 4-year college degree (45.83%) and some college (29.60%). Respondents selected economy seat class the most (84.78%) and the majority of the sample flew domestically (86.38%).

Factor analysis was conducted using principal component extraction and varimax rotation. Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .925, and Bartlett's Test of Sphericity is significant at $p < .001$, indicating that factor analysis may be useful for the data. The measurement items showed high levels of internal consistency reliability, with Cronbach's $\alpha$ values above the cutoff value of 0.70 (Hair et al., 2006). The loadings and cross-loadings of factor analysis show that each item loads highly within its corresponding latent constructs showing sufficient discriminant validity. Indicator reliability can be assumed if all indicator loadings are above the threshold value of 0.70 (Hair et al., 2006).

When examining the moderating effects of personality on satisfaction (Model 1), neuroticism and extraversion are found to be insignificant. Openness ($\beta$ =.2876, p = .0026), agreeableness ($\beta$ =.3386, p < .001), and conscientiousness ($\beta$ =.2973, p < .001) are found to be significant and influence satisfaction directly, however, their moderating effects between service quality and satisfaction are found to be insignificant (Table 1).

| | Openness | Agreeableness | Conscientiousness |
|---|---|---|---|
| **Service Quality** | .7526 *** | .7340 *** | .7365 *** |
| **Openness** | .2876 ** | | |
| **Agreeableness** | | .3386 *** | |
| **Conscientiousness** | | | .2973 ** |
| **Moderating Effect** | Not significant | Not significant | Not significant |
| **R-sq** | .5711 | .5796 | .5712 |
| **R-sq change** | .0014 | .0018 | .0014 |
| ***p* value** | P < .0001 | P < .0001 | P < .0001 |

Notes: ** P< .05, *** P< .001

**Table 1. Results of Model 1 Service Quality and Satisfaction**

When examining the moderating effects of personality on behavioral loyalty (Model 2), extraversion, agreeableness, and conscientiousness were found to be insignificant. Neuroticism ($\beta$ = -.1707, p = .0549) is found to be significant and influence loyalty directly, however, its moderating effect between satisfaction and loyalty is found to be insignificant. The direct effect of openness on loyalty is found to be insignificant, though its moderating effect between satisfaction and loyalty is found to be significant ($\beta$ =.0458, p = .0978) (Table 2).

| | Neuroticism | Openness |
|---|---|---|
| **Satisfaction** | .7292 *** | .6361 *** |
| **Neuroticism** | -.1707 * | --- |
| **Openness** | --- | Not Significant |
| **Interaction Moderating Effect** | Not significant | .0458 * |
| **R-sq** | .6290 | .6282 |
| **R-sq change** | .0015 | .0016 |
| ***p* value** | P < .0001 | P < .0001 |

Notes: * P< .10, *** P< .001

**Table 2. Results of Model 2 Satisfaction and Loyalty**

Figure 3 shows that as satisfaction increases, loyalty increases in those with low, moderate, and high levels of openness. Those who have the highest levels of openness also have the highest levels of loyalty.

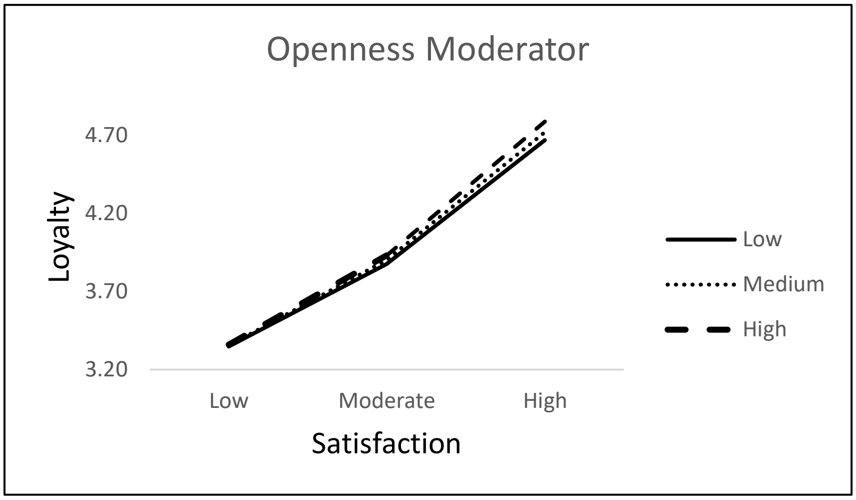


**Figure 3. Openness Moderation**

Though this research found that moderating effects of personality is limited, it did uncover that openness, agreeableness, and conscientiousness affect satisfaction and neuroticism influences loyalty directly. Given the findings of this research, managers might ascertain consumer personality attributes to improve satisfaction, thus leading to higher levels of loyalty.

## Conclusion

This research explored the moderating effects of the "big five" personality traits on satisfaction and loyalty. It was found that openness has a moderating effect on loyalty while other personality traits have direct effects on satisfaction and loyalty. To improve this line of research, future research may explore other factors such as predisposition and trust in which personality might interact with. Additionally, multi-group analysis could be explored to find additional insights.

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# Innovative Leadership: Breaking Constraints

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Leadership, Innovation Bureaucracy, Robert M. Gates

**Introduction**

Dr. Robert M. Gates has led three of the largest, most complex, least adaptive organizations that have ever been created. First, as the youngest director of Central Intelligence in our history – and the first to have done so, starting from an entry-level position (Whipple, 2020) - a global spy network of 22,000 employees, trained in the arts of secrecy and deception. Second, as president of Texas A&M, the fifth largest public university in the United States, with 70,000 students and 3,500 "independent contractors" (Rosovksy, 1990) that share governance. Third, as secretary of the Defense Department, the largest and most powerful bureaucracy in the world, housing the Army, Navy, Air Force, Marines, and Coast Guard. He is the fourth longest-tenured Secretary of Defense and the first to serve presidents of two political parties.

And he was the sole inspiration for Tom Clancy's best known fictional character, Jack Ryan.

Described as quick, bright, with a deep foresight in what was coming, putting different pieces of a puzzle into a larger context, and, "Pound for pound, he is the best bureaucrat we ever had. He knew how to run the U.S. government" (Whipple, 2020: 149).

Gates said of the Department of Defense, but is applicable to the CIA and Texas A&M, "…nearly everyone there is a career professional with considerable job security. Every major part of the organization – budget, acquisition programs, and policy – has a constituency inside and outside…everyone has an oar in the water…pulling in different directions" (Gates, 2014: 577). Admiral James Stavridis, retired Supreme Allied Commander, NATO, said of leading a large, diverse organization like the Department of Defense, "What happens when you put eight colonels in an electrical circuit – you get a circuit of infinite impedance".

The bigger the organization, the higher the level of inertia, the more resistance to innovation, the more gridlock, obfuscation, self-interest, delay, and decay. Gates actively worked to break these circuits of impedance and force innovation, by envisioning new ways to operate, adapting to the nature of the organization, and forcing accountability. And by any leadership metric that can be quantified – whether it be adapting to the external environment, using human resources efficiently, allocating capital, or formulating and implementing solutions to complex social problems – he achieved success at each stop.

How did Gates break these constraints? This paper seeks to develop a general framework of *innovative leadership*.

## Literature Overview

This paper will examine the literature on leadership, innovation, and organizations, specifically, bureaucracies. Leadership has been studied for centuries. Unlike other disciplines that have a foundational text on which the rest of scholarship rests (like Neustadt, 1960), the study of leadership is very fluid.

Rost (1991) read the modern leadership literature, back to 1900 and found leadership had been defined more than two hundred ways and often the definitions are incompatible, within the same text. For example, he found that leaders should be simultaneously decisive and flexible, or visionary and open-minded. In the 30 years since, the study has only increased, the picture is just as cloudy, clarifying nothing. Kellerman (2012), a founding director of the Harvard Kennedy School's Center for Public *Leadership*, noted that, "…we don't have much better an idea of how to grow good leaders, or of how to stop or at least slow bad leaders, than we did a hundred or even a thousand years ago."

According to Rost (1991), the closest scholars came to a consensus definition of leadership was the idea that it was "good management". More recently, Suddaby (2010) argued for more precise and categorical distinctions. Anderson and Sun (2017:76) agree, examining the literature just since the turn of the 21st century and found, "…a bewildering assortment of leadership styles", including shared/distributed, authentic, ethical, spiritual, pragmatic, ideological, and servant leadership, later admitting in a footnote that they omitted several styles, because it would be difficult to do so in one paper.

Zegart (2007) show how government agencies lack three advantages that private organizations enjoy. The first, is that government agencies lack the imperative of markets to adapt or suffer the consequences. Markets create the ultimate incentive – unemployment – whereas government agencies and the bureaucrats in those agencies, do not fear that poor performance will lead to their death and replacement by newer, fitter firms.

The second is that creators and employees in private sectors *want* their firm to succeed, whereas agencies are built on political compromise. As Gates notes (Chicago Council on Global Affairs), the executive branch has a board of directors of 535 members, with no similar interests with the executive branch, or the other 535 members.

The third is that leaders of private firms have more freedom to run their firms than public managers do. At Coca-Cola, the mission is to sell soft drinks, whereas at the U.S. Forest Service, their mission is to harvest timber *and* protect National Parks at the same time. The cynic would note those goals are in conflict with each other. Additionally, if Linda Rendle, the CEO of Clorox, wants to raise capital to expand overseas operations, she can get financial resources from a stock offering, issuing debt, going to bank down the street, or friends and family. Conversely, Gates raises capital from Congress, and only Congress or the Texas state legislature when he was at Texas A&M.

**Methodology**

This paper will utilize the 268 boxes of public papers, taking up 134.50 linear feet at William & Mary that Dr. Gates donated in 2016, as well as the four books he has published (Gates, 1996, 2014, 2016, 2020) to advance this work. Qualitative research has proved valuable understanding how leaders create change, achieve organizational ends, and explore new areas of leadership (Bryman, 2004).

**Results and Implications**

Preliminary study shows that Gates was successful at breaking constraints of entrenchment at each complex organization. As the director of Central Intelligence at the end of the Cold War, he had to "break the concrete" (Rustand, 2021) of 16 agencies and billions of dollars that had been singularly focused on the Soviet Union for 45 years. At the same time, Gates was breaking social constraints, allowing gay employees to serve openly, long-before the rest of federal government could settle on policy (he did the same for scout leaders and volunteers, as president of the Boy Scouts of America, one of the largest youth organizations in the U.S.).

As president of Texas A&M, he increased the size and quality of the faculty; improved graduate and undergraduate programming; increase diversity dramatically without affirmative action or legacy admissions; and made improvements to the physical plant (Letter to Regents, June 21, 2004).

As Defense secretary, he cut over 30 defense programs, costing $300 billion; cut $180 billion dollars out of the bureaucracy; acquired more-heavily armored vehicles to protect soldiers; reduced medivac times from two hours to less than 50 minutes; fired the Secretary of the Army, Secretary of the Air Force, and the Assistant Secretary of the Air Force over the poor treatment of patients at Walter Reed Hospital; and handed the elected Iraqi government, a stable, secure Iraq in 2009 (Gates, 2014).

From studying his papers, there are seven takeaways that explain how Gates was able to lead each of these diverse entities successfully. First he fundamentally **believes in institutions**. His latest book (Gates, 2020) makes the case for the "symphony" of U.S. global leadership, besides the military: diplomacy, economics, strategic communication, development assistance, intelligence, and technology.

Second, he does not micromanage, but has "**micro-knowledge"** (Gates 2016) of the institution**.** With eighteen-hundred pages of published books, as well as 238 boxes of material at William &

Mary, Gates knows how the government and higher education works; understands the political landscape in both sectors; and knows how to win friends, and bargain with enemies.

Third, when you understand the institution deeply, you naturally **develop instincts**. When he became president of Texas A&M, he promised to use the blueprint of his predecessor. That blueprint had 12 imperatives for change that Gates recognized as impossible to implement. He met with each college, asking them to agree on three or four. Those four imperatives – increase and quality and compensation of faculty; increase graduate fellowships and assistance; improve the physical plant; and increase diversity, would be his agenda during his four-year tenure.

Fourth and fifth, that blueprint was reduced to four, because he was sincere about getting **feedback** and **delegating** decision making**.** Gates cut across silos to win support of those in the trenches who have to do the work, particularly amongst the career professionals. Gates frequently used task forces, councils, and advisory committees, to build consensus. Leaders cannot hold individuals accountable if they do not let go of the steering wheel. 'Because I included so many faculty, administrators, students, and [alumni] in the process, the changes were accepted with little resistance and endured after I left. (Gates, 2016: 71).

Sixth, Gates **listened, more than he spoke.** He was often criticized in both the Bush and Obama administrations, for not speaking in cabinet meetings, unless specifically called upon. By waiting to speak, he knew what the other principals were thinking before he spoke and could calculate what needed to be said and how to express it. This was advantageous because the meeting can conclude along the lines he preferred. With other issues, he had not made up his mind and wanted to hear what others had to say.

Finally, Gates **acted decisively**. Whether it was social change at the CIA or the mistreatment of veterans at Walter Reed, once he had the information to make a decision, he made it. 'Don't take the job if you don't want to make decisions – and have the political smarts to make them stick' (Rustand, 2021).

## Limitations and Future Research

Much more investigation in the leadership, innovation, and bureaucracy literature is needed to flesh out this development. There is much more that can be done, using the public papers housed at William & Mary. After a week, I had only reviewed approximately 7% of the content.

## Conclusion

Despite these limitations, early results show that Dr. Gates is a remarkable leader who succeeds, despite sometimes impenetrable, impersonal, and complex organizations. This study attempts to better understand how leaders break these constraints, gaining insight from the well-documented career of Dr. Gates. Implications can guide leaders for success in challenging the status quo of any organization.

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# An Initial Look at Patterns of Appellate Decisions in Employment Related Cases

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## Introduction

The Civil Rights Act (CRA) of 1964 was enacted by Congress to address discrimination in many areas. Prior to passage of the Act, employers were subject to various state laws and regulations governing discrimination in the workplace. Title VII of the statute extended mandates of the federal law to the employment context. Several years ago, the authors initiated a discussion to develop a data set that would extend a previous study conducted by Jon Werner and Mark Bolino (1997) to determine which variables most influenced judicial decisions when performance appraisals were at issue in a lawsuit. While proceeding with that stream of research, the authors decided to expand the model in terms of scope, time and geographic reach. This paper provides descriptive statistics of some preliminary findings of the developing data set.

## Literature Overview

Arguably one of the most important employment practices impacted by Title VII of the CRA of 1964 is performance appraisal. Performance appraisal typically involves the continuous process of identifying, measuring, and developing the performance of individuals and groups in organizations (Aguinis, 2007), and it involves providing both formal and informal performance-related information to employees (Selden & Sowa, 2011). Given the importance of performance appraisals for determining employment outcomes such as raises, promotions, bonuses, terminations, etc., performance appraisal documentation is often presented as evidence in legal challenges of employment decisions. In their watershed study, Werner and Bolino (1997) found that performance appraisal components related to fairness and due process (e.g., giving employees the opportunity to review the appraisal results) were more important to legal decisions than technical components related to the measurement of performance itself (e.g., measuring traits versus behaviors). However, the results of the Werner and Bolino (1997) study are over 20 years old at this point and in dire need of an update. Moreover, the scope of their analysis needs to be expanded to include federal trial court decisions, not just cases that are appealed. Furthermore, Werner and Bolino's (1997) analysis paid little attention to the characteristics of the plaintiffs (e.g., sex, race, age, etc.) in the cases reviewed. Thus, the purpose of the present study is to provide an updated and expanded analysis of the impact of performance appraisal components on employment litigation outcomes.

## Methodology

To develop an initial model for continuing with the line of research developed by Werner and Bolino (1997), the authors used cases containing variables to mirror that study. To extend the study, however, the authors desired to examine other aspects of the cases under review and the researcher was instructed to gather data points not specifically addressed in the Werner and Bolino (1997) study. To expand the scope of review as the model matured, additional variables were coded. Werner and Bolino (1997) utilized case law during the 15-year span from 1980-1995. The authors intend to compare findings of the previous study with results of subsequent judicial decisions and expanded the search frame to include decisions from 1996 to 2020. The authors also want to examine other aspects for comparison. The current study will use federal case law at the intermediate appellate level (United States Courts of Appeals). Later, as a source of comparison, the authors intend to expand the scope of the study to include federal trial court decisions since not all outcomes are appealed.

The coding of variables was accomplished using a method similar to Werner and Bolino (1997), with all categories being assigned numerical codes. Most categories consisted of a single digit code assigned to each variable within the category. However, the level of detail in the current study has been expanded. For instance, geographic regions of the trial courts making the initial decisions, as well as the specific appellate divisions, were identified and coded for comparison purposes. In addition to coding of variables involving performance appraisal information, additional characteristics of the parties involved were determined and coded when possible given the level of detail included in the cases.

The results in this paper are derived from simple descriptive statistics using a first glance at data from the 95 coded cases. The number of cases will increase as the study progresses. The coding for most of the cases thus far was accomplished by one research assistant. Subsequent blind coding of each individual case in the current data set will be conducted for verification of coding accuracy, as will future cases added to the developing data set.

**Results and Implications**

The analysis in this paper is limited to descriptive statistics relating to characteristics of the plaintiff filing an employment-related lawsuit in a federal trial court. The scope of the analysis is limited to the plaintiff's gender, whether the trial court decision was made by jury verdict or summary judgment, success of the plaintiff's claim, and the subsequent decision rendered by the appellate court. The basis of the claim, impact of performance reviews, and implications of the geographic dispersion of the cases will be analyzed in the future as the database grows.

The first level of analysis divides the cases into those decided by summary judgment, meaning the case was summarily determined as a matter of law and therefore did not proceed to trial, and cases decided by verdict after trial. Although each claim is based on discrimination in the employment context, the specific type of discrimination will not be considered until an appropriate number of cases are added to the database. A substantial number of the claims (88%) were summarily disposed of by the trial court while the remaining claims were rendered by verdict after trial. All cases decided by summary judgment were decided in the employer's favor while 73% of the cases going to trial were decided in the plaintiff employee's favor. Of the cases decided by summary judgment at the trial level, employee's obtained favorable outcomes in only 18% of the appeals. It is interesting to note that in the cases decided by verdict, the appellate court flipped the outcome to favor the employer (73%)

A second level of analysis examines the cases based on claims made based on gender. The specific type of discrimination claim is not considered in this analysis either. Of the 95 appellate level cases coded, 55% of the claims were filed by male plaintiffs and 45% by female plaintiffs. The high number of cases mentioned above that were decided by summary judgment at the trial level were equally split between the two categories (male=89%, female=88%). Also, as noted above, none of the cases decided by summary judgment were in favor of the plaintiff employee at the trial level. In cases decided by verdict (male=6, female=5), males had favorable outcomes in four of six cases (67%) at trial, but only one of those decisions (25%) survived the appeal. However, both cases lost by the employee plaintiff at trial were favored by decisions of the appellate court. When examining lawsuits filed by female plaintiffs and decided by verdict, four of the five claims (80%) were won by the plaintiff at the trial level. However, on appeal, none of the five claims survived.

Although much remains to be examined, preliminary implications indicate that employers have been very successful at defending against employment-related lawsuits at the trial level when those claims are dismissed on summary judgment. On appeal of those claims, employers had favorable outcomes in 82% of the cases. If the case went to trial, employees won 73% of the verdicts. However, the advantage flipped on appeal of those verdicts as employers won favorable outcomes in 73% of those cases.

## Conclusion

The analysis in this paper indicates that employers should be encouraged when defending against claims of discrimination when summary judgment is granted by the trial court. That success rate greatly dwindles when such cases proceed to trial. On appeal, however, employer outcomes are very favorable in both cases. When gender was stratified, the analysis didn't reveal significant differences in outcomes at the trial court level. On appeal, no females had favorable outcomes while males had a 50% success rate. A limitation on the analysis is that cases were not coded by multiple researchers. Also, cases were not stratified by different types of discrimination claims and judicial reasons for summary judgment at the trial level were not classified.

This research was inspired by the Werner and Bolino (1997) study which is over 20 years old. Moving forward, this research will update and greatly expand the scope of their analysis. The authors will add multiple reviewers to independently code the current and future cases, expand the time horizon, test for additional variables, and consider geographical differences. The findings and recommendations of this study should be especially useful to the legal and business community, including practicing judges and attorneys, business leaders, human resources practitioners, employees, and other users of legal and/or business information in the employment context.

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# The Impact of Typos on Brand Perception and Business Reputation

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**Introduction**

The purpose of this study was to examine the effects that typographical errors and the lack of effective proofreading can have on brand perception and reputation. Previous studies have shown that a single spelling mistake on a business website can cut online sales by 50%.

This study addressed two research questions:

(1) Do typos in business impact perception and reputation?

(2) Do proofreading mistakes affect consumer relationships?

Primary data, aligned with current literature, show that typographical errors in business lead to losses of perception, brand reputation, and consumer relationships. Several examples of typographical errors and proofreading mistakes are explained.

**Literature Review**

A comprehensive view of the marketing process and consumer relationships is significant when investigating the impact typographical errors has on business entities (Garbarino & Johnson, 1999). Marketing is in the forefront of building brand identity, customer interest, loyalty, value, and brand reputation (Garbarino & Johnson, 1999). Relationships with customers are initiated through print marketing, television commercials, and web-based advertising (Hampel, Heinrich, & Campbell, 2012).

It is important not to dwell only on the errors made by businesses, but also to establish an understanding of how to build consumer relationships to grasp why making typographical mistakes can have such an impact. A business must take the time to ensure products and brand advertising are produced without flaws to build trust and faith in the quality of products and services. Additionally, businesses must avoid making proofreading mistakes which may lead to business errors because consumers are easily influenced by mistakes (Everard & Galletta, 2018).

## Methodology

The research questions were investigated using a 10-question online survey posted on Facebook. Over the 10-day period, 202 individuals responded.

## Results/Implications

Results of the primary data show consistent alignment with current literature, stating that typographical errors in business lead to losses of perception, brand reputation, and consumer relationships. Survey respondents said they were more forgiving of grammatical or spelling errors in text conversation and emails, but were less forgiving of business entities, even if the context of the error was less formal.

Consumer perception is important in maintaining brand loyalty and developing transactional consumers into relational consumers, who will remain committed to a business over time. Businesses must strive to maintain a relationship with consumers that is void of typographical errors because these mistakes can lead to major repercussions that could have been avoided.

Today's consumer expects interest, value, and brand relationships to be nurtured by the company rendering goods; so it is critical for businesses to strive for perfection in marketing and delivering a flawless product to the customer. Instances in which typographical errors have gone unnoticed in marketing campaigns or on product packaging can spell disaster for a brand, with an impact on revenue, reputation, and consumer loyalty. Further still, brands can be affected by typographical errors and proofreading mistakes on behalf of a single individual, such as via the use of social media, forcing public scrutiny on both the brand at stake, as well as the individual who committed the error.

Professionalism can quickly be called into doubt, even by the most loyal of customers, if a business continues to exhibit grammatical and spelling errors to the public. These errors over time create doubt in the quality of products and services, because typographical errors begin to create a perception of carelessness, which can become the new predisposed mood of a brand.

## Conclusions

Typos on the part of a business can greatly impact reputation and perception, but more importantly, consumer relationships can decline due to ongoing typographical mistakes. Consequently, consumer relationships will suffer as a direct result of repetitive typographical errors in business. Positive impressions with consumers lead to customer loyalty, brand awareness, trust, purchase intent, positive perceptions, and increased company reputation. The relationship between business and customer is a delicate balance dependent on trust from both parties.

Further, the growth of internet-based advertising created an environment in which businesses were able expand their consumer reach. With tremendous growth of the internet, brands were given the chance to publish more content with more frequency through the additions of brand websites, social media, videos, and blog posts. The increased frequency at which businesses began broadcasting advertisements to consumers also allowed for much more potential for error, with corporate and professional accounts seemingly held to a higher standard. Professionalism and credibility come under major scrutiny when businesses start making typographical errors in advertising and marketing. Placing doubt into the minds of a consumer base is very dangerous because trust and loyalty begin to decline, which leads to lack of revenue and decreased future purchase intent.

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# Predicting Groundwater Fluctuations in Badgaon of the Dharta Watershed in India – A study of Machine Learning Algorithms and Hard Rock Watersheds


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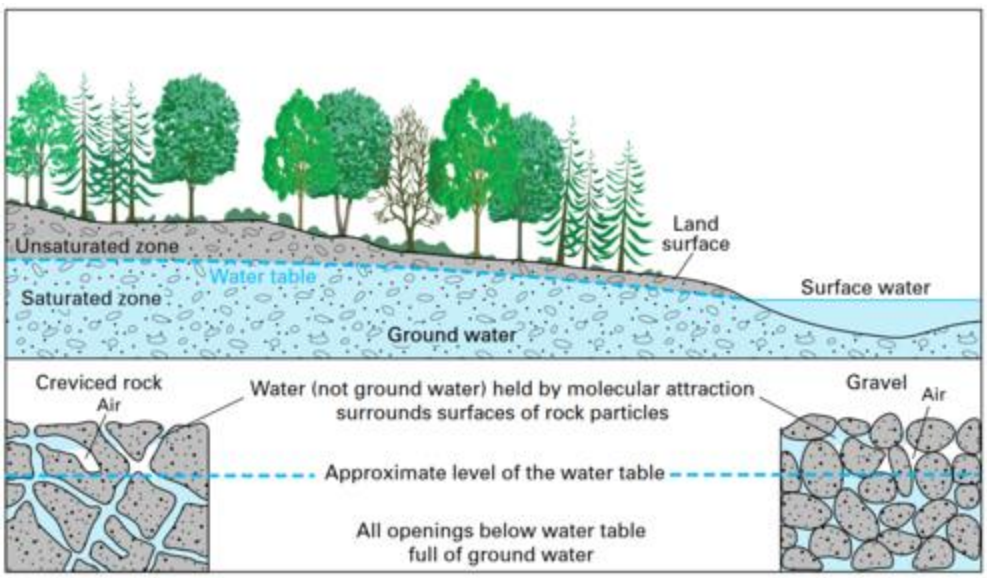
Groundwater fluctuations, predictive model, hard rock basin, UN sustainable goals, analytics

## Introduction

"Water scarcity affects more than 40 per cent of the global population and is projected to rise. Over 1.7 billion people are currently living in river basins where water use exceeds recharge." - UN Sustainable Development Goals #6 (2020)

Groundwater is a vital and limited resource in many parts of the world. India relies on groundwater for 60% of its irrigation water for crops and 80% of its drinking water. Groundwater in India is mainly recharged during monsoon season, which lasts from June to September, with the northern parts receiving less rainfall than the southern parts. Many villages have resorted to drilling deeper to access more water, however, this often results in overuse of an aquifer and leads to a decreasing supply over time. Aquifers are layers of sub-surface permeable rock that can retain water, which can then be accessed using wells. These wells deplete the water level, also known as the water table, underground. Aquifers recharge naturally with precipitation over time, although, in many areas the pumping rate is greater than the rate of recharge. Satellite-based estimates observed a ~109km$^3$ decrease in water supply from 2002 to 2008, indicative of unsustainable consumption (Rodell, Velicogna, & Famiglietti, 2009).




How ground water occurs in rocks.

**Figure 1. A diagram illustrating how ground water occurs in rocks (USGS, 1999)**

Managing Aquifer Recharge and sustaining Groundwater Use through Village-Level Intervention (MARVI) project is a multi-disciplinary project seeking to enable villagers in India to manage their water resources more sustainably. MARVI's approach has led to an increased production of less water-intensive crops, improved irrigation methods, and a focus on resource management.

The questions this study seeks to answer are:

1. What are the patterns of groundwater changes in the wells over time, across villages? Can we utilize these patterns to forecast groundwater levels and to what level of accuracy?

2. What is the minimum number of wells that should be targeted for data collection to get a sense of an aquifer's behavior? In other words, what is the minimum number of wells that will give famers a good understanding of the water level fluctuations around their village? How does the water level in their wells change based on rainfall amounts during the monsoon season?

3. How often should well data be collected to get a sense of an aquifer's behavior?

In this paper, the first question is addressed and additionally, how accurately groundwater fluctuations could be predicted for the monitored wells. If successful, it could be a valuable resource in helping villagers ration their water supplies. The first steps of this research were to use data visualizations and explore machine learning (ML) algorithms to better understand water shortages, aquifer recharge and seasonal variations. ML methods allow for non-linear approaches to modeling these complex interactions within nature, which would otherwise require a large number of resources to calculate manually.

**Literature Overview**

Predicting groundwater fluctuations has grown in prevalence as global concerns rise over water shortages. While the field is still actively changing, "the most obvious input variables in groundwater level predictions studies are rainfall, evaporation, temperature and pumping patterns" (Yadav, Gupta, Patidar, & Himanshu, 2019). The ML approaches at the forefront for this research have been focused on artificial neural networks (ANN) and support vector machines (SVM). According to Hajji, Hachicha, Bouri, & Dhia's work with ANNs forecasting groundwater levels, ANNs are a supervised ML model intended to mirror neural networks, and function by learning associations and patterns within data, with common applications being regression analysis or classifications (Hajji, Hachicha, Bouri, & Dhia, 2012). An SVM is a supervised learning model based on statistical learning theory that similarly is focused on regression analysis and classification (Yoon, Jun, Hyun, Bae, & Lee, 2017). In predicting groundwater fluctuations, ANNs have been found to perform more efficiently than SVM models, however, SVMs were found to be less sensitive to the structure of input data, allowing it to better handle more diverse data in cases where data is limited or provides a less complete image of the environment (Zhou, Wang, & Yang, 2017). Research suggests that ANNs might perform better for predicting groundwater levels, specifically on hard rock aquifers, given the necessary predictors are available. (Sethi, Kumar, Sharma & Verma, 2010). In establishing performance indicators, root mean square error (RMSE) is the average magnitude of errors, meaning greater weight is given to larger errors, with a range from 0 to infinity (Shiri, Kisi, Yoon, Lee, & Nazemi, 2013). RMSE is the primary performance evaluation metric and functions as a measure of accuracy for prediction models to allow for comparison. The coefficient of determination (R2) is the other performance indicator and is used to test for any inadequacies in the data.

Experimental ANNs and SVMs are using modified approaches that apply ML to help clean their data to further improve these models. One such instance is the use of wavelet transform preprocessing, which is a mathematical function that analyzes time-series data and their relationships to analyze time-series with non-stationary data present (Adamowski, & Chan, 2011). Additionally, genetic algorithms are a simple meta heuristic approach, similar to an optimization-focused flowchart, that can be applied to a variety of disciplines (Han, Zou, Xue, Xu, Wang, & Zang, 2020).

## Methodology

Data was collected on 250 water wells, 50 wells per village, in the Dharta watershed in the Udaipur district of the Rajasthan state of India (Figure 1). The villages, Varni, Sunderpura, Hinta, Dharta, Badgaon, and their wells are within a ~24 sq. mile area. However, due to limited resources, this analysis will focus on the village of Badgaon, the north most of the five villages. Bagaon is spread over a ~ 6.8 mile area. Data was collected by Bhujal Jankaars, a Hindi word for "groundwater informed," who were trained to collect the well data. The data was recorded onto an app, "MyWell," that records the entered water level, rainfall amount, and water quality data. The app was developed by the MARVI project to employ crowdsourcing for easier data collection. This data was then exported to a spreadsheet, after which, it was cleaned, put into a panel format, and brought into the machine learning application. Data collection began on August 5th 2012, and the latest data available for analysis was collected on November 24th 2019. Data was very consistently collected with only a handful of weekly readings missing per year, however, at the start of 2016, there would be gaps with several months of groundwater level readings missing for some of the wells. Missing values were omitted for all regression analyses. Additionally, in 2017, the wells per village were reduced to 30 per village for a total of 150 wells. This was a decision made by management to conserve resources.

The data collected on the wells includes the depth of the wells, measured in meters; the elevation of the wells, measured in meters; and latitude and longitude recorded using smartphone readings. Pumping and evaporation patterns were not able to be assessed therefore, they are not explicitly included in the data. They are implicitly tied to fluctuations in groundwater levels over time and while not directly available for analysis, their effect is implicit in the data. Monthly temperature data, recorded in Celsius, was available from an Indian open government platform. Additionally, El Niño3 monthly surface sea temperature (SST) readings from the National Oceanic and Atmospheric Administration (NOAA) were used to gauge shifts in El Niño and La Niña, and their meteorological effects (Yadav et al. 2019). Due to limited resources, the data was not pre-processed, however, hopes to be developed in the future.

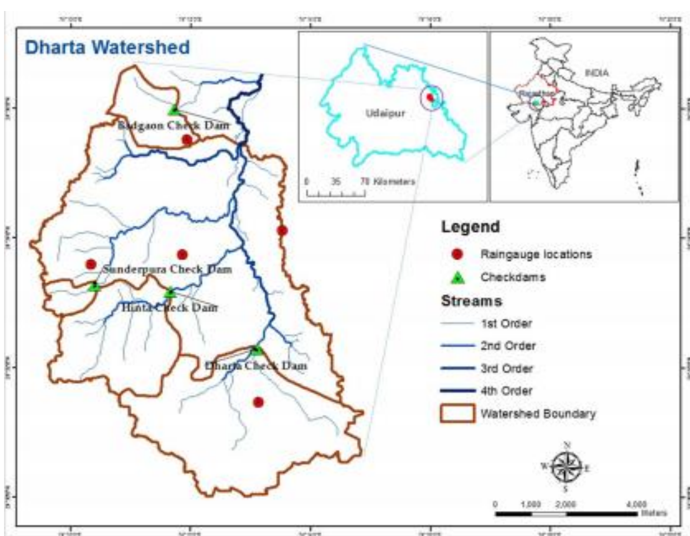



**Figure 2. Location map of study area (from Dashora, Dillon, Maheshwari, Soni, Dashora, Davande, Purohit, & Mittal, 2017)**

Figure 2 below shows the location of the wells. The visualization ([link to the interactive map]) was created using Google maps and when a user clicks on it, provides information about each well such as owner information, the village located in, elevation and the depth of the well.

**Figure 3. Map providing the wells location and information. Badagon is seen in orange and is the north most village.**

The predictive regression-based models used the amount of water available as the dependent variable, with the regressors being date, rainfall, elevation, El Niño3 SST, latitude and longitude data. All models were trained using 80% of the data, with the remaining 20% being used as the test set. The models evaluated were SVM, ANN, stochastic gradient descent (SGD), Lasso (L1) regression, LASSO-LARS, Ordinary Least Squares, K Nearest Neighbors, and a series of different decision tree-based models.

| **Variable** | **Explanation** | **Range** |
|---|---|---|
| **Groundwater Level** | A calculated variable that took the difference between the well depth and the depth to water table. | 0 - 29.60 m |
| **Date** | The date the well was checked on a weekly basis. | 08/05/2012-11/24/2019 |
| **Longitude** | Longitude of the well | 74.174°E - 74.210°E |
| **Rainfall** | Weekly Total Rainfall as recorded by farmers in millimeters | 0 mm - 236.3 mm |
| **Elevation** | Elevation of the wells, recorded in meters | 409.9 m - 448.42 m |
| **Latitude** | Latitude of the wells | 24.581°N - 24.606°N |
| **El Niño3 SST** | Surface Sea Temperature readings from the Niño3 region that are used to predict El Nino and La Niña and monitor their effects. This data is recorded as a monthly average in ℃. | 24.35 - 27.95°C |
| **Temperature** | Temperature readings for the state of Rajasthan recorded monthly | 18.000 - 30.591 |

**Table 1. Table of the variables used for the ML models**

## Results and Implications

| **Model** | **RMSE** | **R2** |
|---|---|---|
| **SVM** | **5.463** | **0.31316** |
| **ANN** | **5.995** | **.17274** |

**Table 2. Table comparing the results of different models**

Ultimately, the only models that had a RMSE below 6 were the SVM and ANN models, with the SVM outperforming the ANN. While more data is necessary to predict groundwater levels more accurately, as seen in Figure 3 with the SVM model, the water level drop offs were predicted fairly accurately and with very limited lag. The groundwater levels are also consistently underpredicted by the SVM Model. In this scenario, under prediction is significantly more valuable than overprediction, as it helps prevent overestimation and overuse of the available water.

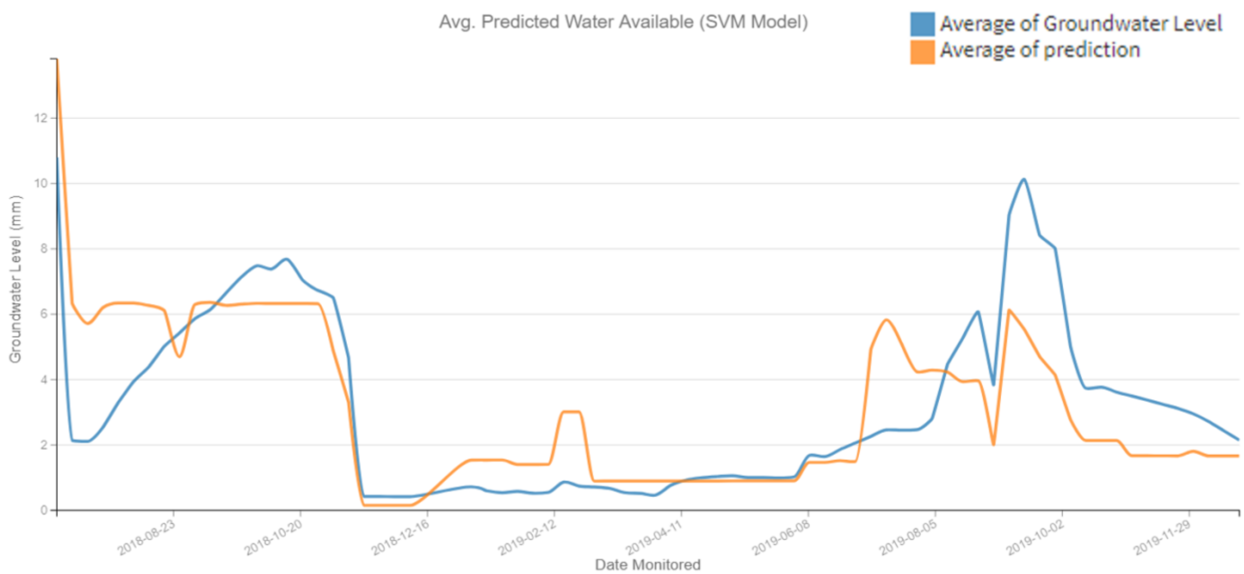



**Figure 4. Predicted Groundwater levels compared to the actual groundwater levels using the SVM Model. The SVM model performs good with sudden drops in water level, and has difficulty with sudden increases in water level.**

The ANN model, seen in Figure 4, performed similarly, however, tended to perform better at sudden drops in groundwater levels, as opposed to the SVM models. This may suggest that while the ANN's overall performance is lower, it may be more ideal for our purposes, as more weather data is gained. A more refined test focused on predicting fluctuations post-monsoon may reveal better performance metrics than the SVM during the long months with limited rain.

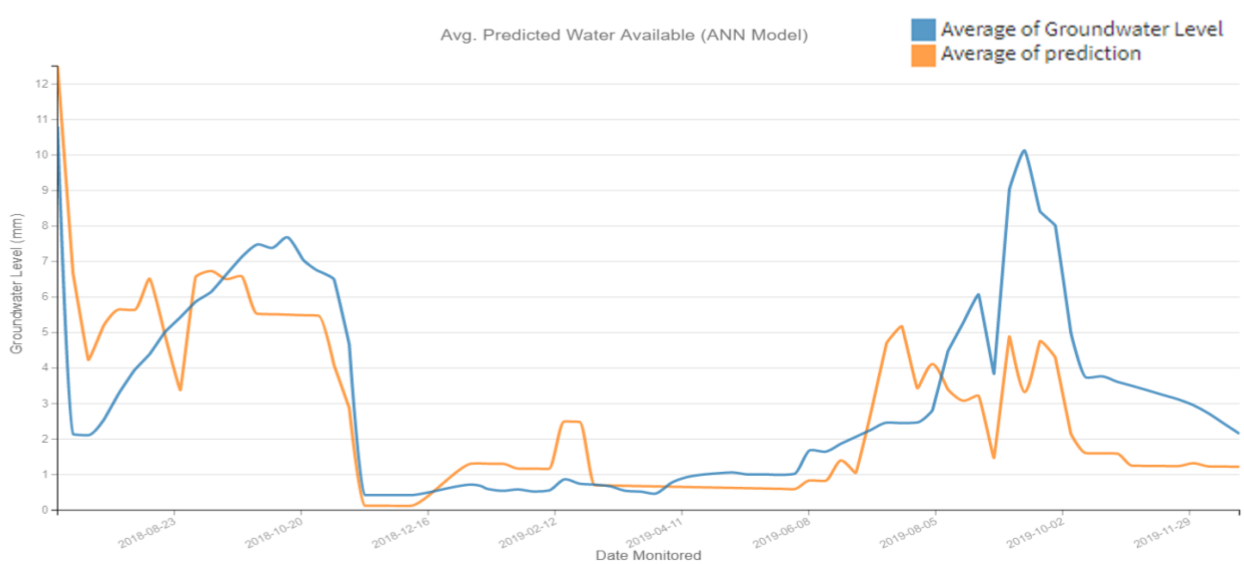



**Figure 5. Predicted Groundwater levels compared to the actual groundwater levels using the ANN Model. The ANN model performed better with sharp drops in water level than the SVM model, but worse with sharp increases in water level.**

## Conclusion

While our findings are in very early stages, we hope to expand our understanding of these aquifers' behavior and our accuracy with our models using pre-processing algorithms in the future. The most immediate next step will be the expansion of this analysis to the remaining 4 villages and the development of a prescriptive model that advises on an optimal number of wells to monitor, pursuant to goals 2 and 3 of this study. In doing so, it will allow the MARVI approach for greater scalability, while increasing efficiency for the villagers. Our final aim is to provide policy makers with substantially compelling data to empower them to commit to more sustainable policy proposals. As this study has been ongoing since 2012, we can observe a continued community commitment to monitoring and more sustainably managing their groundwater.

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# The Risks of Extra-Role (Citizenship) Behaviors

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**Introduction**

Literature on job performance—an ultimate outcome of human management scholarship and practice (Campbell, McCloy, Oppler, & Sager, 1993)—has identified organizational citizenship behaviors (OCBs), employees' voluntary, extra-role actions, as highly desirable behaviors that significantly, positively impact organizational success (Organ, 1988). The line between expected and extra job performance behaviors is admittedly fuzzy (Graen & Uhl-Bien, 1995). Formal job descriptions—derived from job analysis—typically outline organization mandated employee behaviors (e.g., responsibilities, tasks), but employees also engage in voluntary, extra-role performance behaviors (Cascio & Aguinis, 2011), often labeled OCBs or citizenship. These 'extras', not prescribed by a job description or analysis, stem from a response to a perceived need or demand in a given situation as well as employees' own discretion in performing their job roles.

As organizations operate in increasingly unpredictable environments and their employees face novel, dynamic demands for success, we believe the performance of extra-role behaviors (cf. responsibilities captured and prescribed by job analysis) will grow in frequency and importance. Because of this, we believe employee extra-role behaviors, like OCBs, merit further consideration and caution. Namely, scholars and practitioners seemingly assume all OCBs are inherently desirable (see Bolino et al., 2004). Recently emerging research has effectively challenged these assumptions to demonstrate how OCBs can pose drawbacks to the company and employee (Bolino et al., 2014; Vigoda-Gadot, 2006). Similarly, in this conceptual discussion, we assert extra-role job behaviors can—and often do—pose unconsidered, possibly critical, levels of risks to organizational stakeholders. Because extra-role behaviors typically occur (a) spontaneously (George & Brief, 1992), (b) at the discretion of individual employees, (c) within environments comprised of volatility, uncertainty, complexity, and ambiguity (VUCA; Baran & Woznj, 2020), employees and organizational management possess a limited ability to forecast all of their possible risks and threats. Consider a recent, true example:

**Organizational Uncertainty Increases Extra-Role Behaviors**

A car salesperson described waking up to his manager's 1 am frantic phone call: "Storms are flooding the car lot. Come help us move the cars to higher ground." The car salesperson, after complying with the request, reported standing in ankle-deep moving floodwaters, jumping the dead battery of a car while lightning and rain filled the sky. Such a task—jumping dead batteries while standing in moving floodwaters while lightning flashed overhead—would never fit into a car sales person's formal job description. Although no one suffered harm in this instance, the great risks of harm to those involved certainly raises shudders for any professional focused on employee safety and risk-management. The dealership where this occurred had never seen this level of flooding from a storm, and the unprecedented weather patterns of the 21st century indirectly exposed this employee and his company to a tremendous amount of risk through the enactment of extra-role (i.e., not formally prescribed) job behaviors.

Importantly, we distinguish the risks of extra-role behaviors from *dangerous work* or *dangerous work activities.* Many work roles (e.g., police work, mining) inherently include organizationally relevant job tasks posing risks of great harm (Jerimer et al., 1989). Similarly, organizations may operate in a high-stakes environment where members' mistakes can pose disastrous consequences for stakeholders (La Porte, 1996). Organizations facing such high stakes, or where dangerous work occurs, use established processes to identify, anticipate, manage, and mitigate the level of these risks *a priori*, in addition to creating systems specifically to mitigate bad outcomes. Definitionally, extra-role behaviors are not expected behaviors or outcomes, therefore their risks and harms can surprise the organization.

Broadly, extra-role behaviors like OCBs can benefit organizations (Podsakoff et al., 2009), and organizational scholarship and management have long noted the rewards of fostering such actions. In the real world of work, no one could possibly anticipate and formally prescribe—using job analysis and documentation--every organizationally beneficial employee behavior (Katz & Kahn, 1978). But work and organizational environments are changing. The risks posed by extra-role behaviors are inherently unexpected, because the behaviors themselves cannot be forecasted or anticipated. In the case of the car sales member above, no one anticipated the need for cars to be moved with such urgency, therefore no process for mitigating the risks of such an activity could be enacted, nor policies and safeguards for managing the risks provided to employees. As organizations increasingly face environments filled with VUCA, probabilities hold their employees will face more situations requiring extra-role behaviors (Potsangbam, 2017). Likely, the risks posed by extra-role behaviors have always existed, but current forces are making them more likely, thereby increasing their potential for harm. The increasingly dynamic environments in which organizations operate make routine work less common (Eisenhardt, Furr, & Bingham, 2010), requiring more adaptive work behaviors from employees and more discretionary action from members (Pulakos et al., 2000).

**Employee Discretion as Source of Extra-Role Behaviors**

The VUCA faced by companies provides one source of increased extra-role behaviors, but employees' own discretion also drives extra-role behaviors. In the past decades, popular management trends have increased the amount of discretion, and subsequent unpredictability, or employees' job performance. Organizational and job design, managerial behavior training, and organizational rewards are some of the factors which seek to increase levels of employee autonomy, job crafting, and employee innovation behaviors (Hardre & Reeve, 2009; Van den Heuvel et al., 2015; Xerri & Brunetto, 2013). Such trends similarly increase the likelihood of employees working outside formally defined human management systems and the risks they can predict and manage in advance. Consider a second example, of an engineer working in a manufacturing sector who saw a machine component slightly out of place in an automated production line. Fearing the slight issue could halt 100% perfect production levels during his shift, the engineer reported he felt it necessary to ""jump a safety rail, and leap from a platform to try to, without landing, push the component back into position without stopping the machines."

This employee earnestly sought to benefit the company in an innovative, albeit dangerous, manner, and did not stop to ask for permission or to consider the risks of his extra-role behavior. As a result, he narrowly escaped serious injury to himself from landing in the machine's pinch points, his push of the component actually broke the component itself, and production was halted for hours while repairs were made. Thus, the drive for employee empowerment, autonomy, discretion, and proactivity inherent in so much of modern management (cf. 20$^{th}$ century "Tayloristic" management; Taylor, 2004) increases the probabilities of employees engaging in unpredictable, if earnestly well-intentioned, behaviors. Such a drive, as this true narrative demonstrates, can pose underexamined risks to organizational stakeholders. Moreover, for more than three decades, organizational research and management has identified extra-role behaviors like OCBs with the assumption all of these behaviors are categorically beneficial to company and employees. Together, organizations' external environments and their internal practices increase the need for, and probabilities of, employees engaging in extra-role behaviors.

Much evidence correctly justifies fostering employees' engagement in extra-role behaviors, because such actions reliably can provide desirable outcomes (Podsakoff et al., 2009). Certainly, many OCBs, especially the more frequent and mundane types (e.g., helping a coworker) are desirable. However, as organizations and approaches to management continue to evolve, and provide systems where these extra-role behaviors will increase in frequency and impact, we must consider their potential for harm as well. Indeed, the future of our discipline requires we study the *exceptional,* not just the average, instances of workplace phenomena (Cortina et al., 2017). To that end, we argue there is a need to examine the underexplored, neglected, and unnoticed risks posed by managerial systems that foster extra-role behaviors at work. This should provide a rich area for future research efforts to understand what conditions increase these risks, what motivations may uniquely precipitate these risks, why some behaviors end badly while some are beneficial, and how organizations can encourage positive OCBs while mitigating the risks of negative behaviors and/or outcomes.

## Conclusion

This discussion on the risks of extra-role citizenship behaviors was specifically developed for the symposium setting to which it is submitted. We have developed, briefly, our foundational points here, that extra-role citizenship behaviors are increasingly likely and potent in workplaces where (a) organizations face environments filled with growing VUCA and (b) managerial and organizational practices are strategically designed to increase employees' citizenship, discretion, autonomy, and innovation. In such a workplace, of increasing unpredictability for employees who will act with greater levels of discretion, organizations can enjoy the rewards of extra-role citizenship behaviors. However, increased opportunity for rewards typically carry a corresponding increase in risk. Whereas much management scholarship and practice have focused on the rewards of extra-role citizenship, we believe more discussion is merited on the risks of this increasingly likely variety of employee actions. We have developed a fuller model than we present here, but certainly further research and consideration is needed to uncover what factors, situational and personal, may make extra-role citizenship actions riskier. To that end, we believe extra-role citizenship behaviors result in near-misses, accidents, mistakes, and undesirable outcomes, although we cannot find any specific statistics on such events beyond individual stories like those we have shared here. Thus, additional research in this area could begin simply with descriptive work to establish rates of undesirable outcomes of citizenship actions. However, we offer a catalyzing conversation to begin considering and discussing these risks, especially within a discipline where citizenship is all-too-often considered categorically rewarding (Bolino et al., 2004).

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# Understanding Computer Health and Fear Appeals via the Protection Motivation Model

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Online business environments, malware, coping behaviors

## Introduction

Empirical research linking individual responses to fear appeals and subsequent effects on behavioral intentions have been well-represented in fields such as marketing, consumer behavior, and psychology through the years; however, other relevant applications may still exist, especially in the discipline of information systems. In our increasingly virtual world, understanding reactions to online threats becomes paramount. The purpose of this paper is to further apply the Protection Motivation model to Information Systems by measuring individual reactions to computer health when they are faced with a threat, namely identity theft as a result of a malware attack.

The paper is organized as follows: the next section examines the Protection Motivation model, its constructs, and the adaptation to the Information Systems Protection Motivation model (ISPM). The following section provides a review of malware and emanating threats, particularly with respect to identity theft. Then, the current state of the experimental design is discussed. The final section reviews the direction of future research, as this is a working research project.

## Literature Overview

The Protection Motivation (PM) model was first conceptualized as a threat-stimulated cognitive appraisal process by which individuals choose appropriate coping methods to mitigate danger and reduce fear (Rogers 1975). This process includes an assessment of the perceived severity of the threat, the perceived probability of threat occurrence, and the perceived ability of the coping response to eliminate the threat. This model was later amended to include self-efficacy, or an individual's perception surrounding their ability to carry out a chosen coping behavior (Rogers 1983). The PM model also has roots in drive-reduction theory which suggests that the arousal of an emotional state of fear is necessary for effective fear appeal communication (Janis 1967). Furthermore, threats and relative fear has been shown to heighten drive, increasing interest and investment in the message (Ray et al., 1970). The PM model was widely researched in years prior, but new applications emerge as the shift in online business environments has grown swiftly in past years.

More recent research regarding the PM model supports the inclusion of maladaptive behaviors and suggest that individuals process this information in some sort of sequential order and that messages that appeal to individuals' intrinsic motivation, rather than fear, may be successfully in promoting safety (Menard et al., 2017; Tanner et al., 1991). Privacy concerns and threat emotions have also been examined; specifically the effectiveness of these mechanisms on social networking site behavior (Mousavi et al., 2020). The four appraisal processes and maladaptive coping behaviors are discussed briefly below.

***Severity of Threat***

Individuals internally calculate threat severity in order to determine the direct, detrimental harm it may cause. If the threat's severity is not applicable to said individual, it is possible that no behavioral changes will occur, or a coping mechanism may be implemented to help benefit others. On the other hand, if an individual is driven by fear and believes the threat is real and eminent, they will search for alternatives to help mitigate negative effects.

***Likelihood of Threat***

At this stage in the appraisal process, individuals evaluate the likelihood that the threat will occur and affect them directly. Similar to threat severity, if individuals do not perceive the threat as relevant or probable, selected coping mechanisms may reflect the interests of others or simply be non-existent. To effectively influence behavior, individuals must be driven by the fear that the threat can happen and will very likely directly affect them.

***Perceived Ability of Coping Behavior to Remove Threat***

Individuals are not likely to implement a coping mechanism if they do not believe it will have any effect mitigating risk of the threat. If irrelevant or impractical coping behaviors are suggested as a medium to alleviate a potential threat, individuals will not implement them and will have to search elsewhere for alternatives.

***Self-Efficacy***

Self-efficacy refers to an individual's belief that he/she can effectively carry out a chosen coping behavior. This perception will vary from task to task and is likely influenced by the level of knowledge regarding the specific threat or event. Individuals may seek the additional information, advice, or guidance from others if their level of self-efficacy is low.

***Maladaptive Coping Behaviors***

Maladaptive coping behaviors are defined as actions that decrease perceived threat without reducing the actual threat. These behaviors can be influenced by previous experiences and outcomes of similar, past decisions. The stimulation of individual emotional responses when the threat is introduced will also be important in the development and influence of maladaptive behaviors. These behaviors can vary between individuals, and it is likely that they will directly moderate perceptions of threat severity, likelihood, relevance/effectiveness of coping behaviors, and self-efficacy.

**Application to Information Systems**

Whereas traditional applications of the PM model have studied fear appeals as a medium to influence consumer behavior, this research is aimed at measuring and manipulating computer users' behavior with reference to identity theft, malware threats, and preventatives.

For the purpose of this research, ISPM refers to this new approach, which might be more appropriate for examining information systems issues, rather than consumer or psychological behavior patterns. Figure 1 represents the cognitive assessments that an individual processes in the presence of identity theft as a result of a malware attack according to the adapted ISPM model.

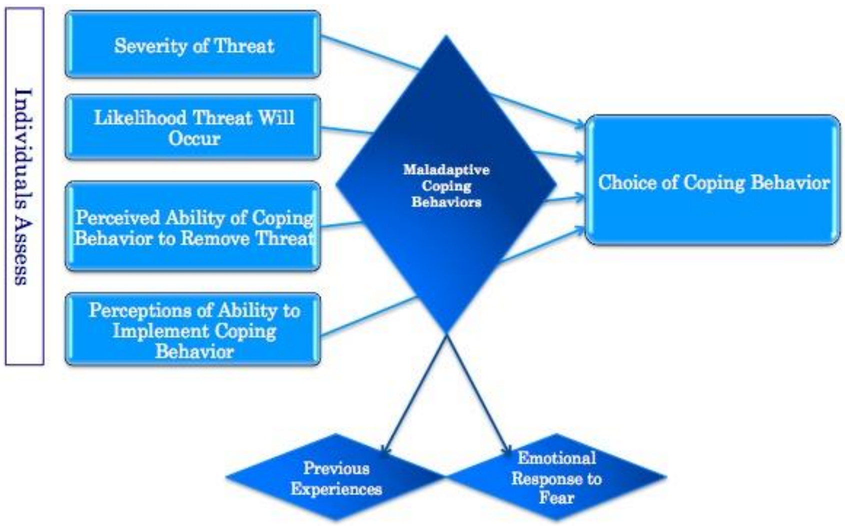


**Figure 1: ISPM Model**

***Malware***

Malware broadly refers to viruses, worms, Trojan horses, time bombs, spy-software, and other malicious programs designed to cause disruption, deny activity, gather private data without user consent, and/or allow unapproved access to system resources (Wadkar et al., 2020; Siponen et al., 2007). The intention of malware is to cause harm, inconvenience, or monetary losses to organizations and/or individuals. The rise of malware attacks in recent years is astonishing, especially coupled with increased instances of ransomware. There are ways to help mitigate the effects of malware attacks, such as strong password creation, employee education, regular data backups, and preventative software packages (Loch et al., 1992). However, it can only be assumed that as organizations and individuals work harder to protect their information, proprietors of these attacks will only look for new, creative ways to bypass preventative measures.

One of the many negative outcomes of malware attacks is identity theft. In 1998 Congress passed the Identity Theft Assumption and Deterrence Act which defines identity theft as "any act that knowingly transfers or uses, without lawful authority, any name or number that may be used, alone or in conjunction with any other information, to identify a specific individual with the intent to commit, or to aid or abet, any unlawful activity that constitutes a violation of Federal law, or that constitutes a felony under any applicable State or local law" (Newman et al., 2005). This law also applies to computer crimes, including the use of malware or phishing schemes to obtain and misuse consumer information.

Proprietors of malware are motivated by several factors. These can manifest as a compulsive attraction to hacking, curiosity, a desire for an enhanced sense of control, power and/or prestige, an outlet for hostility, or simply the satisfaction of identifying with a group (McHugh et al., 2005). Because malware and the intentions surrounding its implementation vary greatly, it is no wonder that fear of an attack and possible identity theft is a real and prevalent threat in the minds of so many individuals, especially in today's increasingly online business environment.

## Methodology in Progress

A laboratory experiment using student test subjects is currently being designed to test the effectiveness of the ISPM model with respect to modifying individuals' coping behavior choices; furthermore, student respondents would be representative and applicable to the overall population of computer users; this is especially relevant given the shift to online work, both in the education and professional business realms. The survey constructs included in the experiment (to test the ISPM model) were derived from previously validated measures (Tanner et al., 1989; Tanner et al., 1991). Given the brevity of this manuscript, a full list of those questions is not included; rather, will be discussed in the presentation.

A pre-experiment assessment will be implemented to gauge individuals' knowledge of malware and level of vulnerability before the threat manipulation is introduced. This step, however, may not be necessary, since most students are aware of malware and potential risks. Then, students will be randomly assigned to one of six treatment effects with various levels of threat and coping behavior: (1) High identity theft/malware threat information only, (2) Low identity theft/malware threat information only, (3) High identity theft/malware threat information with an offered coping response, (4) Low identity theft/malware threat information with an offered coping response, (5) Offered coping response only, and (5) No information (control sample). Offered coping responses will include individual or professional credit mentoring services, anti-malware software packages, or firewalls. Finally, a post-experiment questionnaire will be given to re-assess the pre-experiment survey, appraise the arousal of fear in respondents, identify the perceptions of threat severity and probability, determine individual intentions of implementing coping strategies and levels of self-efficacy, and recognize any maladaptive behaviors that may moderate coping behavior choice.

## Conclusion

It is the intention of the author to empirically test the ISPM model and analyze the results to interpret its validity, specifically through the manipulation of malware threats and possible identity theft constructs. Pending advice from other IS professionals and researchers, specifically gathered at the ARBS 2021 conference, the ISPM and survey constructs may be adapted to better epitomize the research question.

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# Hotel Hurricane Options

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## Introduction

Revenue management scholarship and practices have extensively examined sellers' options for maximizing revenue under various conditions. Systems have been designed to allocate production capacity and inventory holdings which rely on customer segmentation schemes in order to maximize total revenue. I extend this literature by applying it to hotel revenue management concerns arising during natural disaster evacuations. I use a binary option pricing model to predict hotel room prices when customers are segmented into two groups, customers who reserve rooms (by purchasing an option for a room in advance of a natural disaster) and customers who do not hold an option. I find that hotels enjoy higher revenues under conditions which might confound expectations. For example, given the higher probability of evacuation, hotels that offer refund rates paid to those option-holding customers in the event of service failure will not only suffer from lower room prices, but lower total revenue as well. These findings are an important first step in examining revenue management issues related to natural disasters.

Evacuations are typically ordered 24-36 hours before landfall (Urbina & Wolshon 2003). Government officials therefore must balance mandatory evacuation orders with having sufficient lead time for individuals to actually leave the area (Fairchild, Colgrove, and Jones 2006). Having sufficient egress routes and ready information flow can reduce that time but with some residual physical constraints (Lindell and Prater 2007).

## Literature Review

Revenue management systems serve to allocate capacity among products with different prices in order to segment customers to maximize expected revenue. Yield management issues in airlines were first addressed by Simon (1968, 1970), Falkson (1969), and Rothstein (1971, 1985). This was extended by Belobaba (1989), Kimes (1989) and Subramanian et. al. (1999) to determine the optimal policies for allocating seats with multiple classes of customers and with the time of the reservation. Gallego and Sahin (2010) examined the possibility of managing inventory under partially refundable fares and found that even with risk neutral customers the provider will have higher revenue by announcing the future price early. This holds even if a new type of customer emerges in later periods with different preferences.

Taking this same approach of segmenting customers to maximize revenue with no inventory and applying it to the hotel industry, Rothstein (1974) Ladany (1976, 1977), Williams (1977) and Liberman and Yechiali (1978) found solutions using dynamic programing and Markovian Sequential Decision Processes. Gallego and Van Ryzin (1994) examine perishable stock and stochastic demand. Bitran and Gilbert (1996) added the complexity of walk-in and no-show customers with a stochastic dynamic programing model to determine how to optimally allocate rooms. Gu and Caneen (1998) develop two revenue maximization models. Baker and Collier (1999) tested multiple heuristics and found that simple heuristics worked as well as complex ones under a simulated environment. Toh and DeKay (2002) proposed a model for the optimal level in overbooking. Baker and Collier (2003) also examined the advantage of bid pricing compared to traditional pricing methods.

Several researchers examined issues more directly related to revenue management issues concerning customer segmentation when early-purchase customers are offered refunds. Akçay, Boyacı, & Zhang (2013) used a single period model to examine the effect of offering customers money-back guarantees. Nasiry & Popescu (2012) examine the effect of customer regret and its impact on total revenues. Gallego & Sahin (2010) used an inter-temporal choice model under uncertainty which permits customer valuations to evolve over time, and they show that customer choice can be priced as a call option, the price of which is contingent on capacity constraints.

For extensive reviews of this literature, see Vinod (2004), Ivanov and Zhechev (2011), and Talluri & Van Ryzin, (2004).

**Guest Choice Model**

Consider a two-period problem where customers have independent and identically distributed valuations on the room. The distribution of the valuation of the room can be modeled as

$$F(p) = P(V \leq p) \qquad (1)$$

where $F(p)$ is the cumulative distribution function and is equal to the probability that the willingness to pay (V) is less than or equal to the price set by the hotel (p). While this distribution is known to the hotel and guests, the realization does not occur until period two. I assume that $F(p)$is continuous and differentiable. Therefore, the value of $F(0) \leq 1$. The implication is that it is possible some people would not take a room even if it was free because the value of the free room is negative.

In period one, the hotel will announce the price $p_1$ and $p_2$ so that $p_1 < p_2$ and the subscripts denote which time period the price is officially offered. I assume that guests are maximizing their expected consumer surplus. Consumer surplus ($x(p_i)$) is the difference in the willingness to pay (subjective valuation or V) and the actual cost of the room ($p_1$or $p_2$) and acts as a measure of consumer satisfaction with the purchase.

Using a model where the guest is attempting to maximize their expected surplus, the choice to purchase in period 1, paying a price of $p_1$ , results in an expected surplus of $x(p_1) \equiv E[V] - p_1$. Given that the price paid in period one is a sunk cost, rational agents will ignore that price in deciding to use the room which was already purchased. Instead they will use the room if the realized value is strictly non-negative. Similarly, it can be shown that

$$x(0) = E[V]$$

Since consumers will use the room already purchased in period one if the realized value is zero or greater and later consumers will only purchase a room in period two if the realized value minus the higher price is greater than zero.

$$E[V] - p_1 = E[V - p_2] \tag{2}$$

$$x(0) - p_1 = x(p_2) \tag{3}$$

With this model, the hotel simply must announce the prices under the following constraints to induce purchase at time 1.

$$p_1 \leq x(0) - x(p_2) = 1 - \int_0^{p_2} F(y)dy \leq p_2 \tag{4}$$

Similarly if one wishes to view this as a real option, the guest can pay a price X in period one which will allow them to purchase the room in period two at the strike price of P. The strike price is restricted so that $P \leq p_2$ and the strike price must be less than or equal to the value of the exercised option or $X \leq x(P) - x(p_2)$.

Using the surplus value definition, the value to the guest is the surplus value of purchasing the room at price P minus the cost of the option itself, or similarly

$$S = x(P) - X \tag{5}$$

So, using that we have a non-trivial value for the guest in purchasing the option.

**Hotel Choice Model**

The hotel has to set the price of the room ($p_1$and $p_2$). We can assume that this hotel has some finite capacity, C, and this is further reduced by a booking limit to the number of options being sold, b. They do not know in period 1 the number of customers which will choose to buy the option and there is some unknown demand in period 2 for rooms in general.

There is an overbooking penalty, d, if a customer has paid for an option and no room is available with $d > p_2$. This has some minimum value because the customer is choosing to exercise the option with the assumption that the value is greater than the cost of the room therefore to simply make the person whole would require a minimum value (d̲) with the form

$$\underline{d} = X + E[V - X|V > P] \quad (6)$$

$$\underline{d} = E[V|V > P] \quad (7)$$

with that value being what is necessary to make the guest whole.

The evacuation order is formulated in the following manner

$$\varepsilon = \begin{cases} 0 \; if \; no \; order \; for \; evacuation \; is \; given \\ 1 \; if \; an \; order \; for \; evacuation \; is \; given \end{cases} \quad (8)$$

There is a known probability of an evacuation order in period 1, $0 \leq p(\varepsilon) = E[\varepsilon] \leq 1$, that can be used by the hotel in setting price or booking limits.

I assume that some number of customers, $\Lambda$, will choose to purchase the option so that the number of options sold will be

$$\Lambda_b = \min{(\Lambda, b)} \quad (9)$$

where b was the booking limit that the hotel self-imposed. The number of customers that will actually exercise the option in the event of an evacuation order will be

$$\Lambda_b^* = \Lambda_b(1 - F(P))(\varepsilon) \quad (10)$$

There are also walk in customers in the second period, $\Gamma$. These customers will pay the higher price of $p_2 > P$ and so are preferred from a revenue consideration. The Poisson arrivals in period two will have different subjective valuation and in the event of an evacuation that valuation will be assumed to have a higher mean.

This also holds mathematically under the assumption that the revenue function, $Rev(p) \equiv p\big(1 - F(p)\big)$, is a concave function of price. If follows by Jensen's inequality that $Rev(E[p]) \geq E[Rev(p)]$ meaning having a known price is preferred by a revenue maximizer to a random price determined in period 2.

The number of customers that will show in the second period and be able to acquire a room will therefore be

$$\Gamma_b = \min{(\Gamma, C - \Lambda_b^*)} \quad (11)$$

since the number of exercised options are known in the second period.

**Revenue Management**

Ignoring any time value of money considerations between the two periods, the revenue for the hotel will then take the following form.

$$\begin{aligned} &Expected\ Profit \\ &\qquad = Expected\ number\ of\ sold\ options \\ &\qquad * (option\ price + options\ exercised\ under\ the\ room\ price \\ &\qquad * option\ room\ price) \\ &\qquad - expected\ option\ customers\ showing\ in\ excess\ of\ available\ rooms \\ &\qquad * penalty\ for\ no\ available\ rooms + walk\ in\ customers * higher\ price \end{aligned}$$

(12)

$$\hat{\pi}(C, \Lambda, b, \Gamma, P, p_2) = E[\Lambda_b]\big(X + P\big(1 - F(P)\big)(E[\varepsilon])\big) - \max\,(0, E[\Lambda_b] - C)(d + P)(E[\varepsilon]) + E[\Gamma_b]\, p_2 \tag{13}$$

If $E[\Lambda] \equiv \lambda$ and $[\Gamma] \equiv \gamma$ , and the hotel has decided on the booking limit, the second period price, the option price, and the strike price may be found by the following

$$\pi(C, \Lambda, \Gamma) = \max_{X,P,p_2}(\lambda \left(X + P\big(1 - F(P)\big)(E[\varepsilon])\right) - \max(0, \lambda - C)\,(d + P)(E[\varepsilon]) + \gamma p_2) \tag{14}$$

$$such\ that \quad \lambda\big(1 - F(P)\big) + \gamma(1 - F(p_2) \leq C. \tag{15}$$

To determine the economic significance of such a decision, I ran a series of simulations under some reasonable assumptions of the demand. The variables changed as shown in Table 1.

| **Factor** | **Low** | **High** |
|---|---|---|
| **C (Hotel Room Capacity)** | 20 | 80 |
| **E[ε] (Probability of evacuation)** | 0.20 | 0.80 |
| **λ (Demand Factor Early Buy)** | 0.50 | 2 |
| **γ (Demand Factor Late Buy)** | 0.50 | 2 |
| **d (Penalty for overbooking)** | $150 | $600 |

**Table 1: Assumed Factor Values**

The results are demonstrated in Tables 2 and 3.

| **P(Evacuation)** | L | L | L | L | L | L | L | L |
|---|---|---|---|---|---|---|---|---|
| $\boldsymbol{\lambda}$ | L | L | L | L | H | H | H | H |
| $\boldsymbol{\gamma}$ | L | L | H | H | L | L | H | H |
| **d (Penalty)** | L | H | L | H | L | H | L | H |
| **Option Price(x)** | $2.77 | $17.07 | $3.76 | $4.89 | $9.38 | $5.72 | $2.60 | $4.13 |
| $\boldsymbol{P}$ | $125.20 | $125.20 | $42.50 | $38.80 | $46.92 | $35.00 | $26.25 | $22.50 |
| $\boldsymbol{P_2}$ | $139.05 | $210.57 | $61.28 | $63.25 | $93.83 | $63.61 | $39.23 | $43.16 |
| $\boldsymbol{X+P}$ **or** $\boldsymbol{X+P_2}$ | $127.97 | $142.27 | $46.26 | $43.69 | $56.30 | $40.72 | $28.85 | $26.63 |
| **Total Revenue** | $2,433 | $2,729 | $931 | $909 | $1,589 | $2,472 | $629 | $641 |

**Table 2: Low Probability of Evacuation**

| **P(Evacuation)** | H | H | H | H | H | H | H | H |
|---|---|---|---|---|---|---|---|---|
| $\boldsymbol{\lambda}$ | L | L | L | L | H | H | H | H |
| $\boldsymbol{\gamma}$ | L | L | H | H | L | L | H | H |
| **d (Penalty)** | L | H | L | H | L | H | L | H |
| **Option Price(x)** | $55.68 | $34.13 | $24.97 | $26.39 | $37.11 | $23.23 | $17.38 | $9.33 |
| $\boldsymbol{P}$ | $69.60 | $69.60 | $31.22 | $32.99 | $46.39 | $34.86 | $21.72 | $16.89 |
| $\boldsymbol{P_2}$ | $139.21 | $112.27 | $62.43 | $65.98 | $92.78 | $63.90 | $43.45 | $28.55 |
| $\boldsymbol{X+P}$ **or** $\boldsymbol{X+P_2}$ | $125.29 | $103.74 | $56.19 | $59.38 | $83.50 | $58.09 | $39.10 | $26.22 |
| Total **Revenue** | $3,044 | $3,730 | $1,133 | $1,168 | $1,998 | $2,737 | $836 | $1,843 |

**Table 3: High Probability of Evacuation**

**Simulation Results**

In looking for optimal solutions for pricing the option and the room, a comparison was generated with various values for fixed portions. The solutions were calculated using a generalized reduced gradient algorithm. All factor combinations estimated began at the same pricing kernel of $100 and $150 for the two room prices with the initial value of the option a risk adjusted price of a binary option with no inflation discount factor.

Table 2 looks at the generated prices with a low probability of evacuation. With a lower probability of an evacuation, a binary option has a lower intrinsic value. When changing the valuation of the second period customers, the price of rooms in the second period fell; but not as quickly as the price for first period rooms. The option price changed to the market-clearing price, with an option price that was a function of the difference in the price of the early room and of the late room. Changing the valuation function for the early purchase individuals causes a significant drop in the price of the early room. The lowest total revenues result when both groups express the higher values for the valuation equations.

Evaluating the same changes to the factors for the valuation formula and penalty but under the assumption of a high probability of evacuation, results in the values found in Table 3. While the prices are higher under the low assumptions for valuation factor, the prices are less variable under all high assumptions for factors.

## Conclusions and Future Research

It has been demonstrated that the benefit exists for consumers with the introduction of such an option. Even with an assumption that individuals will gain no benefit, i.e. the surplus is equal to zero, there are significant revenue gains for the hotel if such an option was available. This benefit is greatest when the uncertainty around evacuation is the greatest which is the best time to offer such an option from a customer welfare standpoint.

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# Small-Scale Crisis Events Impact on Price Discovery and Volatility Transmission Across Financial Markets: Evidence From Terror Attacks, Assassinations, North-Korean Saber-Rattling, and Natural Disasters

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## Introduction

We examine the impact of terrorist attacks, an assassination, three small wars, two natural disasters, and other crisis events on the stock market returns of various American Depository Receipts (ADRs) and test whether crises significantly affect ADR returns and the volatility structures of ADRs and broad market indexes in the international arena. We focus on the returns of ADRs because these securities trade on American stock exchanges and thus are relatively easy to trade compared to stocks listed in home markets. Also, these securities provide a valuable opportunity to examine market segmentation and whether various international shocks transmit information homogenously to both ADRs and international markets during times of crisis.

We find that terrorist attacks do not affect ADR returns unless the attack involves mass casualties (>100 deaths). We find that the assassination of Benazir Bhutto was associated with significantly negative ADR returns, that North Korean provocative actions negatively affected ADR returns, that small wars can have a persistently negative effect on ADR returns, and that natural disasters do not negatively affect ADR returns. We also find evidence that volatility is transmitted bi-directionally between ADRs and their home market during crisis events and that some shocks (such as the assassination of regional political leaders) affect the volatility structure of both ADRs and the home market index.

## Literature Review

### *Terrorism and Financial Markets*

Crisis events such as terror attacks, wars and violent international provocations, and similar crises can negatively affect financial markets through several channels. Terror attacks and wars can rattle forward-looking financial markets due to the widespread economic harm that such crises cause. Blomberg et al. (2004) examined the effect of 12,164 acts of terrorism across 179 countries from 1968 to 2001 and link terrorism to negative growth and the redirection of economic activity from investment spending and towards government spending. Eckstein and Tsiddon (2004) investigated the impact of terror attacks in Israel and concluded that persistent attacks, even those resulting in relatively few deaths, had a negative impact on annual consumption. Eckstein and Tsiddon (2004) found that over the years 2000 to 2003, terrorism cost Israel roughly 10% in per capita output. Gupta et al (2003) examined the fiscal effects of 22 armed conflicts and terrorism on low-and middle-income countries and linked those events with lower growth and higher inflation, and adverse effects on tax revenues and investment. They concluded that wars significantly and negatively affected economic growth. Lastly, Nitsch and Schumacher (2004) investigated the effects of terrorism and warfare on bilateral trade flows and found evidence that terrorism significantly reduced the trade volume.

The attacks of September 11, 2001 and their effects on stock markets have been studied extensively. Navarro and Spencer (2001) reported that the total market value lost on American stock exchanges immediately after the 9/11 attacks totaled approximately $1.7 trillion. Chen and Siems (2004) found that the attacks caused a 7.14% a one-day abnormal negative return for the DJIA and that the negative effect on the index persisted. They also found that thirty-three global capital markets experienced negative abnormal returns and that the effect persisted in all but two markets, Portugal and Helsinki. Charles and Darne (2006) examined ten daily stock market indexes and concluded that incorporation of large shocks such as 9/11 and significant macroeconomic news announcements could improve financial risk models, especially with regards to stock market price volatility. Nikkinen et al (2008) studied the effect of 9/11 on fifty-three equity markets and found that the attacks significantly increased volatility across markets. They concluded that those economies that are less integrated with the global economy were less susceptible to shocks similar to 9/11. Drakos (2004) and Carter and Simkins (2004) examined airline stock returns in the wake of 9/11. Drakos (2004) found a structural break in airline stock betas, and that the idiosyncratic risk associated with airline stocks more than doubled after 9/11. Carter and Simkins (2004) report similar findings, but noted that markets reacted less harshly to those airlines maintaining adequate cash reserves.

### *American Depository Receipts and Volatility*

The transmission of volatility between ADRs and home market shares has been well studied. Kim et al. (2000) used a VAR approach and a dynamic regression model to examine the transmission of information between ADRs and their underlying shares. They included foreign exchange rates, the prices of underlying shares, and the U.S. market index as explanatory variables. They found that information transmission is bi-directional. Also, they report that the most influential pricing factor was the underlying share price, but that investors initially overreact to the U.S. market index and under react to the underlying price. Hsu and Tsai (2008) extended the analysis by Kim et al. (2000) by including in their analysis both changes in trading volume and macro-event shocks. They examined the information flow between ADR prices and their underlying shares for three markets: Japan, South Korea, and Taiwan. Their results were similar to Kim et al (2008). Hsu and Tsai (2008) showed that information transmission is bi-directional and that changes in past domestic volume affect current ADR returns. Additionally, Hsu and Tsai (2008) examined the effect of various macro shocks (e.g.: economic stimulus plans, Operation Desert Storm, 9/11, East Asian Financial Crisis) on the price transmission dynamics between the underlying shares and their ADRs. They found that macro events lead to a short-run divergence between ADRs and their underlying shares, especially when the macro event is “bad news.” They concluded that the price divergence was due to heterogeneous perceptions between the ADR market participants and the home market participants and that such divergence in perceptions can “result in market segmentation or mispricing” (p. 56). Poshakwale et al. (2008) modeled the directionality of volatility and information flow between ADRs and their underlying stocks using a GARCH (1, 1) model. They showed that volatility varies over time and that the covariance between the underlying shares and their ADRs is not constant. They also found that volatility is transmitted bi-directionally, that is, that volatility is transmitted both from the ADR market to the home market, and vice versa.

This paper extends the work of Hsu and Tsai (2008) and Poshakwale et al. (2008) by examining the transmission of volatility between ADR indexes and their home market indexes and by testing for structural changes in the transmission of volatility due to geopolitical/terrorist shocks. Our findings are consistent with those of Poshakwale et al. (2008) regarding the transmission of volatility between markets and Hsu and Tsai (2008) regarding the differential reaction between markets to bad news. While Hsu and Tsai (2008) focus on returns, this paper focuses on differences in volatility between markets.

## Data

All terrorist and conflict data and information were obtained from the National Counterterrorism Center’s Worldwide Incidents Tracking System. All other event related data, regarding natural disasters, North Korean saber rattling, and similar events were dated using Reuters. All security price information was obtained from the Center for Research in Security Prices. We use the Standard and Poor’s Broad Market Index-All Countries, denominated in U.S. Dollars, as a proxy for home market-wide returns and the global stock portfolio.

We examine the daily returns of ADRs which trade on the NYSE, NYSE Amex, or NASDAQ and the home country that has experienced a terrorist attack resulting in at least 15 deaths, or which suffered a natural disaster or endured a war or some similarly impactful political/military crisis. The period examined for the event study is January 2004 through December 2008. In the volatility section of the paper we examine the daily returns of value-weighted ADR indexes which we create for both South Korean and Indian securities, and their respective home market indexes. The dates examined are from January 2005 thru December 2008.

## Methodology: Event Study

We employ the Brown and Warner (1985) approach to computing test statistics for the abnormal returns, which mitigates the potential problem of cross-sectional correlation of returns. Also, we scan the major international newspapers for significant economy-wide events (such as interest rate increases) and firm-specific occurrences (such as negative earnings reports) which may affect a market's or firm's performance.

## Analysis: Terrorist Attacks

We examine fifty-one terrorist attacks that occur in eight countries from January 2004 through December 2008. (As noted above, these countries appear in the sample because they are the only ones that experienced terror attacks during the sample period and also had firms that listed ADRs on an American exchange.) Of these fifty-one attacks, forty-six involve fewer than one hundred deaths. Of these forty-six attacks, we find no evidence of a negative impact on ADR returns on the day of the attack. Twenty of the attacks occurred in India, involved few casualties, and failed to receive international attention.

The Mumbai train bombings are associated with a negative mean adjusted return, but the result in not significant even at the 10% level. Ten of the twelve Indian ADRs trading at that time did close down on the event date. The Mumbai attacks of 2008 are linked with a negative 3.88% mean AR and the result is significant at the 10% level, though only nine of fourteen ADRs closed down on the event date. It should be noted that on the trading day prior to the Mumbai attacks, that the mean adjusted AAR was almost 25% and that the ADRs made up the almost 4% loss within two trading days. The four Spanish ADRs generated a mean adjusted AR of -2% on the date of the Madrid train bombings. The result is significant at the 10% level. After the attacks, the ADRs continued their downward trajectory. Chari (2004) contends that the terrorist attacks, which took place just three days before national elections, were integral in swaying the electorate to vote the incumbent party out of office. We changed the event date window to include the day of the election and the results become much more significant in both economic and statistical terms. The abnormal AR is -7.59% and this result is significant at the 1% level. The Beslan school crisis which took place in Russia in 2004 coincided with a day that witnessed a AAR of 3.43%, significant at the 5% level. Lastly, the London bombings resulted in at AAR of .88%, but the result was not significant.

## Conclusion

This paper is the first to examine the impact of terror attacks and other surprise geopolitical events on ADR returns and volatility flows. Though there is a substantial literature on the impact of various geopolitical events on home market prices and cross-listed firms, this is the first paper that examines the impact of these events on ADRs. Whereas much of the previous research has focused on the effect of macroeconomic shocks on the returns of ADRs and volatility transmission between home markets and ADRs, our findings shed further light on these factors from a different perspective. As noted below, it appears that it isn't the shock of the terror attack (or similar event) that prompts a sell off of ADRs, but rather the evidence supports the hypothesis that it is the perceived impact of the long-term economic environment that spooks investors.

Terrorist attacks impact ADR returns only in those instances that receive widespread international attention and result in mass casualties. The impact of these events is generally short-lived. The assassination of Benazir Bhutto resulted in a significant impact on ADR returns of firms located in surrounding nations. North Korean provocative actions involving instances of significant regional/global import adversely affected ADR returns on the day of the event. Small wars can lead to significant and persistent negative returns in ADRs. The natural disasters examined in this study did not affect ADR returns. It appears that while instances that are manmade can induce a perceived increase in the risk of the cash flows associated with the underlying shares that natural disasters are not perceived to increase risk. It appears that investors distinguish between different types of grey swans.

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