

# Religiosity and Information Security Policy Compliance

*Completed Research Paper*

**Berhanu Borena**  
IT PhD Program, AAU  
[berhanuborena@gmail.com](mailto:berhanuborena@gmail.com)

**France Bélanger**  
Virginia Tech  
[belanger@vt.edu](mailto:belanger@vt.edu)

## ABSTRACT

Information security is a top concern of managers, often addressed with technical, behavioral and procedural solutions. Information Security Policies (ISPs) are among these solutions. ISPs require organizational members to conform to security measures but individuals often fail to comply with them. While prior studies investigated several factors leading to compliance, the effect of religiosity on intention to comply with ISP (ICISP) has been overlooked. This research, therefore, studies the role of religiosity and conservation value in addition to existing factors. The proposed model is tested with students in universities in Ethiopia and USA to obtain a wide array of religious beliefs. The findings show subjective norm and religiosity indirectly but positively affects ICISP via attitude. They also show direct positive effect of religiosity on ICISP. Contrary to prior studies, conservative-value affects ICISP positively; and, when moderated by religiosity, the relationship becomes stronger. Consistent with prior studies, self-efficacy positively affects ICISP.

## Keywords (Required)

Religiosity, Information Security, Information Security Policy, Motivational Value, ISP compliance.

## INTRODUCTION

Security has become a top concern of managers (Luftman and Derksen, 2012) with continued security violations in organizations. Such breaches bring negative consequences and it is important to understand the causes and intentions of these breaches, and then develop appropriate solutions. Therefore, to minimize security breaches, organizations enact information security policies (ISP). Unfortunately, employees' violation and lack of adherence to ISP continue to be important concerns for organizations (Myyry, Siponen, Pahlila, Vartiainen and Vance, 2009; Vance and Siponen, 2012). Different theoretical explanations are provided as to why employees lack ISP compliance (Bulgurcu, Cavusoglu and Benbasat, 2010; Herath and Rao, 2009; Li, Zhang and Sarathy, 2009; Myyry et al., 2009; Vance and Siponen, 2012). While these studies have identified a number of factors impacting such compliance (e.g., benefits of compliance, cost of compliance, cost of non-compliance, formal sanctions, and security risks), few have focused on religious beliefs, with the exception of Myyry et al.'s (2009) investigation of compliance from the perspective of moral reasoning and value.

One new factor to consider in this context is religiosity. Religiosity is the strength of individuals' beliefs in superpower (Barnett, Bass and Brown, 1996; Vittel, 2009). Prior studies also define religiosity in terms of cognition, affect and behavior, such as church affiliation and attendance, bible reading, and praying (Barnett et al., 1996). Religiosity can inhibit deviant behaviors (Welch, Tittle and Petee, 1991) and enhance compliance to desirable behaviors. Such evidence, together with the considerable influence religion has on moral reasoning and values, indicates religiosity might affect intention to comply with ISP (ICISP). Unfortunately, there has been limited focus on studying religiosity and its influence on business-related ethics (Peterson, Albaum, Merunka, Munuera and Smith, 2010), indicating a gap in our understanding of these concepts. Our research, therefore, addresses this gap by answering the research question: How does religiosity affect intentions to comply with information security policies? In addition to religiosity, the study is anchored in the motivational-value ISP compliance model of Myyry et al. (2009).

## THEORETICAL BACKGROUND

### Information Security

The objective of information security is to be free from danger, by building protection against adversaries, i.e., those who would do harm intentionally or otherwise. To achieve this objective, organizations provide information security at different layers by implementing tools such as policies, training programs, and technologies (Whitman and Mattord, 2005).

Many advocate a combination of both technical and procedural controls to manage information security risks effectively (Kruger and Kearney, 2006). Such an approach is believed to be more effective with information security becoming a comprehensive hierarchical build-up of security apparatuses that involve technical, managerial, and institutional approaches as layers. Concurrently, many information security processes are largely dependent on human cooperative behaviors (Van Niekerk and Von Solms, 2010). This is because employees are the most significant threat to information security (Bulgurcu et al., 2010; Von Solms, 2000) and also, to the contrary, very important safeguarding actors (Bulgurcu et al., 2010).

### **Information Security and Compliance**

An ISP involves processes and procedures an employee should adhere to in order to protect the confidentiality, integrity, and availability of information and other valuable assets (Vroom and Von Solms, 2004). However, such controls can be circumvented or abused by employees who ignore them (Kruger and Kearney, 2006) due to violations, negligence or ignorance (Myyry et al., 2009). Thus, for proper ISP implementation, there should be a major focus on users (Höne and Eloff, 2002), who can help foster proper security culture (Hedström, Kolkowska, Karlsson and Allen, 2011). However, entrenching ISP in organizations so it becomes a normal and acceptable part of day-to-day operations is difficult at best (Höne and Eloff, 2002).

Using different theoretical perspectives, such as Protection Motivation Theory (PMT), General Deterrence Theory (GDT) (Herath and Rao, 2009), Rational Choice Theory (Li et al., 2009), rationality based factors (Bulgurcu et al., 2010), theory of cognitive moral development, motivational types of values (Myyry et al., 2009), value-based compliance model, and Social Action Theory (Hedström et al., 2011), various studies were conducted that investigated antecedents of ICISP. Such antecedents include benefits of compliance, cost of compliance and cost of non-compliance (Bulgurcu et al., 2010), perceived benefits, formal sanctions, and security risks (Li et al., 2009), information quality, attitude, and normative beliefs and habits (Pahnila, Siponen and Mahmood, 2007). Integrating several theories, Vance, Siponen and Pahnila (2009) identified neuroticism, conscientiousness, habit, appraisal and coping appraisal as factors of intention to comply with ISP. Others found that threat appraisal and facilitating conditions impact attitude towards complying, while coping appraisal, sanctions and rewards do not (Pahnila et al., 2007). Similarly, Siponen et al. (2010) found that normative beliefs, threat appraisals, self-efficacy, deterrents, and visibility impacts ICISP, while response-efficacy and rewards do not.

### **Human Values and Beliefs**

Hedström et al. (2011) argue that prior information security studies are informed by a control-based compliance model, which assumes human behavior needs to be controlled and regulated. The Value-based Compliance Model, however, suggests that users' non-compliance represents rational actions, based on reflection-in-action. They argue this gap is the result of lack of understanding of the multiple rationalities coming into play in an ISP (Hedström et al., 2011). Considering values, Myyry et al. (2009) looked at ISP compliance from the dimension of moral reasoning and value employing two psychology theories: Theory of Cognitive Moral Development (Kohlberg, 1969) and Theory of Motivational Types of Values (Schwartz, 1992). Human values are enduring beliefs that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence (Myyry et al., 2009; Rokeach, 1973). The way people prioritize their values plays an important role in predicting attitudinal and behavioral decisions (Myyry et al., 2009) because values can serve as standards for evaluating actions, events, and peoples. Schwartz's (1992) Theory of Motivational Types of Values (TMTV) defines values as goal and motivations that serve as guiding principles in people's lives, with ten motivationally distinct types of values (Schwartz, 1994). The relationship of these values is best described in a circular structure. In the circle, competing values are located in opposite directions, such as Openness to Change versus Conservation, forming a continuum in between; complementary values are adjacent in the circle (Myyry et al., 2009). People either show the motivation to follow their own intellectual and emotional interests (self-direction, stimulation, and hedonism values) or they prefer the status quo and the certainty provided by close relationships with people, institutions, and traditions (tradition, conformity, and security value types) (Myyry et al., 2009). Values that emphasize submissive self-restriction, preservation of traditional practices, and protection of stability (security, conformity, and tradition) are under the Conservation dimension (Schwartz, 1994).

In tests of the relationships between dimensions of value and ICTSP, Myyry et al. (2009) found that openness to change negatively affects ICISP. Conservation, on the contrary, affected ICISP positively; but this was in a hypothetical situation that lacked real life significance (Myyry et al., 2009). The authors suggest the lack of significance might be due to contextual factors. Other research shows that contextual factors like religiosity can affect people's values (Roccas, 2005) and their actions, such as Internet use (Armfield and Holbert, 2003). Religious people tend to favor values that promote conservation of social and individual order and, conversely, dislike values that promote openness to change and autonomy; they also favor values that allow for a limited self-transcendence and dislike Hedonism and promotion of self-enhancement (Saroglou,

Delpierre and Dernelle, 2004). Religiosity is also a significant predictor of commitment to moral self-improvement and behavioral intentions (Kurpis, Beqiri and Helgeson, 2008), is related to business ethics (Rashid and Ibrahim, 2008), and has some influence on people's values, habits and attitudes (Rashid and Ibrahim, 2008). In general, religiosity is related to moral and ethical behaviors in a business context (Vitell, 2009). However, this relationship between religiosity, values and ICISP has not been empirically studied.

### Research Model

Based on the previous discussion, our research model stipulates constructs that impact individuals' intentions to comply with ISP. The model focuses on religiosity and values. However, prior studies repeatedly found that subjective norm, attitude, and self-efficacy positively affect ICISP. We, therefore, included these constructs to assure nomological completeness of the model. Attitude is influenced by subjective norm (Gilaninia, Delafrooz and Machiani, 2012) and religiosity (Sheeran, Abrams, Abrams and Spears, 1993). Consequently, we investigate the indirect relationship between subjective norm and ICISP via attitude (1); and, (2) the indirect relationship between religiosity and ICISP via attitude.

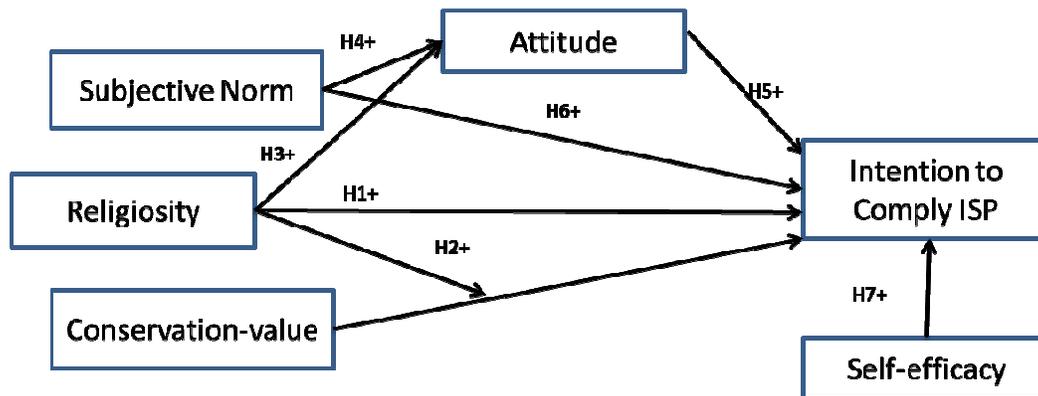


Figure 2. Proposed Research Model

Several theoretical perspectives support the idea that religion implies compliance and submission (Van Cappellen, Corneille, Cols and Saroglou, 2011). Research shows the level of religiosity within a given social context affects projected deviance (Welch et al., 1991). For example, adherence to highly active antiretroviral therapy is highly associated with religiosity (Park and Nachman, 2010). Subjects who followed antiretroviral therapy and achieved excellent adherence are significantly more religious than those who had poor adherence to the treatment. Religion can also promote compliance with laws (Grasmick, Kinsey and Cochran, 1991). Moreover, religiosity reduces the likelihood of anticipating delinquent behavior (Spivak, Fukushima, Kelley and Jenson, 2011).

*H1: Religiosity positively affects ICISP.*

Religiosity can also moderate the relationship between conservation-value and ICISP. Values and religiosity are strongly related to each other (Saroglou et al., 2004). Schwartz, Melech, Lehmann, Burgess, Harris and Owens (2001) reported that prior research conducted in 10 countries confirmed that religiosity has positive correlations with conformity and the traditional values of the conservation construct. A meta-analysis of studies carried out on the relationship between religiosity and values shows a positive association with tradition and conformity dimensions of values (Saroglou et al., 2004) of the supra value type, conservation. This explains why religious people tend to attribute high importance to conservation values. Although the relationship between conservative-value and ISP compliance is empirically refuted in a prior study (Myry et al., 2009), we argue that this factor, being viewed in the context of religiosity, can positively influence ICISP.

*H2: Religiosity positively affects the positive relationship between conservation-values and ICISP.*

Religiosity can affect people's attitude (Peterson et al., 2010). For example, in studies of sexual attitudes and behaviors (Sheeran et al., 1993) and substance abuse (France, 1997), a direct positive relationship is observed between attitude and religiosity. Rothwell (2009) describes how religious beliefs influence people's attitude towards deviance. These studies attest that individual's attitude about a behavior or act is influenced by religious values they possess.

*H3: Religiosity positively affects attitude.*

The direct relationship between subjective norm and attitude towards intention has been investigated in many studies (Gilaninia et al., 2012; Yao and Linz, 2008). However, few explored whether subjective norm could shape attitude towards

the ISPs. Family members', colleagues', and peers' positive outlook of an object influences our attitude towards that object. The relationship between subjective norm and attitude suggests that the attitude formation, favorable or unfavorable towards a behavior, is affected by how significant others consider the performance of that behavior (Chang, 1998). Research shows that subjective norm influences attitude positively, which then influences intention to use mobile banking (Gilaninia et al., 2012).

*H4: Subjective norm positively affects attitude.*

Banerjee, Cronan and Jones (1998) refer to attitude as a personal disposition toward the evaluation of favorableness of a behavior. This implies that the attitude a person has towards an ISP should determine the intention that person has to comply with it. In the Theory of Planned Behavior, there is a positive effect of attitude on intentions (Ajzen, 1991). Similarly, attitude is found to significantly impact employee's ICISP in information security research (Bulgurcu et al., 2010).

*H5: Attitude positively affects ICISP.*

Subjective norm has been often found to positively determine intention (Ajzen and Fishbein, 1977). Subjective norm refers to a person's perception of social pressure whereas most people important to him think he should or should not perform a certain behavior (Fishbein and Ajzen, 1975; Banerjee et al., 1998). Findings from information security studies support the significant positive relationship between subjective norm and ICISP (Banerjee et al., 1998; Bulgurcu et al., 2010; Herath and Rao, 2009; Siponen et al., 2010).

*H6: Subjective norm positively affects ICISP.*

People tend to avoid tasks and behaviors they feel they would not be able to perform well and to get involved in activities and behave assuredly when they judge themselves capable of handling situations (Bandura, 1977). This behavior is related to self-efficacy, which is defined as conviction that one can successfully execute a behavior (Bandura, 1977). Accordingly, individuals who have the ability to act in accordance with ISPs are likely to have more positive feelings towards the ISPs and likely to comply with them (Herath and Rao, 2009, 111). Empirical findings confirm that self-efficacy positively affects ICISP (Bulgurcu et al., 2010; Herath and Rao, 2009; Siponen et al., 2010; Yao and Linz, 2008).

*H7: Self-Efficacy positively affects ICISP.*

## RESEARCH METHOD

To test the proposed model, a survey of users facing an actual ISP was conducted. The sample was drawn from students at universities in the USA and Ethiopia. Both universities have similar ISP with respect to password sharing, the target ISP component for the survey. Using students allowed us to obtain subjects that are maximally similar across countries in some respect, but with a broad range of religious beliefs and values. We requested participation from 215 students and received 120 complete questionnaires, for a response rate of 56%.

There were more males than females (73%) in the sample, with most (everyone) having significant years of computer usage (>10). Education almost was equally split between undergraduate and graduate levels. There was a wide variety of countries represented with citizenship being mainly from the USA (55.8%) and Ethiopia (30%), as expected. For religious affiliation, the majority of subjects were Christians (67%) of various denominations, with Hindu, Islam, Buddhism, and Judaism represented as well. Several respondents (21%) did not identify with a religion (or did not indicate it).

## Instrument Development and Validation

Operationalization of constructs was done consistent with prior studies. Similar to the process used by Myyry et al. (2009), we instantiated ISP into a measurable variable focusing on one of its elements, password sharing, while maintaining the construct abstraction. Items for the questionnaire were adapted from prior studies as follows: conservatism-value (Knoppen and Saris, 2009; Myyry et al., 2009), attitude, self-efficacy, subjective norm, and ICISP (Banerjee et al., 1998; Bulgurcu et al., 2010; Herath and Rao, 2009; Li et al., 2009; Myyry, 2009; Siponen et al., 2010), and religiosity (Barnett et al., 1996; Park and Nachman, 2010; Welch et al., 1991). On the instrument, questions were randomly sequenced. The final section included demographic questions. The instrument was pre-tested for face and content validity with PhD students. After slight modifications, it was pilot tested with 59 post-graduate students in Ethiopia and the USA.

## Data Analysis

The research model involves latent variables and paths that link these constructs. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data. The approach robustness, availability of software tools, and the ability to

handle latent variables led to the choice of PLS-SEM, as implemented in SmartPLS v.2 (Hair, Ringle and Sarstedt, 2011). We employed Factor-weighting and executed the bootstrapping algorithm by setting ‘resampling’, ‘cases’, and ‘sign change’ parameters to 1200, 200, and individual level change, respectively.

**Measurement Model**

For convergent validity, factor loadings were examined. Five items were removed for having loadings below 0.7 (one for subjective norm, one for religiosity, three for conservative-value). The remaining items loaded properly above 0.7 and with no cross loadings, except one conservation-value item, which was retained as it more strongly loaded on its construct, and maintaining it allowed the construct’s Cronbach’s alpha to remain higher than 0.7. All constructs scored composite reliabilities above 0.8 (0.831 to 0.970) and Cronbach’s alphas above 0.7 (0.701 to 0.971). Average Variance Extracted (AVE) indicators were also all above the recommended value of 0.5 (0.537 to 0.770). Discriminant validity was evaluated by checking if the squared AVE of that construct was higher than the correlation value of that construct with the other constructs. All comparisons met this requirement, confirming that discriminant validity is achieved.

**Structural Model**

Most of the hypotheses, except H6, are supported by the data, as can be seen in Figure 3. The model explains 61.3% of the variance in ICISP.

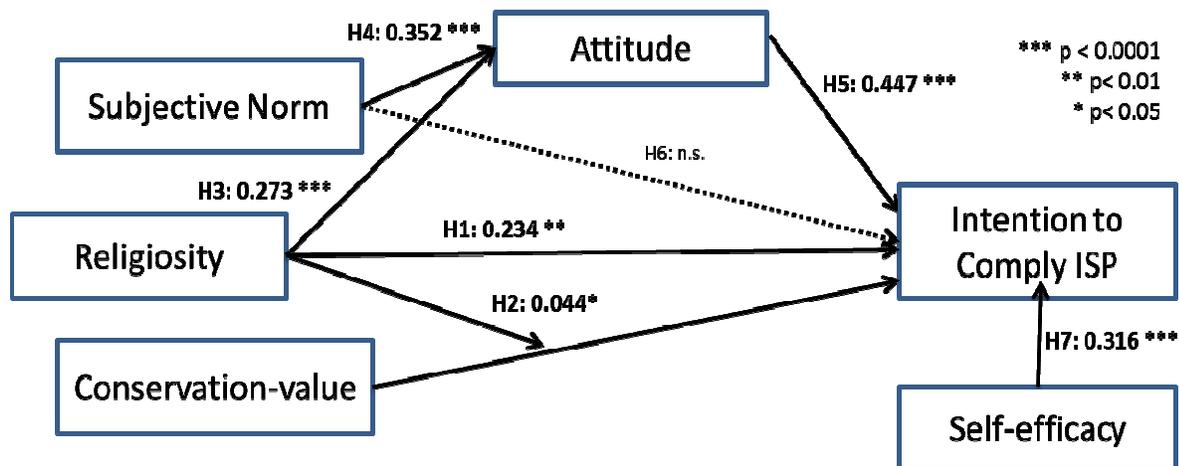


Figure 3. Study Results

**DISCUSSION**

This research identified the direct and indirect role of religiosity in peoples’ adherence to ISPs. It also verified the indirect role of religiosity in motivational value theory, particularly its role in moderating the relationship between conservative-value and ICISP. The results confirmed that attitude and self-efficacy have positive effect on ICISP. Consistent with prior studies, attitude and self-efficacy also positively affect ICISP. However, unlike the finding of Myyry et al. (2009), we confirm a positive effect of conservation-value on ICISP under the context of religiosity. There are two possible explanations for these different findings. First, it possible that the strength of the interaction between religiosity and conservative-value in the effect on ICISP changes the direct relationship between conservation-value and ICISP. In addition, our sample showed greater variance in its composition than Myyry et al.’s (2009) since we draw from several countries as opposed to one country in Northern Europe. The homogeneity of their sample possibly suppresses the role conservation value can play.

The study makes several new contributions to research. Some very interesting new findings include the confirmation of the positive effect of religiosity on attitude and its direct modest positive effect of religiosity on ICISP (supporting H1 and H3). Another important new finding is the positive moderation effect of religiosity on the relationship between conservative-value and intention to ICISP (H2). This indicates that the higher religiosity is for an individual, the stronger the positive relationship between his conservation-value and his ICISP. Together, these findings suggest that religiosity and values can play important roles in compliance in the domain of information security. When individuals grow up developing religious values, they are more likely to respect laws and regulations. These values also help shape individuals’ attitude towards positive behaviors, such as opposing theft and encouraging justice. Recognizing and appealing to these beliefs and values can help security managers encourage individuals to be more compliant with the policies set forth by their organization.

As in prior studies, self-efficacy has significant positive impact on ICISP (H7). Higher self-efficacy means higher level of knowledge, skills, and awareness about ISPs and their purpose. Because individuals with higher self-efficacy are more likely to comply with ISPs, it is important for organizations to provide information security education, training, and awareness (SETA) programs, with the purpose of increasing individuals' self-efficacy. The SETA should be targeted at increasing employees' knowledge and skills regarding security technologies, procedures and policies.

One of the unexpected result of this research, which is contrary to findings in most prior studies in information security (Herath and Rao, 2009; Bulgurcu et al., 2010), is the lack of direct effect between subjective norm and ICISP (H6). However, this result is not totally new since Chau and Hu (2001) also found that subjective norm does not impact ICISP. This variation in result might be due to the indirect positive effect of subjective norm on ICISP via attitude (H4 and H5). This result needs to be confirmed in future research. Because subjective norms positively affects attitude, and indirectly ICISP, security managers should try to develop a security culture in their organizations, where employees will influence each other positively with respect to security behaviors.

This research has shown that, despite differences in the specific religious beliefs (via a wide array of religious affiliations), religiosity, and subjective norm play an important role in raising attitudes towards ISP and intention to comply with ISP. Thus, systematically raising common or acceptable religious values of employees helps raise employees' attitudes towards compliance. Moreover, working to raise awareness and the expectations of family members, colleagues, and other society members for ISP and the need for compliance is important. We also have seen that self-efficacy is an important factor in the function of ICISP. To raise employees' self-efficacy we need to continuously appraise, train and motivate employees.

## CONCLUSION

Information security has been a real and present problem in contemporary organizational settings. Thus, finding practical solutions to avert such potentially devastating danger is the desire of managers, particularly IT managers. The huge investment made by organizations on security hardware, software and procedures clearly indicate managers' concerns. However, the lack of compliance by employees to follow those security procedures hinders the effectiveness of the security tools. In this regard, the identification of factors that can play important role in ISP compliance, or non-compliance, enhances managers' ability to manage security by establishing a well-functioning information security culture. For this, knowing cultural, religious, economic and psychological causal factors is very important. This paper contributed towards this by empirically testing the role cognitive factors such as religiosity and conservation-value and normative factors such as subjective norm, self-efficacy and attitude play in intention to comply with ISPs.

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