Privacy Assimilation in IT Organizations: Carving out Privacy from Security

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Research in collaboration with
Privacy Relevance to IoT

• In the IoT era, organizations play critical role in handling information from physical devices, vehicles, home appliances (which includes personal/sensitive information), and effective privacy frameworks at an organisational levels will be utmost important.
• Organizations best security polices still struggle to retain clients if the privacy policies are immature, especially in the IoT era.
• Effective privacy enforcement will reduce the damage to individuals and organizations even in case of data breach.
• A customized framework for implementing the privacy assimilation, a predominantly perceptive and culture entity go long way in holistic data protection.
Agenda

✓ Introduction
✓ Motivation
✓ Gaps and research objectives
✓ Literature
✓ Theories used in privacy & security studies
✓ Methodology
✓ Qualitative study
✓ Qualitative data analyses
✓ Hypotheses
✓ Research model
✓ Scale development
✓ Measurement model
✓ Results - discussions
✓ Contributions and limitations
✓ Future directions and conclusion
Introduction

➢ Growth of digital universe

(Gantz & Reinsel, 2012; Turner, Gantz, Reinsel, & Minton, 2014)

✓ Key highlights IDC reports 2012, 2014 - Size of digital universe
  ▪ 130 Exabytes (2005), 1227 Exabytes OR 1.2 ZB (2010)
  ▪ 4.4 ZB (2013), 44 ZB (2020) i.e. 44 “trillion gigabytes” forecasted non linear growth

✓ Projections 2020
  ▪ Enterprises have some liability for 80% of data in the digital universe at some point
  ▪ Increase in demand for data protection the projection (40%)

➢ Rise of privacy concerns

✓ Since January 2005 (In US), 912 million records through 5,436 data breaches (Clearinghouse, 2017)
✓ Organizations can successfully secure the stored personal information but still make bad decisions about the subsequent use of personal information, resulting in information privacy problems. (Culnan & Williams 2009)
✓ Studies of Chan et al. (2005) and Greenaway et al. (2015) highlighted organizational imperative to address privacy, distinct from security.
✓ Over 80 countries and independent territories have now adopted comprehensive data protection laws including nearly every country in Europe and many in Latin America and the Caribbean, Asia, and Africa.
Motivation

➢ Background

✓ Global Information Security Survey (GISS) privacy questionnaire, 38% of respondents admitted that they addressed security in new business processes and technologies, but not privacy specifically (Ernst & Young 2015)

✓ Several countries enacting or strengthening data protection laws (Greenleaf, 2014)

✓ Emerging technology trends like cloud, big data posing privacy and security challenges (Rubinstein, 2013)

✓ IS studies had also reported scarcity of privacy studies at organizational level as against individual level (Belanger & Crossler, 2011).

➢ Academic studies analyzed the interplay between the external institutional forces and the internal factors at an organizational level with reference to security assimilation, not privacy (Hsu et al., 2012; Tejay & Barton, 2013).

➢ Broad enquiry

✓ What are the external forces and internal mechanisms influencing information privacy of IT organizations?

✓ How do external forces act internally to make organizational information privacy assimilated in the strategies and actions of IT organizations?
Gaps and research objectives

Research gaps

There is a paucity of research on information privacy at organizational level in general (Belanger and Crossler, 2011)

IS research addressing the emerging concerns of the IT industry, particularly addressing the potential for the leverage of information privacy practice as an element of strategy has received little attention in academic research

Previous research on IT and its diffusion and assimilation has informed practice on leveraging IT for business strategy (Armstrong and Sambamurthy, 1999). It is still not very clear how institutional forces influence information privacy assimilation and the factors driving the same within an organization

Research objectives

The following specific objectives have been framed to guide further work:

- identify specific variables that influence senior management participation for privacy practice
- understand the interactions among internal and external forces that influence information privacy assimilation
- develop a theoretical model following inductive and deductive methods to explain information privacy assimilation and
- test the model using a sample drawn from the Indian IT industry.
Organizations can successfully secure the stored personal information but still make bad decisions about the subsequent use of personal information, resulting in information privacy problems (Culnan and Williams 2009).

Studies of Chan et al. (2005) and Greenaway et al. (2015) highlighted organizational imperative to address privacy, distinct from security.

Privacy definitions

- **Value based definitions**
  - Privacy as a Right - The right to be left alone (Warren & Brandeis, 1890)
  - Privacy as a Commodity - Subject to economic principles of cost benefit analysis and trade-off (Bennett, 1995)

- **Cognate based definitions**
  - Privacy as a State - A state of limited access to information of ourselves (Westin, 1967)
  - Privacy as Control - Control of information about ourselves (Altman, 1975)

- **AICPA-GAPP (American Institute of Chartered Public Accountants)**
  - The rights and obligations of individuals and organizations with respect to the collection, use, disclosure, and retention of personally identifiable information (PII)
Privacy evolution (Westin, 2003)

- **Privacy Baseline** (1945-60)
- **1st Era**, (1961-79)
- **2nd Era** (1980-90)
- **3rd Era** (1990-02)

Rise of the internet, web

*In the last one decade*
- Rise of social networks (Facebook, Twitter, WhatsApp),
- Ease of information sharing,
- Information privacy is gaining more focus across world
# Theories used in privacy & security studies

<table>
<thead>
<tr>
<th>Theory</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance theory</td>
<td>(Chen, Ramamurthy and Wen, 2012)</td>
</tr>
<tr>
<td>Criminology theories</td>
<td>(Hu, Xu, Dinev and Ling, 2011; M. Siponen and Vance, 2010; Willison and Backhouse, 2006)</td>
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<tr>
<td>Communication theory and fear appeals model</td>
<td>(Johnston and Warkentin, 2010; Spears and Barki, 2010)</td>
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<tr>
<td>Control theory</td>
<td>(Boss, Kirsch, Angermeier, Shingler and Boss, 2009)</td>
</tr>
<tr>
<td>Elaboration likelihood model related to human behavior</td>
<td>(Johnston and Warkentin, 2010; Takagi and Takemura, 2013)</td>
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<tr>
<td>General deterrence theory</td>
<td>(D'Arcy, Hovav and Galletta, 2009; Straub Jr, 1990)</td>
</tr>
<tr>
<td>Learning theories</td>
<td>(Puhakainen and Siponen, 2010)</td>
</tr>
<tr>
<td>Theory of reasoned action</td>
<td>(M. T. Siponen, 2000)</td>
</tr>
<tr>
<td>Theory of planned behavior</td>
<td>(Bulgurcu, Cavusoglu and Benbasat, 2010; Dinev and Hu, 2005; Hu, Dinev, Hart and Cooke, 2012; M. T. Siponen, 2000)</td>
</tr>
<tr>
<td>Institutional theory</td>
<td>(Bjorck, 2004; Hsu, Lee and Straub, 2012; Hu et al., 2012; Hu, Hart, and Cooke, 2007; Tejay and Barton, 2013)</td>
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</table>
Neo-institutional theory

➢ **Neo institutional theory**


✓ Institutional isomorphism by three primary forces
  Coercive - external influences from regulatory, political, societal
  Mimetic - uncertain environments
  Normative - professionalization of the workforce

➢ **Applicability as per literature**

✓ Information System security research
  (Bjorck, 2004; Hsu et al., 2012; Hu et al., 2012; Hu, Hart, & Cooke, 2007; Tejay & Barton, 2013)

✓ Information privacy research
  (Chan & Greenaway, 2005; Kshetri, 2013)
Assimilation

➢ **Assimilation**: As an extent to which the use of technology/innovation diffuses across the organizational work progress and become routinized in the activities associated with those process.

(Chatterjee, Grewal, & Sambamurthy, 2002; Cooper & Zmud, 1990; Fichman & Kemerer, 1997)

➢ **Assimilation (strategy + activities)**: Investment in a technology/innovation, how well firms able to assimilate that specific technology/innovation to leverage business value

(Armstrong & Sambamurthy, 1999; Purvis, Sambamurthy, & Zmud, 2001)

➢ **Assimilation studies**:  
  ✓ Assimilation of Software Process innovations (Fichman & Kemerer, 1997)  
  ✓ IT Assimilation in Firms (Armstrong & Sambamurthy, 1999)  
  ✓ Assimilation of IT Innovations (Fichman, 2000)  
  ✓ Assimilation of Knowledge Platforms (Purvis et al., 2001)  
  ✓ Assimilation of Complex Technological Innovations (Gallivan, 2001)  
  ✓ Web technology Assimilation (Chatterjee et al., 2002)  
  ✓ Assimilation of ERP packages (Liang et al., 2007)  
  ✓ Assimilation of Security-Related Policies (Gallagher, Zhang, & Gallagher, 2012)

*Privacy assimilation: Need of the hour in IT Organizations?*
Methodology

➢ Mixed methods design
✓ Following Creswell (2009) and Saunders et al. (2009), this work employs a sequential mixed method approach (uses a combination of qualitative and quantitative methods in succession) to examine the interplay between the external forces and internal influencers on privacy assimilation within IT organizations

➢ Qualitative study
✓ Multi-case, multi-site approach - Thematic analysis
✓ Important variables from neo-institutional theory for Initial semi-structured interview question
✓ Combination of inductive and deductive principles (Davis and Eisenhardt, 2011)

Privacy assimilation framework in IT organizations

➢ Quantitative study
✓ Survey method, adopted and tested instrument
✓ PLS path modelling used for hypotheses testing
Qualitative study

➢ Key highlights
✓ Duration: Aug-2015 to Nov-2015
✓ Interviews were conducted either in-person or telephonically
✓ Each interview lasted about 40 minutes on an average

➢ Coding procedure
✓ More than 25,000 words transcribed, analysed and coded following thematic analysis procedure
✓ 41 major themes with 287 quotations were extracted that best represented the identified themes
✓ Two external coders involved; Holst’s (1969) code of reliability is 0.78

➢ Data triangulation
✓ Websites of the companies
✓ Industry bodies and reports of consulting companies
Qualitative data analyses

✓ Eight (8) constructs emerged, 5 - 6 themes under each construct

<table>
<thead>
<tr>
<th>Construct</th>
<th>Indicator</th>
<th>Themes</th>
<th>Label</th>
<th>Literature reference for Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coercive Force (COER)</td>
<td>COER1 : Government, regulatory influence</td>
<td>It is important for our organization to comply with government regulations on information privacy</td>
<td>Y++</td>
<td>(Cavusoglu et al., 2015)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(Tejay and Barton, 2013)</td>
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<td></td>
<td>(Johnson, 2009)</td>
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<td></td>
<td></td>
<td>(Liang et al., 2007)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Ang and Cummings, 1997)</td>
</tr>
<tr>
<td></td>
<td>COER2 : Contracts with other businesses</td>
<td>Contractual terms force organizations to have established information privacy practices</td>
<td>Y</td>
<td>(Tejay and Barton, 2013)</td>
</tr>
<tr>
<td></td>
<td>COER3 : Customer expectations</td>
<td>Customers expect our organization to protect their (private) information</td>
<td>Y+</td>
<td>(Cavusoglu et al., 2015)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(Tejay and Barton, 2013)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Bjorck, 2004)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Teo et al., 2003)</td>
</tr>
<tr>
<td></td>
<td>COER4 : Industry association’s encouragement</td>
<td>Industry associations encourages our organization to protect private information of the clients, employees etc.,</td>
<td>Y</td>
<td>(Tejay and Barton, 2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Liang et al., 2007)</td>
</tr>
<tr>
<td></td>
<td>COER5 : Competitive conditions</td>
<td>Competitive conditions pressurize our organization to have effective information privacy practices</td>
<td>Y+</td>
<td>(Tejay and Barton, 2013)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(Johnson, 2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Liang et al., 2007)</td>
</tr>
</tbody>
</table>

**Label** (Braun and Clarke, 2006)

- Y++ used to represent two thirds (or more) of participants have statements supporting the theme, similar to the “majority of participants”
- Y+ used to denote more than one third of participants supporting the theme, similar to ‘many participants’
- Y used to denote two or more participants responded in support of a theme
Hypotheses development - sample

➢ **Senior management participation**: The participants echoed that the themes related to
  - Government, regulatory influence (3)
  - Competitive conditions (3) and
  - Customer expectations (2)
positively influenced the senior management participation.

➢ **Few representative quotes**

*Sometimes the requirements might come from Senior Management or IT managers (mid-level). We usually need support from Senior Management, but it’s easy to get support if it’s related to data privacy & security as it's a “must rule” and “not nice to have”.*

- Senior Manager, Medium Scale US Company (MSU-2)

*The current organization has invested a lot in privacy & security framework both from Competitive Plus strategic view. Here you might be competing with competitors who are also playing with same data, but strategic in envisioning what probably data exploitation is in future.*

- Information Architect, Large Scale Multi National Company (LSM-1)

➢ **Literature**: Organizational studies related to security suggest that pressure from regulations will positively influence investment in information security resources (Cavusoglu et al., 2015)

➢ **Hypothesis**: Drawing on these findings I posit the following hypothesis

  *H1a: Coercive forces pertaining to information privacy will positively influence senior management participation*
Hypotheses

➢ **External forces and their influence on senior management participation**
  ✓ H1a: Coercive forces pertaining to information privacy will positively influence senior management participation
  ✓ H1b: Normative forces pertaining to information privacy will positively influence senior management participation
  ✓ H1c: Mimetic forces pertaining to information privacy will positively influence senior management participation

➢ **Mediating effects**
  ✓ H2a: Senior management participation has a mediating effect on the relationship between coercive forces and privacy assimilation
  ✓ H2b: Senior management participation has a mediating effect on the relationship between normative forces and privacy assimilation
  ✓ H2c: Senior management participation has a mediating effect on the relationship between mimetic forces and privacy assimilation

➢ **Moderating effects**
  ✓ H3a: Higher levels of privacy capability in an organization leads to a stronger relationship between coercive forces and privacy assimilation
  ✓ H3b: Higher levels of privacy capability in an organization leads to a weaker relationship between mimetic forces and privacy assimilation
  ✓ H4a: Higher levels of organizational culture leads to a stronger relationship between mimetic forces and privacy assimilation
  ✓ H4b: Higher levels of organizational culture leads to a stronger relationship between normative forces and privacy assimilation
Research model and hypotheses

Assimilation (Second Order Formative Construct: Business Strategy + Organizational Activities)

Privacy Capability

H1a, H2a, H2b, H2c

H3a, H3b

H1b, H1c

SMP* (Senior Management Participation)

Coercive

Normative

Mimetic

Organizational Culture

Business Strategy

Organizational Activities

Research model

* SMP - Senior Management Participation
Scale development

➢ Scale development
  ✓ Literature search was carried out to identify the measurement items for identified themes to come up with an instrument
  ✓ For face validity, the survey instrument was reviewed by seven experts - 5 professionals from the IT industry and two senior faculty members in the Information System’s area

➢ Pilot study
  ✓ Duration : Dec 2016 to Jan 2017
  ✓ 213 responses. 9 cases were dropped due to not meeting the key informant criteria, resulting in 194 responses
  ✓ Sample is a set of graduate students, who after graduation, have an average IT industry experience of 1 year (minimum 6 months)

➢ Data collection
  ✓ Duration : Feb 2017 to May 2017
  ✓ 272 responses, out of which 214 were complete in our sample survey data
  ✓ Total six (6) cases were dropped for not meeting the key informant criteria, resulting in 208 responses

[Link to Descriptive statistics]
Measurement model

➢ Testing of research model
  ➢ Partial Least Squares (PLS) based Structural Equation Modelling using SmartPLS software

➢ Validity and reliability through confirmatory factor analysis
  ✓ Measure of the construct (loadings) > 0.6
  ✓ Composite reliability > 0.8
  ✓ Average Variance Extracted (AVE) > prescribed minimum value of 0.5
  ✓ Discriminant Validity
    • Correlation values of the items with their own constructs > 0.7
    • Values greater than correlation values of other constructs

➢ Assessed common method bias
  ✓ Harman single-factor test
  ✓ Common method factor that links to all of the single-indicator constructs that were converted from observed indicators (Liang et al. 2007)
Results - discussions

➢ **Institutional forces’ influence on Senior Management Participation (SMP)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>COER (Coercive)</td>
<td>H1a supported</td>
</tr>
<tr>
<td>NORM (Normative)</td>
<td>H1b supported</td>
</tr>
<tr>
<td>MIM (Mimetic)</td>
<td>H1c supported</td>
</tr>
</tbody>
</table>

➢ **Mediating role of Senior Management Participation**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Direct Effect / Indirect Effect</th>
<th>VAF* (Indirect / Total)</th>
<th>SMP Mediation / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>COER (Coercive)</td>
<td>Not Significant / Significant</td>
<td>96%</td>
<td>Full mediation. H2a: Supported</td>
</tr>
<tr>
<td>NORM (Normative)</td>
<td>Not Significant / Significant</td>
<td>90%</td>
<td>Full mediation. H2b:Supported</td>
</tr>
<tr>
<td>MIM (Mimetic)</td>
<td>Significant / Significant</td>
<td>26%</td>
<td>Partial mediation H2c: Not supported</td>
</tr>
</tbody>
</table>

* p ≤ 0.1, ** p ≤ 0.05 and *** p ≤ 0.001  

+ VAF - Variance Accounted For

➢ **Moderating effects**

<table>
<thead>
<tr>
<th>Interaction Effects</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>COER x PACAP</td>
<td>H3a : Not supported</td>
</tr>
<tr>
<td>MIM x PCAP</td>
<td>H3b : Supported</td>
</tr>
<tr>
<td>MIM x CULT</td>
<td>H4a : Not supported</td>
</tr>
<tr>
<td>NORM x CULT</td>
<td>H4b : Supported</td>
</tr>
</tbody>
</table>
Contributions and limitations

**Contributions**

The main contributions of this work:

✓ Developing a theory for information privacy assimilation, building on the concepts derived from neo-institutional theory using primary data collected through case studies

✓ As information privacy stands out as a distinctly different phenomenon affecting organizations at a strategic level, this study adds to the body of knowledge pertaining to information privacy

✓ This thesis work tested the relationships identified during theory building phase on a larger sample drawn from India’s IT industry.

✓ The findings are important for senior managers in understanding the nature of institutional forces, and leverage them for effective privacy assimilation within IT organizations in the Indian context.

**Limitations**

✓ The first limitation is the location of the study sample for the Indian context. This might limit the external validity of our findings

✓ Wider industry samples across the globe can yield more generalizable results

✓ Privacy concepts are dynamic in nature, parallel to evolving culture and perceptions and have to be revisited periodically
Future directions and conclusion

➢ Future directions

✓ Strengthening the scale and instrument development
✓ Administering the survey to large industry samples that include
  ○ Different geographic regions and types of industries.
✓ Multilevel and longitudinal studies

➢ Conclusion

✓ This study produced interesting results useful for theory and management practice - understanding the nature of forces, tweak the internal influencers for effective privacy assimilation

Privacy vs Security

✓ Pink vs Blue: 2013 IEEE Symposium on Security and Privacy (NITRD Program, 2013)
✓ Plastic vs Other industry dump: Interview with senior executive, Global IT organization
✓ Forgetting & Forgiving are privileges and noble gifts to human beings

  *Let us not get this human touch undervalued in the computer and Artificial Intelligence era.*
Publications

International Journals

International Conferences

Industry Forums

Work in Progress
References


- **Bennett, C. J.** (1995). The political economy of privacy: a review of the literature. *Center for social and legal research, DOE genome project, University of Victoria, Department of Political Science, Victoria.*


References


Thank You