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# Forensic Accounting and Cyber-Attack: Considering the Relevance of Behavioural Theories in Fraud Prevention, Detection and Response

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## Abstract

This study examines the relevance of four behavioural theories such as Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Fraud Diamond Theory (FDT) and Triangle of Fraud Action (TFAT) in the niche area of fraud prevention, detection and response. As noted by the American Institute of Certified Public Accountants (AICPA) Core Wheel (2008), fraud prevention, detection and response constitute one of the functional areas of forensic accounting that require serious attention and intervention from the government, the society, public administration, anti-fraud organisations and other numerous stakeholders. The current study focuses on the 2017 cyber-attack, which is an offshoot of the 2014 Sony Hack attributed and linked to Lazarus Group. The Ransom cyber-attack infected over 300,000 computers in more than 150 countries and dubbed WannaCry while the fraudsters resort to ransom demand for money in order to restore the computers and infrastructure to perfect normality. Thus, motivates the authors to explore the relevance of behavioural theories in preventing, detecting and responding to fraud. Similarly, the study integrates the triangle of fraud action theory (TFAT) and the extended theory of planned behaviour (TPB). The integration is to demonstrate a theoretical model for detecting fraud and obtaining prosecutorial evidence and the importance of attitude factors to red flags or symptoms of fraud that is central to this scandal of cyber-attack and the demand for ransoms.

**Keywords:** Cyber-attack, forensic accounting, behavioural theories, fraud prevention, fraud detection, fraud response

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## 1. INTRODUCTION

Considering the scandals from the Enron, Parmalat, Worldcom, Waste Management, Sunbeam, and others at the dawn of the century coupled with the era of trade globalisation, acquisition of high technology as a business enabler, and complex and new legislation, fraud and fraudulent practices continue to be on the significant increase. The 2017 cyber-attack is an offshoot of the 2014 Sony Hack attributed and linked to Lazarus Group. Precisely, on 11 May 2017, another high-level scandal with magnitude called cyber-attacks came into limelight. This is

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referred to as Ransom Cyber-attack that infects 300,000 computers in more than 150 countries (CNN News, 1600 hours ET, 12 May). The Ransomware has been dubbed WannaCry, also known as WanaCryp0r, or WCry. The malware exploits known windows vulnerability, thereby bypassing traditional anti-virus protection and granting the malware full administrative rights over the victim's computer. From this point, it starts to encrypt all the user's files. Once it is done, it locks the victim out of their computer. Sources to CNN news believed the malware to be among a cache of powerful hacking tools stolen from the NSA sometime in August 2016. The attack has spread across Europe, Asia, North and South America, and some parts of Africa (Northern and Southern Africa). More worrisome is the demand by the hackers for money to restore the computers and other infrastructure back to normality. This new dimension of fraud (i.e., cyber-attacks for ransoms) motivates the current study to focus on the relevance of behavioural theories in forensic accounting.

## 2. LITERATURE REVIEW

In this section of the literature review, the authors discuss the theory of reasoned action, the theory of planned behaviour (extended), the fraud triangle theory, and the triangle of fraud action theory.

### 2.1 Theory of Reasoned Action

The theory of reasoned action is primarily used to explain individuals' behaviour through the impact of attitude as far back to the period of 1918 - 1970. This theory originates from the expectancy-value theories in the social psychology field. Ajzen and Fishbein (1980) emphasise that the theory of reasoned action is "designed to explain essentially any human behaviours". The basis of the theory of reasoned action is founded on the postulation that individuals are rational. It is expected that they will make systematic use of the information at their disposal to take necessary, reliable and relevant action. In essence, individuals consider the implications of their actions before they make a decision either to engage or not to engage in a particular behavioural situation (Ajzen & Fishbein, 1980). The theory of reasoned action emphasises that in making rational decisions, the intention is the best predictor of behaviour (Fishbein & Ajzen 1975).

Importantly, the theory of reasoned action has shown that the most significant determining factor of an individual's behaviour is behavioural intentions, which is a grouping of attitude towards the performance of the behaviour and subjective norms. However, according to Ajzen (1985), the theory of reasoned action is limited by what is known as correspondence. This is buttressed by Sheppard *et al.* (1988) that intention and attitude must agree on a course of action to predict particular or appropriate behaviour. The theory of reasoned action may perhaps apply to the current study because attitude and subjective norms possess significant impacts on the behaviour of individuals such as a forensic accountant, accountant and auditor in the working environment. However, there is a limitation to the use of the theory of reasoned action due to its inability to account for external and threat perception factors beyond the individual level.

### 2.2 Theory of Planned Behaviour (Extended)

The theory of planned behaviour is an offshoot of the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) that includes only the first two constituents of the model: (1) attitude, and (2) subjective norms. According to Cohen, Ding, Lesage & Stolowy (2010), and Hess (2007), the theory of planned behaviour is a "parsimonious model" but has substantial power to explain disparities of intentions. The straightforwardness of the design makes it a real tool for understanding and clarifying the numerous studies conducted on the ethical behaviour in organisations.

The theory of planned behaviour is beneficial to predict dishonest or evasive actions (Beck & Ajzen, 1991). As noted by Al-Qeisi (2009), the theory of planned behaviour does not recognise person's volitional control before it addresses the problem of behaviours that happen, and it contrasts from the theory of reasoned action owing to the inclusion of perceived behavioural control. This element accounts for circumstances where a person has less than absolute control over the behaviour. This can vary across conditions and actions (Ajzen, 1991). As noted by Ajzen (2006), the theory of planned behaviour dealt with the backgrounds of attitude, subjective norms and perceived behavioural control, and therefore, it assumes that behaviour is a role of salient beliefs applied to that behaviour. The beliefs include (1) behavioural beliefs, (2) normative beliefs, and (3) control beliefs. As confirmed in a survey study by Carpenter and Reimers (2005), the theory of planned behaviour can assist to shed more lights on unethical, dishonest and fraudulent financial reporting.

There is no model that has no limitation, and therefore, the theory of reasoned action and the theory of planned behaviour are not without limitation. Even though, the theory of planned behaviour came into existence as a

replacement of the theory of reasoned action. Given its volitional control drawback which states that behaviours are “deliberate and planned”, the theory of planned behaviour does not show how do people plan and how does planning mechanism relate to the theory.

### 2.3 The Fraud Triangle Theory

The fraud triangle theory came into prominence through Cressey (1950) as a PhD student in criminology who began the research on embezzlement behaviour. As noted by Dorminey, Fleming, Kranacher and Riley (2012), Cressey conducts interviews with inmates in the Illinois State Penitentiary at Joliet and notices common attributes among convicts serving time for white-collar offences and based on his observations, three criteria for criminal violations of trust were hypothesised. These are “a non-shareable financial problem, knowledge of the workings of a specific enterprise and the opportunity to violate a position of trust, and the ability to adjust one’s self-perception such that violating this trust does not constitute, in his or her mind, criminal behaviour” (Cressey, 1950).

These criteria develop into (1) perceived pressure, (2) perceived opportunity and (3) rationalisation. This eventually evolves into what we know today as the “fraud triangle” (Dorminey *et al.*, 2012). As noted by Cohen *et al.* (2010), these three elements of fraud were first recognised by Sutherland (1949) and were later developed by Cressey (1953). Albrecht *et al.* (1984) in their study adapted the concept from criminology to accounting and reinforced the disintegration with a study of over 1500 fraud references. Their study acknowledged 82 fraud-related variables, which are classified into three as (1) situational pressures, (2) opportunities to commit fraud, and (3) personal integrity (that is, a substitute for rationalisation).

Similarly, Statement of Auditing Standard No 99, Consideration of financial statement fraud in an audit (AICPA, 2002) posits three requirements for fraud to occur. These are (1) management or other employees have an incentive or are under pressure that provides a reason to commit fraud; (2) conditions exist in the absence of controls, ineffective controls, or the ability of management to override controls – that provide an opportunity for fraud to be perpetrated, and (3) those involved can rationalise committing a fraudulent act.

Prior research has shown that some persons possess an attitude, character, or a set of moral values that allow them to knowingly and intentionally commit a dishonest act (Cohen *et al.*, 2010). In essence, there is a link from these definitions to the fraud triangle, which indicates the theory can render useful means of predicting the perspective in which individuals may act unethically and thus, encourage the perpetuation of fraud.

### 2.4 The Triangle of Fraud Action Theory

The Triangle of fraud action theory deals with the features of the white collar crime, that is, the action. As noted by Dorminey *et al.* ((2012), the fraud triangle identifies the conditions under which fraud may occur, whereas the triangle of fraud action theory describes the actions an individual must perform to perpetrate the fraud. The meta-model structure which shows the Fraud Triangle and Fraud Diamond and the Triangle of fraud action as a measure for evaluating the anti-fraud profession’s response are illustrated in Figure 1.

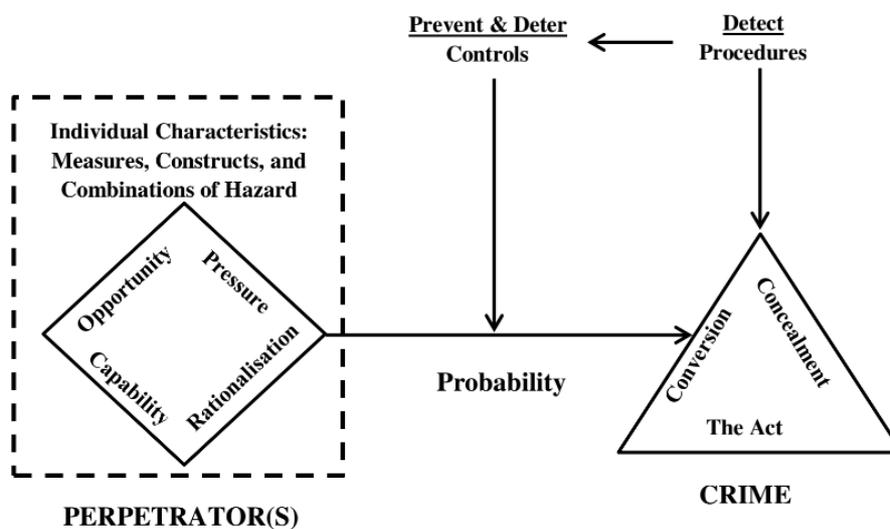


Figure 1. A Meta-model Framework for Evaluating the Anti-fraud Profession’s Response  
Source: Adopted from Popoola (2014)

Previous research has shown that the consequence to the fraud triangle is the lesser-known triangle of a fraud action, sometimes referred to as the “components of fraud” (Kranacher *et al.*, 2011; Albrecht *et al.*, 2006). The three elements of the triangle of fraud action are: (1) the act/theft, (2) the concealment, and (3) the conversion. For example, the word “act” represents the execution and methodology of the fraud such as embezzlement, cheque kiting, or substantial fraudulent financial reporting. Furthermore, the word “concealment” represents hiding the fraudulent act. For example, creating false journal entries, falsifying bank reconciliations or destroying files while the word “conversion” is the process of turning the ill-got gains into something usable by the perpetrator in a way that appears to be legitimate, such as money laundering, cars, or homes.

The incremental value of the triangle of fraud action theory according to Dorminey *et al.*, (2012) is that it represents the documentation of specific actions with evidence as well as control points where the potential fraud may be prevented, detected or remediated. This shows that accountants could develop specific procedures, controls, or structure their audits in such a way to illuminate the act, the concealment or the conversion.

The triangle of fraud action theory is the most exceptional value of the forensic accountant or fraud specialist where evidence of intent is required. While the fraud triangle directs forensic accountants to why people might commit fraud, the evidentiary trail might not be firm or unavailable. For example, the financial pressure and rationalisation elements of the fraud triangle are not directly observable and accordingly a lack of fraud evidence, which is not proof that a fraud has not occurred (Ramamoorti, 2008). It, therefore, follows that forensic accountants require an evidenced-based approach to conduct audits or investigations, and the triangle of fraud action is most helpful in this regard because the components can be directly observed and documented.

The triangle of fraud action theory represents a theoretical model for detecting fraud and obtaining prosecutorial evidence. This means the proof or evidence of the act; concealment and conversion could be collected and presented in a court of law or public adjudication. In totality, it could be said the triangle of fraud action makes it an undeniable fact for the perpetrator to argue that the act was accidental or to deny the role in the act. Dorminey *et al.* (2012) claim that the evidence of concealment especially provides a convincing argument that the act was intentional.

## **2.5 Integrating the Triangle of Fraud Action Theory (TFAT) and the Theory of Planned Behaviour (TPB)**

For this study, the researchers examine forensic accounting as a field and the relevance of behavioural theories in fraud prevention, detection and response by adapting and integrating the triangle of fraud action theory (Dorminey *et al.*, 2012; Kranacher *et al.*, 2011; Albrecht *et al.*, 2006) with the theory of planned behaviour (Ajzen, 1991; 1988; 1985). Accurately, the triangle of fraud action theory describes the actions individuals must perform to perpetrate fraud in any working environment. The actions are exemplified through the three components - the act, the concealment, and the conversion. In addition, the theory of planned behaviour comprises attitude, subjective norms, perceived behavioural control, and Beck and Ajzen’s (1991) moral obligation. To buttress further, Carpenter and Reimers (2005) confirm in an empirical study that the theory of planned behaviour can assist to shed more lights on unethical, dishonest, and fraudulent financial reporting.

This study having realised the occurrence of a gap and in contribution to the body of literature hereby addresses the seemingly apparent gap. Hence, the researcher reviews and discusses relevant underpinning theories concerning fraud and forensic accounting and brands the association “TFAT/TPB” (for “triangle of fraud action theory/theory of planned behaviour applied to fraud” that is depicted in Figure 2. Given that the Triangle of fraud action theory and the theory of planned behaviour as shown in Figure 2 are complementary theories, this study, therefore, integrates them for use as a theoretical model in this research. A prior study also reveals that auditors usually perceive “attitudinal” factors to be significant fraud signals than “situational” factors (Heiman-Hoffman *et al.*, 1996).

Consequently, this study brands the association “TFAT/TPB” (for “triangle of fraud action theory/theory of planned behaviour applied to fraud”). This association is depicted in Figure 2.3, and most specifically considered to be an integral part of this study.

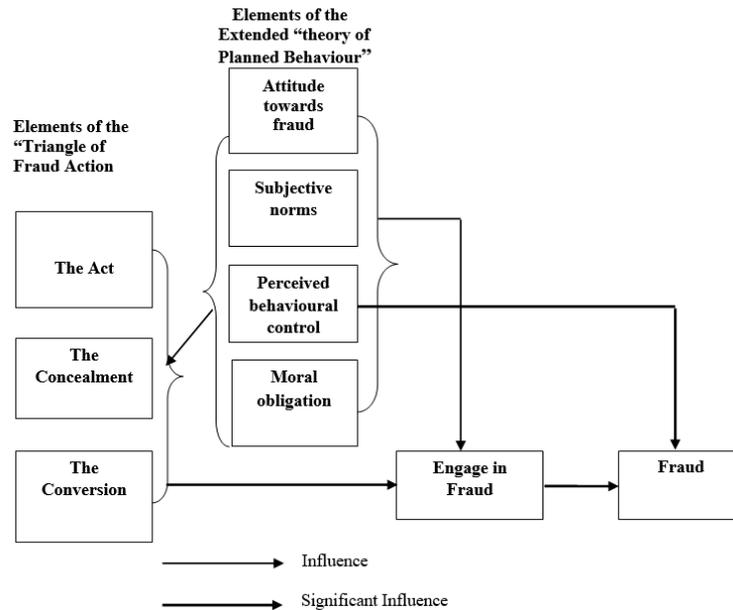


Figure 2. An integration of triangle of fraud action theory (TFAT) and theory of planned behaviour (TPB): an association of “TFAT/TPB”  
Source: Adapted from Popoola (2014).

### 3. SUMMARY

This study has discussed several relevant theories relating to forensic accounting such as the theory of reasoned action, the theory of planned behaviour, the fraud triangle and triangle of fraud action. In addition, it integrated the triangle of fraud action theory (TFAT) and the theory of planned behaviour (TPB) to illustrate a theoretical model for detecting fraud and obtaining prosecutorial evidence and the importance of attitude factors to red flags or symptoms of fraud that is central to this scandal of cyber-attack.

### REFERENCES

- AICPA. (2008). *Forensic and Valuation Services: Overview of Certified in Financial Forensics (CFF) Credential* (American Institute of Certified Public Accountants, Durham. Retrieved September, 2009, from <http://fvs.aicpa.org/Memberships/Overview+of+Certified+in+Financial+Forensics+Credential.htm>
- AICPA. (2002). Statement on Auditing Standards (SAS) No. 99: Consideration of Fraud in a Financial Statement Audit (American Institute of Certified Public Accountants, Durham).
- Ajzen, I. (2006) Theory of planned behaviour [Internet] Available from <http://www.people.umass.edu/ajzen/tpb.diag.html>. Retrieved July 18, 2014.
- Ajzen, I. (2006). Constructing a TPB questionnaire: Conceptual and methodological considerations. Retrieved November 7, 2012.
- Ajzen, I. (2002) Perceived Behavioural Control, Self-efficacy, Locus of Control, and Behaviour. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Ajzen, I. (1998). Models of human social behaviour and their application to health psychology. *Psychology and Health*, 13 (4), 735-739.
- Ajzen, I. (1991). ‘The Theory of Planned Behaviour’, *Organizational Behaviour and Human Decision Processes* 50 (2), 179–211.
- Ajzen, I. (1988). *Attitudes, Personality, and Behaviour*. Dorsey Press, Chicago.
- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behaviour’, in J. Kuhl and J. Beckmann (Eds.), *Action-control: From cognition to behaviour*, (Springer, Heidelberg), pp. 11–39.
- Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Ajzen, I., & Fishbein, M. (1974). ‘Factors Influencing Intentions and the Intention-Behaviour Relation’, *Human Relations* 27 (1), 1–15.
- Albrecht, W. S., Howe, K. R. & Albrecht, C. O. (2006). *Fraud Examination*. New York, NY: Thomson South-Western.
- Albrecht, W. S., Howe, K. R., & Romney, M. B. (1984). *Deterring Fraud: The Internal Auditor’s Perspective*. Altomonte Springs, FL: The Institute of Internal Auditors’ Research Foundation.
- Al-Qeisi, K. I. (2009). *Analysing the use of the UTAUT model in explaining an online behaviour: Internet banking adoption*. PhD thesis. Brunel University.
- Beck, L., & Ajzen, I. (1991). ‘Predicting Dishonest Actions Using the Theory of Planned Behaviour’, *Journal of Research in Personality*. 25 (3): 285–301.
- Carpenter, T. D., & Reimers, J. L. (2005). ‘Unethical and Fraudulent Financial Reporting: Applying the Theory of Planned Behaviour’, *Journal of Business Ethics* 60 (2), 115–129.
- Cohen, J., Ding, Y., Lesage, C., & Stolowy, H. (2010). Corporate Fraud and Managers’ Behaviour: Evidence from the Press. *Journal of Business Ethics*. 95:271-315; DOI 10.1007/s10551-011-0857-2
- Cressey, D. R. (1953). *Other People’s Money: A Study in the Social Psychology of Embezzlement* (The Free Press, Glencoe, IL).
- Cressey, D. R. (1950). The criminal violation of financial trust. *American Sociological Review* 15 (6): 738–743.
- Dorminey, J., Fleming, A. S., Kranacher, M., & Riley, R. A. (2012). The Evolution of Fraud Theory. *American Accounting Association. Issues in Accounting Education*. Vol. 27, No. 2: 555 – 579.
- Durkin, R., & Ueltzen, M. (2009). *The Evolution of The CFF Credential, The Practising CPA*, July/August.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and behaviour: An Introduction to Theory and Research* (Addison-Wesley,

- Reading, MA).
- Heiman-Hoffman, V. B., Morgan, K. P., & Patton, J. M. (1996). 'The Warning Signs of Fraudulent Financial Reporting', *Journal of Accountancy* 182 (4), 75-77.
- Hess, D. (2007). 'A Business Ethics Perspective on Sarbanes-Oxley and the Organizational Sentencing Guidelines', *Michigan Law Review* 105(8), 1781-1816.
- Kranacher, M. J., Riley, R. A., & Wells, J. T. (2011). *Forensic Accounting and Fraud Examination*. New York, NY: John Wiley & Sons.
- Kranacher, M. J., Morris, B. W., Pearson, T. A., & Riley, R. A. (2008). A model curriculum for education in fraud and forensic accounting. *Issues in Accounting Education* 23 (4): 505-519.
- Popoola, O. M. J. (2014). *Forensic Accountants, Auditors and Fraud: Capability and Competence Requirements in the Nigerian Public Sector*. A thesis submitted to the Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, in fulfilment of the requirement for the Degree of Doctor of Philosophy. Malaysia.
- Ramamoorti, S. (2008). The psychology and sociology of fraud: Integrating the behavioural sciences component into fraud and forensic accounting curricula. *Issues in Accounting Education* 23 (4): 521-533.
- Sutherland, E. H. (1949). *White collar crime* (Dryden Press, New York).
- Wells, J. T. (2005). Accountants need help fighting the war on fraud; ACFE founder urges anti-fraud education [Press Release]. Retrieved November 13, 2008, from <http://www.acfe.com/about/press-release.asp?copy=10-12-2005>.
- Wolfe, D. T., & Hermanson, D. R. (2004). The Fraud Diamond: Considering the four elements of fraud. *The CPA Journal* 74 (12): 38-42.