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Fire hazard in buildings: review, assessment and strategies for improving fire safety
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Abstract
Purpose – The current fire protection measures in buildings do not account for all contemporary fire hazard issues, which has made fire safety a growing concern. Therefore, this paper aims to present a critical review of current fire protection measures and their applicability to address current challenges relating to fire hazards in buildings.

Design/methodology/approach – To overcome fire hazards in buildings, impact of fire hazards is also reviewed to set the context for fire protection measures. Based on the review, an integrated framework for mitigation of fire hazards is proposed. The proposed framework involves enhancement of fire safety in four key areas: fire protection features in buildings, regulation and enforcement, consumer awareness and technology and resources advancement. Detailed strategies on improving fire safety in buildings in these four key areas are presented, and future research and training needs are identified.

Findings – Current fire protection measures lead to an unquantified level of fire safety in buildings, provide minimal strategies to mitigate fire hazard and do not account for contemporary fire hazard issues. Implementing key measures that include reliable fire protection systems, proper regulation and enforcement of building code provisions, enhancement of public awareness and proper use of technology and resources is key to mitigating fire hazard in buildings. Major research and training required to improve fire safety in buildings include developing cost-effective fire suppression systems and rational fire design approaches, characterizing new materials and developing performance-based codes.

Practical implications – The proposed framework encompasses both prevention and management of fire hazard. To demonstrate the applicability of this framework in improving fire safety in buildings, major limitations of current fire protection measures are identified, and detailed strategies are provided to address these limitations using proposed fire safety framework.

Social implications – Fire represents a severe hazard in both developing and developed countries and poses significant threat to life, structure, property and environment. The proposed framework has social
implications as it addresses some of the current challenges relating to fire hazard in buildings and will enhance overall fire safety.

**Originality/value** – The novelty of proposed framework lies in encompassing both prevention and management of fire hazard. This is unlike current fire safety improvement strategies, which focus only on improving fire protection features in buildings (i.e. managing impact of fire hazard) using performance-based codes. To demonstrate the applicability of this framework in improving fire safety in buildings, major limitations of current fire protection measures are identified and detailed strategies are provided to address these limitations using proposed fire safety framework. Special emphasis is given to cost-effectiveness of proposed strategies, and research and training needs for further enhancing building fire safety are identified.

**Keywords** Fire hazard, Framework for fire design, Strategies for fire safety, Buildings, Fire protection engineering

**Paper type** Research paper

### 1. Introduction

Buildings constitute majority of built infrastructure and play a pivotal role in socio-economic development of a country. Most of the buildings are designed to last for several decades and provide residential and functional operations to large number of inhabitants throughout their design life. During this long time-span, buildings are subjected to several natural (earthquake, hurricane, tsunamis etc.) and manmade (fire, explosion etc.) hazards which can cause partial or complete collapse of the building, and incapacitation of building operations. Such destruction or incapacitation in the event of a hazard can jeopardize the life safety of inhabitants and can cause significant direct and indirect monetary losses. Hence, buildings are designed to withstand actions from numerous anticipated hazards to ensure life and structural safety during their design life, and fire represents one such extreme hazard that can occur in buildings.

Fire hazard in buildings can be defined as the potential of accidental or intentional fire to threaten life, structural, and property safety in a building. With rapid development across the globe, fire hazard in buildings have undergone significant transformation in terms of severity and versatility and have become a growing concern in recent years. In the past two decades (1993-2015), a total of 86.4 million fire incidents have caused more than one million fire deaths (Brushlinsky et al., 2017), and total annual loss from global fire hazard accounts for about 1 per cent of the world GDP (Bulletin, 2014) (approximately US$857.9bn [GDP, 2018]). On an average, 3.8 million fires caused 44,300 fire deaths every year in both developed and developing countries across the globe (Brushlinsky et al., 2017). Between 2010-2014, maximum number of fires (600,000-1,500,000 per year) and the second highest number of fire deaths (1,000-10,000 per year) in the world occurred in a developed country such as USA (Brushlinsky et al., 2016). Whereas, developing countries such as India and Pakistan suffered highest number of fire causalities (10,000-25,000 per year) and second highest number of fires (100,000-600,000 per year) (Brushlinsky et al., 2016). Therefore, to mitigate these adverse effects of fire hazard, it is important to provide necessary fire safety in buildings.

Fire safety can be defined as the set of practices to prevent or avert occurrence of fire and manage growth and effects of accidental or intentional fires while keeping resulting losses to an acceptable level. Currently, fire safety in buildings is provided through following provisions recommended by building codes of practice. While specifications and strategies for ensuring fire safety in buildings vary from one code of practice to other, most of them are based on prescriptive based approach and are derived from similar fire safety principles. In prescriptive based approaches, fire safety in buildings is provided
using a combination of active and passive fire protection systems. Active fire protection systems (sprinklers, heat and smoke detectors etc.) are designed to detect and control or extinguish fire in its initial stage and are more important from life safety perspective. Whereas, passive fire protection systems (structural and non-structural building components) are designed to ensure structural stability during fire exposure and to contain fire spread. Their main goal is to allow ample time for firefighting and rescue operations, and to minimize monetary losses.

This traditional approach of ensuring fire safety have several limitations in addressing contemporary fire hazard challenges (discussed in detail in Section 4) and provide limited guidelines on prevention of fire hazard itself. Major limitations of active fire protection systems include poor performance and functional reliability, and high cost of installation and maintenance -which often becomes a big concern in developing countries with limited monetary resources. On the other hand, passive fire protection focusses on fire performance of individual structural members and building components instead of holistic fire safety in building; which leads to an unquantified fire safety in building. Moreover, prescriptive approach of ensuring fire safety is not well integrated with actual building design process, and often fire design is done with the main goal of obtaining approval from fire safety regulatory bodies (Maluk et al., 2017). Therefore, in developing countries with poor regulation and enforcement environments, often no or inadequate fire safety provisions are provided in buildings.

To address these challenges, this study proposes a new integrated framework (see Figure 1) of fire protection features in buildings, regulation and enforcement, consumer awareness, and technology and resources advancement to improve fire safety in buildings. Unlike current fire safety improvement strategies, which focus only on improving fire protection features in buildings (i.e. managing impact of fire hazard), the novelty of proposed framework lies in encompassing both prevention and management of fire hazard. To demonstrate the applicability of this framework in improving fire safety in buildings, major limitations of current fire protection measures are identified, and detailed strategies are provided to address these limitations using proposed fire safety framework. Special emphasis is given to cost-effectiveness of proposed strategies, and research and training needs to further enhance building fire safety are identified.

![Figure 1. Integrated framework to implement strategies for improving fire safety in buildings](image)


2. Impact of fire hazard

Buildings contain several direct and indirect sources that contribute to fire hazard; and in the event of a fire there is significant risk to life, structure, property and environment from the initial development stages of fire itself.

2.1 Sources of fire hazard

Fire hazard constitute of all factors present in a building that can cause ignition (start fire), aggravate fire severity, incapacitate building fire safety provisions, and hinder escape or firefighting operations. Based on available statistics it is suggested that cooking is the leading cause of fire in both residential and non-residential buildings (USFA, 2016). Other sources of ignition in buildings include all live flames, heaters and hot surfaces, electrical malfunction, fireworks, and arson and vandalism. After ignition, fire severity can be aggravated by several factors such as large quantity of combustible household materials; improper storage of tools, rubbish, equipment, and volatile flammable materials (liquid petroleum gas, paints, ammunition etc.); materials producing toxic smoke on combustion; and combustible building components such as composite panels and timber. Also, use of open architecture (glass partitions, false ceiling etc.), large windows, and poor fire compartmentation design can cause rapid fire growth and spread by providing constant supply of oxygen to fire. All of the factors discussed above have a direct impact on starting fire or increasing its severity, and a comprehensive review of all such factors can be found in the literature (Buchanan and Abu, 2017; Drysdale, 2011).

On the other hand, fire safety in building can be threatened by indirect factors as well, which can incapacitate building fire protection measures, and hinder fire escape and firefighting operations. Some of these factors include poor regulation and enforcement of building codes (no or inadequate fire safety provisions in buildings), lack of common and civic sense (disabling or not using smoke detectors, ignoring fire alarm, vandalism etc.), lack of resources for maintenance of active fire systems (insufficient water for sprinklers, expired fire extinguishers etc.), and damage to fire safety provisions from other hazards (earthquakes, hurricanes etc.). These factors can lead to insufficient fire safety provisions within a building and significantly increase risk to life, structural, and property safety in the event of a fire; thus, contribute to fire hazard.

Another source of fire hazard, especially in populated areas close to wildlands, is one arising from forest fires (wildfires). Due to increase in human encroachment on the wildland urban interface, number of buildings and people living in the fire prone wildland is increasing significantly in recent years. This has made wildfires (resulting primarily from arson and lightning) a major source of fire hazard in wildland urban areas across the globe. In USA alone, an average of 66,903 wildfires occurred every between 2009-2018 which burned an average of 6.9 million acres and caused an average of US$1.8bn for firefighting costs (NICC, 2018; Cost, 2018). In 2018, a total of 25,790 structures were destroyed by wildfires including 18,137 residences, 6,927 minor structures, and 229 commercial/mixed residential structures; which is highest number of structures lost to wildfires since 1999, and almost double of previous highest of 12,306 in 2017 (NICC, 2018). In Canada, about 8,000 wildfires occur every year and are responsible for burning of 6.1 million acres per year (CWFIS, 2018). Similar trends in building fire hazard from wildfires can be found across the globe as well.

2.2 Development of building fire

The full uninterrupted development process of a building fire inside a typical room is illustrated in Figure 2 through temperature-time evolution. The temperature-time evolution
depends on a wide range of variables (fuel load, ventilation, compartmentation characteristics etc.), therefore, there is significant variation in fire dynamics of each fire. A comprehensive discussion on fire development and its characterization can be found elsewhere in the literature (Buchanan and Abu, 2017). In general, growth of fire in a compartment is categorized into two distinct phases; namely pre-flashover fires and post-flashover fires (Figure 2). In pre-flashover phase, the duration from smoldering (flameless combustion) to ignition (combustion with flames) is defined as incipient stage, and duration from ignition to flashover (rapid increase in temperatures) is defined as growth stage of fire. Whereas, in post flashover phase, duration for which temperatures keep increasing from combustion is defined as burning stage, and subsequent cooling is defined as decay stage of fire. Pre-flashover phase is important from life safety perspective, and post-flashover phase is important from structural safety perspective. Detailed impact of fire hazard in pre and post-flashover phases is discussed below.

2.3 Impact on life safety

There is significant risk to life safety in both pre and post-flashover phases of building fires, and on an average about 44,300 fire deaths have occurred every year between 1993 and 2015 (Brushlinsky et al., 2017). During pre-flashover phase of fire, combustion generates several toxic gases which are extremely deleterious to humans and inhalation (even in small quantities) can be fatal within minutes (Nelson, 1998; Alarie, 2002). Most common among these are carbon monoxide (generated from incomplete combustion), hydrogen cyanide (generated from burning plastics), and phosgene gas (generated from burning vinyl-based household materials). The smoke generated from combustion also contains small soot particles and toxic vapor which can cause irritation to eyes and digestive system. It is due to this high toxicity of smoke (toxic gases, soot particles and vapor) that more fire deaths occur from smoke than burning itself (NFPA, 2018). Also, smoke and hot gases obscure and hinder escape routes from building during fire, which further increases risk to life safety from inhalation of toxic gases and burning.

Other threats to life safety are from reducing oxygen levels in room from combustion and inhaling hot air. Humans undergo impaired judgement and coordination when oxygen levels in room fall to 17 per cent from normal 21 per cent; headache, dizziness, nausea, and fatigue at 12 per cent; unconsciousness at 9 per cent; and respiratory arrest, cardiac arrest, and even death when oxygen levels fall to 6 per cent (NFPA, 2018). Also, inhaling hot gases can burn respiratory tract, and one breath of hot air can even lead to death. During post-

![Figure 2. Uninterrupted building fire development process inside a typical room](image)
flashover phase, the concentration of toxic smoke is very high and fire temperatures are untenable for humans and can lead to certain death, thus, all life safety operations are usually targeted towards pre-flashover phase of fire. Apart from toxic smoke and burning, biggest risk to life safety during post-flashover phase is partial or complete collapse of structure which can inhibit firefighting operations and kill trapped inhabitants under collapsed debris. Therefore, fire represents significant threat to life safety even when it is not fully developed, and every minute is critical in evacuating inhabitants during building fires.

2.4 Impact on structural safety
During fully developed stage, fire temperatures can reach above 1,000°C which can cause significant degradation in strength and stiffness properties of structural materials (concrete, steel, wood, etc.) (Kodur, 2014). This material degradation can incapacitate structural members to carry designed structural loads, and lead to partial or complete collapse of building during or after fire. Also, material degradation has strong potential to cause permanent structural damage which can cause premature failure of building under other natural hazards for which it was originally designed for; thus, endangering structural safety. A detailed review on impact of fire on structural safety can be referred to literature (Buchanan and Abu, 2017).

2.5 Impact on property safety
One of the biggest impact of fire hazard is on property safety and it causes direct and indirect losses of billions of dollars in both developed and developing countries across the globe (Brushlinsky et al., 2017). Even if building withstands fire without life losses, aftermath of almost every fire involves monetary losses magnitude of which depends on severity of fire. Direct losses from fire hazard include loss of property from burning, sprinkler operation, firefighting operations (damage to property from water of fire brigade, breaking of doors and windows etc.), falling debris from partial or complete collapse of structure; and structural damage and cost of repair. Whereas, indirect losses include loss of use during time required for repairs, loss from temporary or permanent relocation, loss from demolishing structure, increase in insurance costs, environmental contamination etc.

2.6 Impact on environmental safety
Fire hazard generates several environmental pollutants from combustion, firefighting operations, and spillage from containers of hazardous materials due to damage from fire. Most common fire pollutants include metals, particulates, polycyclic aromatic hydrocarbons, chlorinate dioxins and furans, and brominated dioxins and furans, polychlorinated biphenyls and polyfluorinated compounds (Martin et al., 2016). During fire, transmission of these pollutants occurs to environment through fire plume (air contamination), from firefighting water runoff (water contamination), and deposited air and water contaminants (land contamination); thus, causing environmental pollution. The magnitude of environmental pollution depends on the exposure duration, transmission medium, and susceptibility of receiving atmospheric, aquatic and terrestrial environments; and a detailed study on effect of fire on environment can be referred to the literature (Martin et al., 2016).

3. Review of current fire protection measures
Most of the current fire protection measures are prescriptive and based on similar fire safety principles. Therefore, these provisions can be grouped under four generic categories as:
general strategy for fire safety, building codes and standards, safety provisions within building, and firefighting operations.

3.1 General strategy for fire safety
The first line and foremost strategy to tackle fire hazards is prevention of fire occurrence. Because it is not always possible to prevent fire, impact of fire should be managed by either managing fire itself or by managing exposed persons and the property. The usual strategy for managing persons is to evacuate exposed persons from the building by causing movement of people through a safe fire escape route. For people to evacuate safely, it is important that these requirements are met simultaneously: fire is detected in incipient or growth stage (earlier the better), occupants are notified using fire alarm and a safe fire escape route exists in the building. However, in case of high rise buildings, it is not possible to evacuate people through a safe fire escape passage in the time bound. Therefore, defend-in-place strategy is adopted by providing safe refuge on certain levels of building, which are then evacuated by firefighting department. This allows firefighters to target evacuation operations to these specific refuge areas only and save precious time which can be a factor of life and death in fire situations.

To manage fire and its impact, general strategy is to control the available fuel for combustion and use suppression by using various fire protection features installed in a building. Many building codes and standards specify a permissible limit of the available fuel load in a building (given as energy floor density in MJ/m²), so that in case of ignition, fire growth is controlled by limited fuel supply. The fire severity corresponding to this limited fuel load is taken into consideration in the building design to withstand this certain level of fire severity. Therefore, the limit on the available combustible fuel load inside a building is dependent on the fire resistance requirement of the building and vice versa.

The other effective method of controlling fire is through suppression using automated or manual fire protection provisions. In case of automatic fire suppression systems, it is essential that both fire detection equipment and fire suppression equipment work simultaneously. The automatic provisions for fire suppression include automated sprinklers, condensed aerosol fire suppression systems, and gaseous fire suppression systems. On the other hand, manual fire suppression refers to manual fire extinguisher systems or standpipe systems. The suppression of fire depends upon early detection, functional reliability, and performance reliability of fire protection measures.

The last defense (for controlling fire and to manage its impact) is through compartmentation and structural stability. The structural stability is important as it helps in localizing fire, allows the firefighting operations to continue safely and prevent property losses arising from total collapse of structure. To ensure structural stability, it is important to control the fire spread inside building and to keep it to a localized zone only. This can be achieved by using fire compartmentation which contains the fire to a local area only and does not allow further movement of fire inside the building. Another possibility for controlling fire movement is by using fire venting which provides increased ventilation to fire affected zone only and exhausts the available fuel.

3.2 Building codes and standards
Detailed provisions in building codes are specified to avert the occurrence of fire, manage its impact, and to ensure life and structural safety while keeping property and life losses to a minimum. Building codes and standards provide guidelines for both design and assessment of fire resistance of structural members and assemblies. In case of building fire design, codes specify function of building elements under fire exposure, permissible limit of fuel load
density, required fire ratings for building elements, recommendations on type of materials, minimum member dimensions to achieve required fire rating, and guidelines for evacuation strategies. These recommendations vary with type of occupancy such as hospital, commercial buildings, and residential buildings etc. Generally, for public buildings such as hospitals and nursing homes (where risk to life safety is higher and indirect monetary losses are very high), building codes and standards recommend much conservative solutions with high factor of safety.

To assess fire safety of a structural member or assembly, building codes and standards use three main fire safety criteria as per function of a building member. These include: stability criterion (R) which is the ability to withstand applied loads during fire exposure; integrity criterion (E) which is the ability to prevent fire propagation due to formation of cracks and fissures; and insulation criterion (I) which is the ability to insulate the unexposed faces during fire exposure. Considering these fire safety criteria, the fire resistance assessment can be carried out by prescriptive approach or advanced analysis (Buchanan and Abu, 2017). In prescriptive based approach, fire resistance assessment is carried out by correlating member specifications (dimensions, clear cover, aggregate type) to fire safety criteria using data from standard fire tests. Whereas, in case of advanced analysis methods, building codes and standards provide parametric fire curves to be used in the fire resistance assessment, and recommend material properties at elevated temperatures to be used in the analysis while fire safety criteria remains same (Eurocode 2, 2004).

3.3 Fire safety provisions within a building
The fire safety provisions provided within a building are grouped under two main categories as active and passive fire protection systems. The active fire protection systems (sprinklers, smoke detectors, fire extinguishers etc.) refer to the control of fire by taking some action using an automated device or by a person. On the other hand, passive fire protection systems refer to the fire protection measures which are built in within the building itself, and do not require any operation by people or automated controls (for example fire ratings of structural and non-structural members or assemblies).

In the incipient stage of fire, fire extinguishers are used to contain the fire while they still can. If the fire goes into growth phase, the priority is to evacuate people out of the building as inhalation of toxic gases from fire can be fatal within minutes (Nelson, 1998; Alarie, 2002). In this stage, the fire management falls to automated or manual active fire protection systems. It should be noted that the timing for onset of all automated fire protection systems is crucial as any delay in fire alarm directly endangers life safety and reduces chances of containing fire once it grows in intensity. Therefore, ideally all evacuation process should be completed before fire gets out of control of active fire protection systems. Time available for escape can be related to the fire growth period as:

\[ t_d + t_s + t_{rs} \leq t_u \]  

where \( t_d \) is the time elapsed from ignition to fire detection, \( t_s \) is the delay between detection and start of escape activity, \( t_{rs} \) is the time to move to a place of relative safety and \( t_u \) is the time (from ignition) for the fire to produce untenable conditions.

After flashover, the fire temperatures can reach as high as 1,000°C and the resulting thermal expansion and degradation in material properties pose a serious threat to structural safety. During this phase of fire, the main target of passive fire protection systems is to contain the spread of fire while ensuring structural stability. To do so, it is important that all structural and non-structural members satisfy the fire safety criterion of Section 3.2 for the
required duration of fire exposure. These passive fire protection systems allow safe firefighting operations, safe evacuation operations, and mitigate property losses.

3.4 Firefighting

If the fire is not extinguished through active fire protection systems, extinguishing or controlling fire as well as ensuring life safety comes down to the role of firefighting department. The time required by the firefighting department to reach the site and begin firefighting operations play a key role in firefighting and is known as response time. The firefighting department is equipped with specialized equipment to provide alternate entries into a building, and to perform rescue operations even in most inaccessible places. In some countries, firefighting department also has the legal powers to inspect and enforce building owners to comply with building fire safety provisions as specified in codes and standards. This allows for better enforcement of the fire safety provisions, and a continuous monitoring of the same helps in improving fire safety.

4. Assessment of current fire protection measures

Current fire protection measures have several limitations in addressing contemporary fire hazard challenges.

4.1 Adverse conditions/features in modern buildings

Urbanization and increasing population density are leading to increased number of high rise buildings in the cities for both commercial as well as residential purposes. Despite fire safety provisions specified in building codes, implementing fire safety has become a serious challenge. These challenges arise because of:

- modern buildings having high fuel (fire) load which is hard to limit;
- highly combustible nature of room contents – due to more plastic and cellulose based materials in modern houses;
- open space architecture and use of too much glass (which is poor for fire compartmentation);
- use of new construction materials with poor fire performance; and
- longer response times for firefighting – due to adverse traffic conditions, narrow lanes and irregularly planned cities.

Due to enhanced standard of living, there is abundant carbon rich fuel (for example wood furniture, stationary, clothes, and other flammable items) in most of the modern buildings. Such high intensity of fuel load plays a key role in faster fire propagation, shorter flashover time, and rapid changes in fire dynamics. A full scale experimental study aimed at characterizing fire development in modern and legacy rooms concluded that flashover point can occur as fast as within 5 min of fire in modern rooms, and after 29 min in case of legacy rooms (Kerber, 2012). The development of room temperatures in case of legacy and modern rooms of this study is shown in Figure 3. It can be clearly observed from Figure 3 that temperature rises rapidly for relatively shorter duration in case of all modern room fires, thus, represent increased fire severity.

Further, modern buildings are designed with open architecture glazing with transparent glass windows and false ceilings to facilitate larger open office spaces for comfort and aesthetics. These open spaces, false ceilings, and large openings do not provide required compartmentation for fire safety. Thus, the probability of fire spread from one floor to
another via large openings increases as compared to normal buildings, as glass windows and false ceiling are prone to failure at high temperatures. Breaking of such large sized windows can provide immense supply of oxygen to fire, thus, aggravating the fire severity as well. Therefore, combination of high fuel load density and open architecture create ideal conditions for intense and rapid-fire spread in modern buildings.

In recent years, new construction materials are being developed to achieve high performance in terms of strength, stiffness, ductility and cost. Examples include, ultra-high-performance concrete with 6-8 times greater compressive strength than that of conventional concrete; high performance steel; and fiber reinforced polymers (FRP) which are non-corrosive, extremely lightweight, and stronger than steel. These new materials are often used in high rise buildings and have better strength and stiffness than conventional construction materials at normal temperatures. However, most of these materials undergo rapid degradation in structural properties (usually faster than conventional materials) at elevated temperatures which leads to lower fire resistance (Kodur, 2014; Firmo et al., 2015). Also, modern buildings consist of large quantities of plastic and vinyl-based materials which have high combustion toxicity, and therefore, increase risk to life safety.

Further, due to narrow streets, high traffic volume, and irregularly planned cities the response time for firefighting operations is significantly longer in most of the developing countries. This longer response time along with extreme reduction in flashover time in modern buildings [5 min vs 29 min (Kerber, 2012)] provides insufficient time for evacuation and firefighting operations, and significantly exacerbates the risk to life and structural safety. However, the current adopted fire safety provisions based on prescriptive based approach do not account for these factors.

4.2 Limitations of current building code provisions
In case of defining structural fires, most of the building codes and standards use standard fire curves (Figure 2) (ISO 834-1, 2012; Eurocode 1, 2004; ASTM E119-18, 2018). These standard fires are highly conservative and do not represent realistic fire scenario in building. No consideration is provided to fuel loads, ventilation openings, progressive burning, or localized fires; which play a key role in characterizing temperatures in post-flashover stage.

In case of active fire protection systems, prescriptive codes have limited guidelines on providing acceptable limits for functional and performance reliability of new/existing fire protection systems, and they lack a framework to assess the same. Further, there is a lack of rational provisions to standardize the qualitative and quantitative requirements of fire
protection systems such as sprinklers, smoke detectors, fire extinguishers, fire safety escape routes etc. For example, Figure 4 (Hagiwara and Tanaka, 1994) illustrates that for a similar number of inhabitants, the required width for fire escape stairway is significantly different in building codes of different countries. Due to these factors, most of the building codes and standards have significant differences in terms of the active fire safety provisions in buildings.

For passive fire protection systems, fire resistance of desired structural member or assembly is assessed under standard fire exposure at service load levels, simplified end restraints, and simplified failure criterion. The resulting fire resistance is extended to other members of different dimensions based on simplified correlations of experimental fire resistance with member dimensions, concrete cover to reinforcement, type of aggregate etc. These provisions are provided in the form of prescriptive guidelines to obtain desired fire resistance of structural or non-structural members. Most of these prescriptive guidelines offer very limited to no commentary on the accepted fire safety provisions which makes the comparison between such codal fire safety provisions very difficult. Also, there is significant variation in the predicted fire ratings of different codes for same member (Kodur and Hatinger, 2011).

Further, this traditional approach of evaluating fire resistance is often overly conservative and do not account for specific conditions in buildings such as varying fuel load, realistic fire and loading scenarios, compartmentation characteristics, member interactions, continuity, restraint conditions etc. Therefore, the experimental studies based on this conventional approach provide unrealistic response of the structural systems under fire scenario and should not be used to predict actual response of structures under fire. Also, no consideration is provided to the adverse effect of performance specific problems of new constituent materials (for e.g. spalling in high strength concrete), toxicity, and degradation in their corresponding material properties at elevated temperatures in fire resistance predictions.

4.3 Reliability of fire protection systems
Reliability of active fire protection systems is not 100 per cent and this inhibits fire detection in its growth stage, risks safe evacuation of inhabitants, and decreases the chances of extinguishing or controlling fire in its growth phase. On the other hand, improper functioning of active fire protection systems such as false alarms can cause disbelief in the
fire alarm, unnecessary panic, and valuable property damage (for e.g. water damage to sensitive furniture and paintings due to sprinklers).

Between 2012 and 2016, smoke alarms failed to operate for an average of 25,700 home fires per year which caused an average of 440 deaths and 1,440 injuries annually (Ahrens, 2019). Whereas, a comprehensive review on effectiveness of sprinklers indicate that general sprinkler system effectiveness in controlling fire ranges from 70.1 to 99.5 per cent (Frank et al., 2013). These variations can be different in different countries; however, there is significant lack of reliable statistical data, experimental, and analytical studies. Therefore, it can be argued that there is significant amount of uncertainty associated with the functioning of active fire protection systems.

In case of passive fire protection systems, the major reliability constrains lie in the holistic fire performance of the structure. Passive fire protection is often focused on individual elements, and it is assumed that if individual elements satisfy required fire resistance criteria, these elements will satisfy fire safety criteria in building assembly as well. However, it may not be the case always, as restraints to thermal expansion, continuity, load transfer mechanisms and redundancy in structural system inside building may enhance or aggravate fire resistance of the building components; which makes it difficult to assess passive fire resistance of the building assembly.

Other reliability constrains with passive fire protection systems lie in the use of thermal insulation materials. These insulation materials are used to enhance the fire resistance of new or existing structural elements, and there is significant variation associated with the performance of the same. This variation is primarily due to uncertainty in the adhesion of insulation material with structural element, varying thickness (in case of spray applied insulation systems), and due to lack of reliable high temperature material properties. It has been demonstrated by experimental and numerical studies that fire insulation undergoes significant delamination under dynamic loading, and it can significantly accelerate failure of the structural element under subsequent fire exposure in post-earthquake fire scenario (Arablouei and Kodur, 2016).

4.4 Limitations of firefighting
The available resources for firefighting vary from country to country and play a key role in minimizing fire deaths and fire losses. The effectiveness of firefighting depends mainly on three factors:

1. average response time;
2. quality and quantity of available resources (including firefighters) for firefighting; and
3. compliance effectiveness of fire safety regulations.

The response time is defined as the minimum time taken by the firefighting department to reach the fire site and start firefighting operation, after receiving the notification of fire incident. Shorter response time provide many advantages to life safety, as the chances of complete evacuation and quenching or controlling fire are higher in the initial stages of the fire. However, the average response time vary from few minutes to few hours in different countries. This high variation in average response time from country to country can be attributed to its dependence on high number of factors such as topology of area, firefighting equipment, traffic conditions, civic sense etc.

The second influencing factor on firefighting is the quality and quantity of available firefighting resources. For example, the fire brigade has a limit to the maximum height up to
which firefighting operations can be performed, amount of water it can carry etc. Therefore, even if the response time of fire brigade is short, firefighting may not be effective. Moreover, the standards of training for firefighters vary significantly from one country to another, and some countries do not even have trained firefighters at all (Brushlinsky et al., 2017). It should be noted that firefighting involves working in intense stress environments with high risk to life safety, and therefore, lack of proper training has direct impact on firefighting effectiveness.

Another important role of firefighting department is to inspect the compliance efficacy of fire safety regulations in buildings. However, many developing countries have no such provisions in firefighting department at all. Moreover, due to high initial setup and maintenance costs, firefighting department in many developing countries of the world struggle with quality and quantity of firefighting resources (Rafi et al., 2012), and sometimes firefighting department is not present at all.

4.5 Excessive cost of installation and maintenance
One of the major drawbacks of the fire protection measures is the high cost of installation and maintenance. Based on average percentage cost distribution of fire hazard for 16 countries from 2008 to 2010, it is observed that providing fire protection measures in buildings is the most expensive measure with a huge 39.6 per cent contribution to total fire hazard costs (Brushlinsky et al., 2016). Also, it should be noted that the direct and indirect costs contribute to only 22.4 per cent of the total fire hazard costs, and the rest 77.6 per cent of costs come from the cost of fire protection measures, fire insurance, and cost of fire service. It means that the cost of fire protection measures is significantly higher than the actual direct or indirect losses resulting from fire hazard, which clearly demonstrate the need for economically effective fire protection systems. The active fire protection systems such as sprinklers require constant maintenance and water resources as well, both of which may not be feasible in developing countries with limited water resources. This high cost of fire protection is the primary reason for moderate to no fire protection measures within buildings in developing countries.

4.6 Poor compliance of fire safety regulations
Even though number of fires in developed countries is significantly high than developing countries, still the death rate in developed countries is much lower than developing countries with lower number of fire incidents (Brushlinsky et al., 2016). One of the main attributes for this anomaly is the variation with respect to compliance effectiveness, degree to which fire safety provisions are implemented, of fire safety regulations in specified building codes and standards of each country. This is very important from fire safety perspective as the level of fire safety prescribed in codes and standards will not matter if it is not followed and implemented properly in the buildings. In developed countries (such as USA and Canada), specific provisions for measuring the code compliance effectiveness exist (Park, 2008). However, this may not be the case in many developing countries where fire safety regulations are always a major challenge due to lack of enforcing mechanism/awareness, resources and poor regulating environments. Such lack of effective measures of enforcing fire safety regulations can lead to inadequate fire safety provisions in buildings which results in high life and property losses.

4.7 Lack of consumer education and awareness
To identify major source of structure fires, the leading causes of fire in residential and non-residential buildings of USA has been analyzed (USFA, 2016), as maximum number of fires
in the world occur in USA and there is a scarcity of reliable global statistical data on fire hazard. Trends in leading causes of fires in residential and non-residential buildings are shown in Figure 5. It can be observed from Figure 5 that cooking is the leading cause of fire in both residential and non-residential building fires. Further, as cooking is more frequent in residential buildings, numbers of fires from cooking in residential buildings (about 160,000) are higher as compared to non-residential buildings (about 25,000). Apart from cooking, the other leading causes of fire include heating, electrical malfunction, carelessness, open flame and arson. However, it can be clearly observed from Figure 5 that relative to cooking, these leading causes contribute much smaller portion in fire hazard for both residential and non-residential buildings. These leading causes of fires can be addressed by increasing the consumer awareness about the fire hazards. Nevertheless, the current scenario clearly represents a lack of the same. It should be noted that these leading causes of fire in USA may not necessarily represent global fire scenario, however, it certainly illustrates the impact of consumer awareness on fire hazard.

5. Strategies for improved fire safety
One of the biggest limitations of existing fire protection strategies lies in not providing a holistic framework to mitigate fire hazard. Most of the building codes focus on management of fire hazard using active and passive fire protection features in buildings together with some emphasis on prevention, regulation, and enforcement. These protection strategies were

![Figure 5.](image)

Leading causes of fire in buildings from 2003 to 2016 in USA in (a) residential and (b) non-residential buildings
mainly developed for fire scenarios and construction practices of the 1960s and 1970s and do not take into consideration contemporary fire hazard challenges discussed in Section 4.

Similar trend is followed by recent strategies on improving fire safety in buildings as they lack a holistic framework and only focus on one aspect of fire safety in buildings such as: fire safety design, research needs, or the human behavior. Maluk et al. (2017) presented a study on exploring the potential benefits of integrating fire safety with building design process, as fire safety is perceived as an additional constraint in the current design practice rather than a design parameter. Gehandler (2017) proposed a theoretical framework to change traditional linear decision based fire safety design to an iterative deterministic decision based process. Kobes et al. (2010) studied the impact of human behavior on evacuation response under fire conditions, and concluded that more studies are required to properly understand the psychonomics related to fire safety. While these studies present an excellent case for improving one aspect of fire safety, they do not provide a comprehensive strategy to mitigate fire hazard itself.

Also, most of the newly developed strategies to improve fire safety are specific to type of building, location, and socio-economic conditions for which they are originally developed (Chien and Wu, 2008; Chen et al., 2012; Cowlard et al., 2013; Navitas, 2014; Nimlyat et al., 2017); which makes it difficult to extrapolate their results to global fire hazard. Therefore, an integrated framework encompassing prevention and management of fire hazard is proposed (illustrated in Figure 1), and its applicability in improving above limitations of existing fire safety strategies is demonstrated below. Further, special emphasis is given to the applicability of these strategies specific to place of application in both developing and developed countries.

5.1 Improving fire protection features in buildings
As discussed in Section 4, several adverse conditions exist in modern structures from fire safety perspective and this is not fully addressed in current fire protection provisions laid out in building codes. Due to several socio-economic differences, addressing these limitations require different strategies for developed and developing countries. In developing countries, cost is a major criterion for incorporating fire safety provisions; therefore, in place of costly fire safety strategies, alternate strategies should be developed to provide similar level of fire safety. Therefore, to avoid rapid growth of fire and to localize its impact in developing countries, it is proposed to use fire compartment concept (less use of glass and open spaces, limiting fuel load etc.) in building design. In case it is not possible to change building architecture, additional exit paths should be strategically located in building to improve egress timing, and thus, improve life safety. In all existing buildings, where it is not possible to provide additional fire exits, illuminating paint and additional exit signs can be provided along with temporary exit paths in terms of emergency ladders and staircases. Also, in all irregularly planned cities, reserved parking spots should be provided for firefighting vehicles in building sites along with maintaining active water mains, fire extinguishers, and a separate water tank to reduce initial start time of firefighting operations.

In developed countries, use of open architecture with high content of combustible fuel load should be justified using installation of reliable active fire protection systems, or realistic simulation of egress and fire resistance using advanced analysis procedures. Instead of relying on standardized prescriptive procedure to assess fire safety in buildings, it is preferable to use performance based fire design. Also, before using any new construction materials in buildings, it should be made mandatory to assess its performance under fire exposure.
On the other hand, one of the biggest limitations of building codes in practice is lack of uniform criteria for classification of structures. This can be fixed in both developing and developed countries by classifying buildings for fire hazard based on building design characteristics, potential of fire hazard, significance of building, and impact of fire hazard. Kodur and Naser (2013) have developed a framework to assess the importance and risk factor for design of bridges against fire hazard by assigning weightage factors to key characteristics of bridges. Similar approach can be applied to classify buildings into four categories as critical, high-risk, moderate-risk and low-risk. Other researchers have developed risk based analysis models to quantify fire risk in buildings as well (Xin and Huang, 2013), and a set of guidelines to identify critical structures can be defined in the national codes as per common consensus. This will promote uniform fire safety throughout country, and ease of classification as well.

Further, this risk-based classification should be integrated with building design using performance-based codes and standards to make building codes more effective in evaluating realistic fire performance of building. The provision of fire safety in each risk-based category should be justified on the account of classified risk, and special emphasis should be given to the use of cost-effective alternate strategies to attain desired level of fire performance. For example, only critical structures should be designed with highest factor of safety for worse possible fire scenarios. In high to low risk buildings, designers should be allowed to benefit from realistic fire scenario, loading, continuity, and actual restraint conditions which can lead to a less conservative and more integrated design.

5.2 Regulation and enforcement

Regulation and enforcement are one of the leading problems in developing countries which is often overlooked by current fire safety strategies. There should be a legal provision of severe fines/penalties which can be implemented using an appropriate mechanism. Such provisions do not exist in several developing countries, and according to authors is one of the leading causes of fire hazard in developing countries. For example, often the offset distances between buildings are not followed in most of the developing countries, and that leads to easy migration of fire from one building to other. Required active and passive fire protection measures are often compromised in building due to monetary constrains or from reluctance due to unawareness. In all such cases, the regulatory guidelines should be more stringent with higher fines in all such cases when occupants endanger the safety of others in the vicinity. Fire warden should be assigned to carry out annual inspections in all residential and commercial buildings for up keeping of fire protection features. Inspections should aim at ensuring fire loads to be below permissible limits, performance and functional reliability of fire protection features such as active water mains, functional fire extinguishers, unobstructed fire escape etc.

Also, in developed countries, regulation authorities should benefit from newly developed cognitive infrastructure, where active and passive fire safety measures in building are monitored continuously using automated sensors, to check for fire safety regulation and enforcement automatically (Naser and Kodur, 2018). This concept can be of great importance in high rise buildings, where all fire safety provisions can be monitored using automated sensors instead of doing it manually. Not only this will save significant time but will also increase safety through continuous monitoring of fire safety provisions instead of annual inspections.
5.3 Common and civic sense
Common/civic sense and public awareness is one of the most neglected cause of fire hazard and is the leading cause of fires in both developing and developed countries across the globe. Common sense includes keeping ignition source and fuel source away from each other, keeping household items with high potential of ignition away from the reach of children, proper dispose of inflammables, use of fire extinguishers, or taking other necessary precautions to avoid accidental fires. Civic sense or public awareness includes knowledge of fire escape routes and extinguishers, giving right of way to firefighter or other emergency vehicles, proper use of inflammatory substances (lighters, cigarettes, candles, etc.) in buildings, and understanding impact of fire hazard and individual responsibility in mitigating it.

Most of the fires can be easily prevented using common sense and public awareness in day to day life if properly implemented. Also, people can play a key role in reducing response time of firefighting operations by giving right of way to firefighters on roads, which can significantly improve firefighting operations. This common and civic sense among public can be greatly influenced in both developed and developing countries using consumer education for improving fire safety in buildings. Occupants should be provided basic knowledge of available fire escape routes, fire safety symbols, location of fire extinguishers, places of assembly in case of fire, and fire alarm. To ensure new occupants are familiar with emergency fire response, regular evacuation drills should be organized. In case of high rise/critical buildings where there is high risk to life safety, refuge floors (places of assembly in case of fire) should be provided and fire wardens should be designated on selected floors to prevent fire hazard. This awareness about fire safety in buildings should be disseminated using media, and mandatory fire safety curriculum in educational system.

5.4 Technology and resources
This section is applicable to both developing and developed countries. Technology and resources should focus on four main components:

1. reduction of response time;
2. developing new firefighting resources;
3. proper design and planning; and
4. learning from experience to update building codes.

Shorter response time is key to controlling fires as it is easier to control fire in its incipient or growth stage. In addition, shorter response time increases the chances of safe evacuation from building. Therefore, firefighters should be provided with adequate equipment and training to execute emergency fire drill with high efficiency. In developing countries, where number of professional firefighters is very less and it is not possible to provide required firefighting equipment due to monetary constrains, volunteer firefighters should be trained to ensure ample workforce for firefighting operations. These volunteers can further disseminate information about fire hazards to increase public awareness.

In developed countries, research should focus on developing new fire resistant materials and harnessing emerging technological advances for mitigation of fire hazard. For example, recent study by Olawoyin (2018) argued that nanotechnology, can be the future of developing fire resistant materials if it is tested and applied properly. However, there are several knowledge gaps in this field that need to be addressed. Çakiroğlu and Gökoğlu (2019) used virtual-reality to teach basic fire safety behavioral skills to a group of ten primary school students, and concluded that virtual reality significantly enhanced the fire
safety behavioral skills of students in real life. Similar studies should be pursued by developed countries to further enhance the field of fire safety. Whereas, in case of developing countries, research focus should be on finding new cost-effective alternatives to traditional automated and manual firefighting equipment.

Other important resource allocation in both developing and developed countries should be in proper design and planning. Firefighting department should maintain the building plan records of critical buildings classified in very high-risk category to properly assess the evacuation and firefighting operations in case of a fire. To further reduce response time in developing countries with irregularly planned cities, special emphasis should be given to the strategic location of firefighting department to ensure similar response time for all covered areas.

Also, it is important to periodically update the building codes based on experiences from previous disasters, new innovations in materials, design changes, and contemporary fire hazard issues. For example, if the recent trends in fire hazard represent a decay or increase in its severity, fire safety in buildings should be adjusted accordingly. The fire performance of new construction materials should be characterized and used in the fire design process. The impact of change in building design, due to modernization, should be assessed on fire safety, and contemporary fire hazard issues resulting from design, socio-economic growth and other factors should be identified. Updating building codes regularly for all these factors will allow them to evolve and improve along with fire hazard, and thus, increase their effectiveness.

6. Research and training needs
Major research and training needs to improve fire safety in buildings can be identified as: cost-effective active fire protection systems, rational fire design approaches, characterization of new materials, performance-based design guidelines, and fire hazard from wildfires.

6.1 Cost-effective fire suppression systems
Currently, most of the fire suppression systems (sprinklers, active mains, automated aerosol fire suppression systems etc.) have high installation and maintenance costs. For example, according to an NFPA estimate sprinklers cost about $14.5 per m² ($1.35 per ft² mean cost) in new construction (NFPA, 2013). Therefore, for a standard house with 204.3 m² (2,200 ft²) area total cost of installation alone is US$2,962 (approximately INR 200,000). This cost of installation is too high for developing countries with limited financial resources and low household incomes. Also, sprinklers incur additional costs in terms of maintenance as they require water main supply which is not easy to provide in developing countries with limited water resources. Therefore, there is a strong need to come with alternative cost-effective fire suppression systems.

6.2 Rational fire design approaches
Rational fire design approaches use advanced numerical models and focus on tracing realistic behavior of structural components under fire exposure. While some validated numerical models exist in literature (Kodur and Kumar, 2018; Kumar and Kodur, 2017; Kumar and Srivastava, 2017; Kumar and Srivastava, 2018), still, there is a lack of a framework for undertaking rational fire design of structures. The absence of well-defined rational design framework and validated numerical models for fire resistance assessment is constraining designers to create cost effective and rational designs. This is limiting the versatility of structural products and creating a hindrance in using their full potential in building applications. Therefore, research efforts should be focused on developing a generic
framework for undertaking rational fire design of structures. The availability of such framework will lead to innovative and cost-effective design of structures while ensuring better degree of fire safety as compared to current prescriptive approaches. Also, such an approach will allow fabricators to assess the fire resistance of structural members and assemblies before undertaking expensive and time-consuming fire tests in laboratories.

6.3 Characterization of new materials for fire performance
With new advancement in construction materials, there is a strong need to characterize and establish their fire performance under various fire design scenarios. Often, new materials bring new challenges to fire design process, which are widely overlooked by current prescriptive based approaches such as spalling of concrete, rapid strength degradation of FRP composites etc. Therefore, to ensure good fire performance of new construction materials, their behavior under fire conditions should be characterized prior to use in buildings. Most of the current research efforts are focused on characterizing strength degradation of new materials, however, there are limited studies on determining toxicity and combustibility of material. High toxicity can increase risk to life safety, whereas, high combustibility aggravates fire severity by causing rapid fire growth and spread. Therefore, research efforts should characterize all three fire safety aspects viz. toxicity, combustibility, and strength degradation; and then make informed decisions on the use of new materials in buildings.

6.4 Development of performance-based codes
While prescriptive based codes state how to construct a building, performance-based codes state how a building should perform under a wide range of conditions. Therefore, to develop performance-based codes for fire design it is important to define acceptable levels of performance for life, structural, property, and environmental safety. For life safety, code should provide acceptable limits for toxicity, combustibility, and egress parameters to ensure life safety during fire exposure. For structural safety, the performance parameters include structural response parameters under fire exposure such as deflection, integrity, insulation and residual strength. Performance-based codes should also provide guidelines to limit or minimize property losses under fire exposure by providing guidelines on detection and evaluation of residual strength of fire exposed structures (i.e. whether structure is reparable or not). Also, to minimize impact of fire hazard on environment, performance-based codes should provide acceptable limits for firefighting operations, and other factors

![Figure 6. Annual wildfires and acres of land burned in USA from 1999 to 2018](image)
influencing pollution. The availability of performance-based codes will not only allow a better understanding of fire design but will also lead to uniform fire safety provisions.

6.5 Fire hazard from wildfires

With the continuously changing habitat for humans it is important to account for all new factors that can contribute to the fire hazard. Wildfires represent one such example which have resulted from recent excessive human encroachment in wildlands. Recent trends in the number of wildfires occurred and burned area is illustrated in Figure 6. It can be observed from Figure 6 that higher number of wildfires in a particular year do not necessarily mean higher area burned as the impact of wildfire depends on available fuel and weather conditions. Therefore, even small number of wildfires can be very dangerous to built infrastructure if they transform into conflagrations. Also, there is currently very limited data in the literature on key differences in fire response of structure subjected to wildfires and building fires from within. As buildings are usually designed for a fire resistance of 2-4 h only, it is not possible or economical to design buildings to withstand wildfires which can last as long as few days to few weeks. Therefore, more focus should be on rapid evacuation instead of providing passive fire resistance. Also, there is a strong need to study the behavior of buildings subjected to wildfires as there is a scarcity of studies on the same in literature.

7. Conclusions

Based on the information presented above, the following conclusions can be drawn:

- Fire represents a severe hazard in both developing and developed countries and poses significant threat to life, structure, property, and environmental safety.
- Current fire protection measures lead to an unquantified level of fire safety in buildings, provide minimal strategies to mitigate fire hazard, and do not account for contemporary fire hazard issues.
- Implementing key measures that include improving fire protection features in buildings, proper regulation and enforcement of building code provisions, enhancing public awareness, and proper use of technology and resources are key to mitigating fire hazard in buildings.
- Major research and training needs required to improve fire safety in buildings include developing cost-effective fire suppression systems, rational fire design approaches, characterizing new materials, developing performance-based codes, and understanding fire hazard from wildfires.

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Student perceptions on using cell phones as learning tools
Implications for mobile technology usage in Caribbean higher education institutions
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Abstract
Purpose – This paper aims to examine students’ perception, views and opinions about the usage of mobile phones in an educational setting in a higher education institution located in Jamaica. The results of these findings were used to gain insights and to assist education policymakers in adopting most suitable approaches to integrating mobile technology in learning.

Design/methodology/approach – A survey approach was used for this study. A total of 145 students participated in the study using structured questionnaire design containing 14 questions.

Findings – The results indicated an overall positive student perception toward cell phones usage as a learning tool and integrating cell phones into learning activities. Students were keen on its usage as a social connectivity and collaborative tool, which they can use for flexible and personalized learning activities.

Originality/value – Less research has been done in Caribbean and developing countries in analyzing student perception toward using cell phones for learning purposes. This research provides insights in developing policies to assist with the integration of mobile phone technology in learning and how institutions can respond to the advent of advancing mobile technology.

Keywords Jamaica, Learning, Mobile technology, Student perception, Cell phone, Pedagogies, Caribbean, Developing countries

Paper type Research paper

Introduction
Mobile devices connected to the internet such as smartphones and tablets have become the choice platform for the millennial generation engaged in various internet activities. There has been spectacular growth in the global mobile market with projection of increases in ownership and penetration rates (GSMA Intelligence Report, 2016). The estimate is to be at 5.8 billion subscribers and 71 per cent penetration rate by the year 2025.

Advances in technologies and ICTs have led to greater use of mobile technology in the education sector, and particularly at the university level. Many institutions worldwide have started to experiment with various learning methods and integrating mobile phone use to facilitate students’ learning. The higher education sector has become increasingly
technology-driven. More developed countries are using modern advances in educational technologies and instructional design. These range from e-learning, distance education, Bring Your Own Devices (BYOD), use of online and social media, student response systems in classrooms, to now game-based learning, Web 2.0, simulation technology, three-dimensional apps and virtual classroom environments. These advances in conjunction with newer pedagogies such as adaptive, collaborative and hybrid learning styles are being used to enhance students' learning experiences. This has created disruption in pedagogical structure and framework of learning institutions resulting in noticeable shifts from instructor led to more student-learner centered, self-lifelong modes of learning. Universities in Jamaica and the Anglophone Caribbean have also embarked on initiatives to increase the use of technologies in their institutions in response to the emergence of these educational technologies.

For instance, University of the West Indies, the region's premier higher education institution in the English speaking Caribbean, with campuses located in Jamaica, Trinidad and Barbados, through their Centre for Excellence in Teaching and Learning have accelerated ongoing drive to sensitize and train lecturers in how to use mobile and other ICT technologies in the class setting. Recent developments such as the “Inaugural Teaching with Technology Showcase” (2014), e-book access for incoming graduate students allow for real time, interactive online and group study, and support services provided by MITS, the university’s information technology services leverage technology use to drive students’ IT requirements during their course of study, via the UWI Triple A Strategy (2017-2022).

Mobile and ICTs, therefore, provide many opportunities to create, deliver and support innovative methods of learning. Research points to the use of such technologies in facilitating collaboration and communication, enhancing creative and interactive learning styles and the development of tools, applications to aid in the delivery of educational content. Institutions, therefore, have to carefully weigh investments made in technology against the benefits realized by students and administration in adopting such technologies in learning environment. Technology implementation can create its own set of challenges and issues specific to each institution. This can represent substantial costs and resources expended to acquire potential benefits.

Hence, a study of students’ perception, views and opinions about the use of cell phones as a learning tool in class setting is an important consideration for university administration decision-makers for mobile technology adoption. Students’ user acceptance of mobile devices in the learning environment is even more critical for Caribbean and developing world institutions in the context of significant infrastructural, institutional, socio-economic and financial resource constraints.

The purpose of this paper is to examine students’ perception about the use of mobile phones in an educational setting in a higher education institution located in Jamaica. Research indicates that the study of various user acceptance models in developed countries is a useful technique in predicting successful adoption of technology in learning. Given our unique challenges and constraints, such studies on student receptiveness to mobile technology use in classroom scenario may better inform institutions how to integrate mobile phone usage into pedagogies and delivery modes to enhance student performance and learning outcomes.

This research embarked on an empirical approach by collecting data on a sample of undergraduate students and soliciting their perception about using cell phones in a class setting via survey instrument. To elaborate and investigate our main objective, we explored in further depth two areas:
(1) How do students perceive/rate their own use of mobile phone technology use and impact on their learning and academic performance?

(2) How do students perceive/rate their lecturers’ use of mobile phone technology use and impact on their learning and academic performance?

It is hoped that the results of this survey will provide useful insights of students’ views about mobile phone use in learning and benefit lecturers, facilitators and university administrators to craft suitable strategies for better implementation in the context of Caribbean challenges, with the ultimate objective of enhancing academic performance and ensuring region’s higher education standards are on par with developed countries. The ensuing sections contain the research methodology, analysis and discussion of the results along with recommendations for the future.

Literature review
Technology’s disruptive force has forced higher education institutions to rethink current cell phone policies and to spur innovative approaches to enhance student participation and involvement in the learning process. While much of contemporary literature seem fixated with the wide range of features and capabilities of these devices, others rightly focus on identifying those key properties and attributes, which can be incorporated and employed to learning delivery methods.

University students are especially heavy users of cell phones and this has implications for learning outcomes at the tertiary level. Institutions will have to place greater importance on using mobile technology resources efficiently to support learning. Research cites a number of common recurring themes regarding students’ positive perception of their devices’ capabilities in their educational pursuits. They offer more appeal to students with respect to the ease of access to search for information.

Internet connection enables students to use mobile phones as modern tools to collect and acquire knowledge, which creates further opportunities for learning while attending lectures. Primary benefits are enhanced communication and collaboration, along with greater interaction and increased learning irrespective of time or location.

Mobile devices belong to six categories such as smartwatches, mobile phones, PDAs, web pads, tablets and laptops (Sharples and Beale, 2003). Others classify mobile phones as one variant of portable digital assistants (PDAs), which is defined as any handheld device equipped with computer capabilities, which can be used to support educational objectives (Churchill and Churchill, 2008). These mobile devices facilitate students’ ability to communicate, interact, engage in discussions, store and record material for later use, give lecturers affordances to use mind mapping tools to better gauge how students think and process information. More importantly, they also facilitate higher-level thinking and computational skills.

In terms of pedagogical frameworks, there is the view that mobile phone features and attributes can be of significant value in helping to create new learning styles and methods. For instance, such devices can be used to design “collaborative, contextual and constructionist” (Patten et al., 2006) forms of learning.

The increasing use of mobile phone technology within the higher education context represents a paradigm shift in thinking about teaching and learning strategies. Existing pedagogical frameworks tend to assume that learning occurs largely in the context of a classroom setting. Many contend that mobile technology integration in learning upsets this notion and is spawning new pedagogies integrating its use inside and outside the university...
Mobile phones are enabling the “here and now” of mobile learning, i.e. the ability to practice authentic learning instantly irrespective of time or location. This type of ubiquitous learning has been shown to produce significant improvements in student performance, specifically with respect to higher enjoyment levels, greater “engagement, motivation, focus and enthusiasm” (Martin and Ertzberger, 2013). Others conceive its use in assisting with “seamless” learning styles, i.e. a type of smooth, unified integration of learning experiences spanning across many dimensions of the education experience, such as students’ exposure to formal/informal, social, physical and virtual learning context. Otherwise referred to as mobile-assisted seamless learning (MSL), it can be considered to an “all-in-one” approach, which produces benefits of context-based, personalized, socially engaged and multidisciplinary approaches to learning. In addition, with continued advances in technology, such methods are considered especially relevant for applications in virtual learning environments with the growing use of digital tools.

The literature also indicates the use of mobile phone device features to support more popular learning approaches in higher education, namely, lifelong learning and mobile learning (m-learning). The pedagogy of lifelong learning focuses on providing students with higher-order skills and competencies (i.e. critical thinking, adaptability, self-directed reflection, meta-learning, creativity and problem solving), which are required over a lifetime to succeed in a dynamic changing world (Bolhuis, 2003; Fischer, 2001). Supporting mobile technology tools ideally suited to the advancement of lifelong learning strategies as enunciated by Sharples (2000) include students’ ability to engage in collaborative and situated type learning as a response mechanism to adapting to changing environment, immediate accessibility to information, portability and personalized features to react instantaneously anytime, anywhere.

Directly emerging from mobile technology advancements, mobile learning (m-learning) is viewed as perhaps offering potentially the most exciting, futuristic and technologically advanced possibilities in revolutionizing the delivery of higher education in the immediate future. This is because mobile phones are exceptional learning tools in various educational settings (Ahmad, 2015, 2018a, 2018b, 2019a, 2019b). The ubiquitous nature of mobile technology combined with advances in ICT and wireless internet technology is considered to be the future of education technology and learning (Moreira et al., 2018; Peng et al., 2009).

Early development of mobile learning frameworks
Mobile tools have become important factors contributing to the “social, collaborative and situated elements of human learning” (Roschelle and Pea, 2002). Mobile phone, in particular, smartphones are particularly suited for collaborative and augmented learning styles (Martin-Gutiérrez et al., 2015). Such devices are regarded as vital technology support tools, which facilitate rather than replace normal methods of communication and interaction during the learning process, and hence, are essential in the creation of innovative learning strategies for university students (Naismith et al., 2004).

Others view the return on investment, cost-benefit analysis and cost-effectiveness approaches as more important determining factors in developing strategies around appropriate pedagogical approaches to mobile phone technology integration. It provides for “flexible pedagogies” (Gordon, 2014) by supporting and enhancing personalized, and blended learning methods. In terms of cost savings and long term benefits, it can also enable real value for all education stakeholders via mechanism such as virtual learning environments, peer and assessment tools without the requirement for additional amounts of
resource outlays. Mobile phone technology carries with it certain unique technical features, which present real cost savings for existing educational models. In evaluating the pedagogical impacts, both “technical and non-technical factors” (Sarrab et al., 2016) needs to be incorporated in measuring the quality impact. The entire gamut of quality performance (QUPER) factors including “flexibility, scalability, usability, maintainability, functionality, reliability, connectivity, performance, user interface, security, flexibility, scalability, usability and maintainability” (Svensson et al., 2008) will affect mobile phone adoption rates and more importantly, the receptiveness of education stakeholders to integrate it into learning. Mobile technology advances also increase students’ expectations about the delivery and access to quality education. Given the level of technology with advances in networking, internet and digitalization, students have higher expectations regarding access to lower cost and just in time modes of learning. Mobile phone technology offers this extra value from a pedagogical perspective in terms of organizing teaching and learning “on the go”, providing instant communication, collaboration, knowledge and assessment support. It is considered by some as a means of better satisfying the demands of learners while balancing the needs of institutions to provide cost-efficient quality learning outcomes in “supporting existing self-directed, interactive and constructivist pedagogical frameworks” (Rajasingham, 2011).

**Alternative pedagogical frameworks**

Given the ubiquitous nature of mobile phones and continued advances in technology, we have witnessed a gradual shift in thinking about the creation of new approaches to teaching and learning. Much of the discussion centers on the role of mobile phones in developing personalized, collaborative and authentic forms of learning to generate rather than enhance student learning experiences and raise higher education outcomes. The literature indicates a revolutionized approach to m-learning methodologies. There is increased recognition that mobile technology’s ubiquitous nature has led to learning inside and outside the class context, which has led to new learning opportunities. Some assert that both students and lecturers need to be receptive, aware and ready to adapt to this new dispensation to successfully implement new pedagogies surrounding mobile phone technology (Moreira et al., 2018).

Earlier applications of m-learning, drawn from a sample of research studies during the 2010-2015 period in US and developing world institutions, examined frameworks using cell phone integration in creating innovative learning styles, which facilitate individualized learning, anytime, anywhere, but which also allow for “unstructured” and “customizable” styles suitable to the learner’s need in any “situated and context aware” learning atmosphere (Gikas and Grant, 2013; Compton, 2013).

More recent developments have seen the creation of alternative pedagogical frameworks such as technological pedagogical content knowledge (TPACK), technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) models of mobile technology integration (Scherer et al., 2019).

The TPACK framework uses supporting mobile features together with three important knowledge domains, namely, technology (supporting tools), content (educational subject matter or materials) and knowledge pedagogies (best fit education methods) to deliver the desired learning outcomes. It is referred to as the three important knowledge domains, which requires teachers to be competent in all three areas in conjunction with the supporting tools to produce the best learning outcomes.

TAM attempt to explain factors, which account for acceptance and adoption of digital and mobile technologies in education. It examines such factors as perceived usefulness, ease
of use and attitudes as powerful influences for comparison with other models of technology integration.

One study conducted in a South African higher education institution applied this framework with the use of the popular mobile instant messenger (MIM) app, WhatsApp, in a learning context. This application affirmed a positive relationship between these factors and perceived usefulness of mobile learning. More importantly, the use of MIM enabled efficiencies with respect to accessibility, timeliness, quality and relevance of data, which are regarded as key factors in perceived usefulness and enhancement of flexible, collaborative learning environments (Bere and Rambe, 2016).

The UTAT framework are essentially theoretical models, which try to explain the mechanism behind determining the factors contributing to technology adoption, i.e. users intentions. These factors are heavily influenced by social, psychological and behavioral factors such as performance and effort expectations, social influence and facilitating factors, which, in turn, can also be affecting age, gender and experience levels (Taherdoost, 2018; Williams et al., 2015).

The literature points to the wide differences among institutions within regions and countries with respect to these acceptance factors. These may be impacted by technology factors (e.g. security, privacy, compatibility, etc.), institutional and organizational issues (e.g. readiness, resistance to change) and quality issues in institutions located in the Middle East, Asia and Latin America (Almaiah and Al Mulhem, 2019), to developing countries in the Caribbean (English speaking Guyana, Trinidad, Jamaica, Barbados), which identify specific cultural, social and country-level differences “moderating UTAT effects” (Thomas et al., 2014, 2013).

Use of Smart Mobile Pedagogies in response to latest technology advances

Rapid and dynamic evolution of technology, particularly in the mobile space will continue to generate new theoretical frameworks and experimentation about integrating mobile technology in higher education. Latest literature attempts to predict how higher education institutions will respond in the near future with the advent of higher-level: “smart technologies” such as the pending implementation of 5G wireless mobile internet services, edge computing, the internet of things, mobile cloud computing services, and the use of mobile support tools, such as wearables for application in augmented and virtual reality learning environments (Khan et al., 2019; Sergio Fortes et al., 2019).

The result is a paradigm shift in thinking and approach to learning from prior traditional, lower technology integrated, teacher led models to use of more “highly adaptive, customizable ubiquitous, mobile learning technology supported tools and devices,” which empowers and affords learners to adapt their learning experiences to suit inside and outside the classroom environment.

This would need teachers to keep current with emerging mobile and digital technologies, but also to have the needed institutional and infrastructural support to enable adequate preparation and adjustment of pedagogical approach to support learner-centered styles.

From a practical perspective, educational researchers are beginning to see glimpses of hands-on application of these smart pedagogical approaches with the development of “smart campuses” (Fortes et al., 2019) and “smart teaching platforms” (Xu et al., 2019) based on 5G Mobile technology and other tech advances in Chinese and Spanish education systems.

Experimentation with 5G in the Chinese university and college system has seen an explosion of mobile and online teaching network models heavily supported by government and university administration. Such testing in Chinese higher education are producing benefits in terms of students’ ability to access to materials and instructions via mobile
distance teaching, real-time impact monitoring and adjustment of teaching approaches, emergency communications and real-time access and navigation of learning databases (Xu et al., 2019).

Caribbean and developing world response to technology advances
The big question is how will Caribbean and developing world HE systems respond to this new wave of tech advances? How will they adjust or revamp pedagogical approaches to teaching and learning with continuous tech disruptions in a dynamic twenty-first-century learning environment? Much has already been written about the constraints to technology adoption in higher education and the factors contributing the digital divide between developed and developed countries (Nye, 2015; West, 2015; Thomas et al., 2013).

Latest research work conducted by International Telecommunications Union (ITU) and the GSMA Digital Inclusion in Latin America and The Caribbean Report, 2016, speaks to the concerns about “digital inclusion” for developing country institutions with the incorporation of 5G, IOT, cloud and edge computing in learning and other spheres of life (ITU Report, 2019; GSMA Intelligence Report, 2016).

Digital inclusion is especially important for developing economies to meet vital sustainable development goals (SDGs) pertaining to the attainment of basic health, educational, social and economic objectives of lesser developed states. Concerns about access, affordability, pricing of more sophisticated and higher quality technology brings into sharper focus the challenges faced by developing states (Noll et al., 2018).

Over the past five years, a number of innovative initiatives have been implemented by regional institutions to integrate mobile technologies at tertiary level. Many of these spearheaded by the UWI’s Centre for Excellence in Teaching and Learning, which have deployed deliberate strategies to continually sensitize teachers to new “innovative pedagogical strategies incorporating twenty-first-century technology.” Recent focus has been on the use of collaborative and cooperative learning approaches to achieve higher learning outcomes.

Examples of specific approaches to introducing technology tools include workshops, presentations, and round table discussions on the use of Skype and Google apps in teaching and group work monitoring, using Web 2.0 technologies (e.g. blogs, wikis, podcasts, social networking) and mobile learning techniques in classroom setting. In addition, there has been much sensitization by the university’s information technology services department (MITS) about the impact of new media technologies in higher education (UWI, Centre for Excellence T&L, 2014).

Research method and design
A survey approach was used for this study. A 12-item survey covering three constructs was used. Four survey questions comprised each of the following constructs: perception of fairness of university cell phone policy, perception of lecturer initiated educational cell phone applications and perception of student initiated cell phone educational applications. Responses were based on a six-point Likert-type scale with the neutral response omitted. Respondents selected one of the following responses for each question: strongly disagree: 1; disagree: 2; slightly disagree: 3; slightly agree: 4; agree: 5; strongly agree: 6.

The data was collected from a group of students attending The University of the West Indies in Jamaica. A total of 145 surveys were distributed of which 144 participants responded. This comprised of 71 males and 73 females ranging in ages 19-22 years. All were enrolled in an undergraduate degree program with 63 (44 per cent) being 1st-year students, 13 (9 per cent) 2nd year and 68 (47 per cent) 3rd year students.
All the information gathered was at the convenience of the researcher. Participation was voluntary and no personal or identifying information was gathered to ensure confidentiality and high participation rate. The demographic statistics of the respondents are summarized in Figures 1-3 below.

Procedure

The survey questionnaire was used to gather participants’ perception of cellphone use as a learning tool in the classroom setting. The survey instrument was divided into two main sections.

Section I

The first section was used to obtain information relating to cellphone use and access, ownership and demographic facts.

Figure 1. Gender composition of students

Figure 2. Academic standing

Figure 3. Student age group
Section II
The second section sought to enlist specific student perceptions and views on cellphone use in education by posing 12 questions. These questions were divided into three subsections of four questions each which focused on themes regarding students’ perception of the usefulness of cellphones in learning and educational activities.

The three subsections questions centered on the following topics:
1. Satisfaction with School Policy.
2. Perception as Teacher Initiated Learning Tool.

The results were then presented in a number of tables along with important calculated indicators. The analysis was used to gain important insights into response trends and patterns within the data.

Specifically we looked at the following indicators:
- The highest average/percentage form of agreement (all categories).
- The highest average/percentage form of agreement (within category).
- The highest average/percentage form of disagreement (all categories).
- The highest average/percentage form of agreement (within category).
- The ratio of unfavorable vs favorable (of 12 questions).

The results were then used to discuss the findings in a number of ways:
- Firstly and most importantly we used it to find out the possible factors, which influence student perceptions about cellphone use as an educational learning tool.
- How these perceptions differed from the researchers “anticipated” perceptions.
- How these findings could be incorporated into policy and implemented for mobile usage in the classroom.
- Finally, we compared to what extent our results concurred or diverged from other research findings in other countries.

Results
The findings for the first section of the survey instrument are presented in the following Figures 4 and 5.

Section I
The overwhelming majority of students (97 per cent), own a cellphone and indicates the high mobile penetration rates in Jamaica and other developing countries in Latin America, Caribbean, (West, 2015). The results show that cellphone usage, access and ownership patterns are generally consistent with those in other countries.

Figure 4, shows that the largest numbers (132 and 128), use cellphones for calling and texting and reinforces its importance as a vital connectivity and socialization tool. What is interesting is the large numbers (101, 93 and 52) who utilize it as a clock, an important time management and emergency back- up tool.
Section II
The results are summarized in the following figures and tables. It shows the results per category with responses to each of the four questions posed.

For the first category pertaining to school policy with cellphone, we found a strong awareness of the rules and guidelines, which stood at 90 per cent. With regards to the fairness of the policy and fairness of the sanctions for breach of policy, a majority of 58 per cent in both cases indicating a favorable response.

However, the greatest negative response was for the freedom to use cellphones anytime, which recorded a 76 per cent unfavorable response. It is interesting to note that notwithstanding a strong awareness of the policy (55 per cent), a high 32 per cent registered strong disapproval with not being allowed to use it at any time (Figures 6 and 7, Table I).

With regards to using the cellphone as student-initiated tool of learning, three out of the four questions posed in this section received higher positive response than negative. The highest favorable response of 84 per cent thought it is an excellent idea to use it as a collaborative tool with other students, followed by a 79 per cent positive rating for its use in seeking teacher assistance.

However, students were not enthusiastic about using cellphones to submit assignments to teachers, which registered a 55 per cent combined unfavorable response.

We should note the very strong agreement ratings of 24 per cent and 23 per cent respectively for its use in seeking teacher assistance and collaborating with others on projects, which points to its perception as an important interaction and engagement tool (Figures 8 and 9, Table II).

The final category was the only one, which returned more favorable than unfavorable responses to the questions posed. In fact, all questions returned in the range of 64-75 per cent
positive rating relating to the perception of use of cellphone as a teacher-initiated learning tool. Students strongly agreed that it could be used by instructors to provide feedback (18 per cent), followed by its use as an educational tool (15 per cent) and encourage students’ participation in educational activity (13 per cent).

Table I. Mean and SD–satisfaction with school policy

<table>
<thead>
<tr>
<th>Response</th>
<th>Awareness of policy</th>
<th>Fair cell phone policy</th>
<th>Freedom to use cellphone anytime</th>
<th>Fair breach policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total respondents</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>Mean</td>
<td>5.2</td>
<td>3.7</td>
<td>2.4</td>
<td>3.6</td>
</tr>
<tr>
<td>SD</td>
<td>1.3</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Implications for mobile technology usage

Figure 6. Response to satisfaction with School Policy

Figure 7. Favorable vs unfavorable response
**Figure 8.** Perception as student initiated learning tool

<table>
<thead>
<tr>
<th>Used by students to seek teacher assistance on assignments</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>35% 6% 20% 10% 24% 5%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used to collaborate with other students on class projects</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>36% 7% 25% 6% 23% 3%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used to submit assignments to teachers</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>18% 22% 15% 18% 12% 15%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used by students obtain peer tutoring</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>31% 11% 26% 11% 12% 9%</td>
<td></td>
</tr>
</tbody>
</table>

- Agree
- Disagree
- Slightly agree
- Slightly disagree
- Strongly agree
- Strongly disagree

**Figure 9.** Favorable vs unfavorable response—student initiated learning tool

<table>
<thead>
<tr>
<th>Used by students to seek teacher assistance on...</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>79%</td>
<td>21%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used to collaborate with other students on class projects</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>84%</td>
<td>16%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used to submit assignments to teachers</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>45%</td>
<td>55%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used by students obtain peer tutoring</th>
<th>Student Initiated Learning Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>69%</td>
<td>31%</td>
</tr>
</tbody>
</table>

- Form of agreement
- Form of disagreement

**Table II.** Mean and SD—perception as student initiated learning tool

<table>
<thead>
<tr>
<th>Response</th>
<th>Used by students obtain peer tutoring</th>
<th>Used to submit assignments to teachers</th>
<th>Used to collaborate with other students on class projects</th>
<th>Used by students to seek teacher assistance on assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total respondents</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>Mean</td>
<td>3.9</td>
<td>3.4</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>SD</td>
<td>1.5</td>
<td>1.6</td>
<td>1.3</td>
<td>1.4</td>
</tr>
</tbody>
</table>
The highest mean of 4.2, percentage favorable (75 per cent) and lowest unfavorable response of (25 per cent) was mobile phone use to provide feedback, which again indicates its perceived importance by students as a vital interaction and engagement tool.

In summary the question, which received the highest percentage favorable response was the student awareness of cellphone policy, which stood at 90 per cent. On the other hand, the question, which garnered the highest percentage unfavorable response is the freedom to use cellphone at any time. It is interesting to note that these fall in the first category relating to policy (Figures 10 and 11, Table III).

In addition, out of the 12 questions posed, 10 received generally more favorable than unfavorable responses, while two received more unfavorable than favorable responses as summarized in Figure 12 below.

Findings
The results of our study revealed a number of interesting findings. Students’ perception regarding cellphone use as a learning tool was generally positive. In 10 of the 12 (83 per cent) questions posed returned a more favorable than unfavorable rating regarding its adoption. A number of important patterns or trends emerged, which contributed to students’ views. We see from Figure 12 that students place the greatest premium on mobile phone use for collaborating (84 per cent), communicating (75 per cent) and seeking teacher assistance (79 per cent).

This finding confirms previous research studies, which attest that students view the adoption of cellphone in classroom environment as an important collaboration, communication, accessing and information sharing. Students place a high priority on its use as a source of greater interaction and encouraging higher levels of engagement. In addition, they leveraging cellphone technology features as a means to a complement and enrich the learning experience and collaborate outside the classroom (Biddix et al., 2015; Andrews et al., 2015).
Table III.
Mean and SD—perception as a teacher initiated tool

<table>
<thead>
<tr>
<th>Response</th>
<th>Used as educational tool</th>
<th>Used by students in surveys</th>
<th>Used by teachers to provide feedback</th>
<th>Used by students to compete in educational activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Respondents</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>Mean</td>
<td>3.9</td>
<td>3.7</td>
<td>4.2</td>
<td>4.0</td>
</tr>
<tr>
<td>SD</td>
<td>1.6</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Summary of Favorable and Unfavorable Response Rating

<table>
<thead>
<tr>
<th>Response</th>
<th>Form of agreement</th>
<th>Form of disagreement</th>
<th>More favorable</th>
<th>More Unfavorable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of Cellphone Policy</td>
<td>90%</td>
<td>10%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Fair cellphone policy</td>
<td>58%</td>
<td>42%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Freedom to use cellphone anytime</td>
<td>24%</td>
<td>76%</td>
<td>Favorable</td>
<td>Unfavorable</td>
</tr>
<tr>
<td>Fair cellphone breach policy</td>
<td>58%</td>
<td>42%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used by students obtain peer tutoring</td>
<td>69%</td>
<td>31%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used to submit assignments to teachers</td>
<td>45%</td>
<td>55%</td>
<td>Favorable</td>
<td>Unfavorable</td>
</tr>
<tr>
<td>Used to collaborate with other students on class projects</td>
<td>84%</td>
<td>16%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used by students to seek teacher assistance on assignments</td>
<td>76%</td>
<td>24%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used as Educational tool</td>
<td>64%</td>
<td>36%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used by students in surveys</td>
<td>65%</td>
<td>35%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used by Teachers to provide feedback</td>
<td>75%</td>
<td>25%</td>
<td>Favorable</td>
<td></td>
</tr>
<tr>
<td>Used by students to compete in educational activity</td>
<td>69%</td>
<td>31%</td>
<td>Favorable</td>
<td></td>
</tr>
</tbody>
</table>

Figure 11. Favorable vs unfavorable response—teacher initiated learning tool

Figure 12. Summary of favorable and unfavorable response rating
Although less research has been conducted in developing countries, we find that the study confirms that students in this region are no different in displaying their worldwide affinity and comfort with the use of mobile technology. Also similar to findings in developed countries, we find that a strong awareness of the rules regarding restrictions on use of cellphones in class at 90 per cent with lesser support agreeing to the fairness of the policies and sanctions imposed for breaching the guidelines. The author is not surprised about students’ knowledge of the guidelines and policies while registering strong opposition with restrictions placed on the use of cellphones at any time.

This researcher was somewhat surprised to find more students returning unfavorable (55 per cent) response to the use of cellphone for submitting assignments to teachers. This author would have expected that as a student-initiated tool, it would have been perceived as a means of fostering greater levels of student-teacher engagement.

However, this affirms earlier studies in developed countries that students in this part of the world also place greater priority on its use as a social connectivity, social networking and communication tool, which can be used in any context at any time, often “blurring the lines between formal and informal learning” (Pedro et al., 2018).

For Caribbean students and the majority of mobile phone users in the developing world, portability and affordability are especially unique advantages, and is vital for maintaining important business, customer and personal “linkups” (Horst, 2006; Horst et al., 2005).

**Implications and recommendations**

Advances in technology will continue to unravel higher education systems. Education policymakers will have to continuously rethink their pedagogies and models in the age of technology and the digital revolution. We see from the survey results that students are more responsive to using cell phones along with learning methods, which enhance communication, collaboration and sharing of learning experiences.

More importantly, mobile technology is making demands on the system for learning styles, which are more highly personalized and customized to the learners needs. Learning is increasingly taking place outside formal learning environments, and hence, institutions will have to adjust to this new shift in delivery methods.

Currently, what also seems to be evolving are rapid shifts in the nature of the global economy with the emergence of “on demand, collaborative, sharing economies” along with advances in digital and mobile technologies (5G wireless, mobile cloud computing, etc.), which is creating an intersection between learning, technology and economic systems.

There is the view that higher learning institutions will have to build strong educational ecosystems driven by technology to meet the needs of this “on demand economy” and specifically to cater to young millennial and Generation Z students’ demand for educational services, which are personalized and customizable. At one extreme end, is a vision of future learning pedagogies based on “platform learning” (Means, 2018) using mobile tech and other advances to integrate “on demand learning” and “on demand work” for this new economic system.

Others view the integrating newer advances in technology (smart technologies) with existing pedagogical frameworks but developed in a more seamless fashion (smart pedagogies) as the solution to deliver more student centric, socially collaborative, self-directed learning styles. For our purposes, regional higher institutions must have the ability to access and leverage advances in mobile technology irrespective of our economic, social or institutional strictures to reap the benefits of high-quality learning systems.

Integrating mobile technology with learning methods, which emphasize self-directed, lifelong and flexible learning while augmenting these with some degree of instructor led
activities can lead to significant savings and value without compromising on quality educational outcomes if the following strategies are integrated (Cuesta Medina, 2018):

- Ensure that teachers acquire new teaching skills, which emphasize interaction and assessment of students.
- Teachers should adopt more the role of facilitator, and maintain effective “facilitator-student” metrics.
- Institutions must have monitoring and assessment mechanisms to measure learning outcomes over time.

With respect to newer technologies, 5G mobile wireless technology presents an especially pressing concern for developing countries. Some innovative initiatives to ensure greater digital inclusion and sustainable development goals with respect to education should be considered.

For instance, the “internet light” concept (Noll et al., 2018) introduced via a partnership between more developed western European counties and some African countries, uses network slicing of distributed network systems to share certain content (e.g. educational material). Caribbean institutions could also consider increasing using such partnership initiatives as cost-effective ways to ensure mobile digital inclusion with the advent of new technologies.

The future of higher education is changing where new methods are being used to engage Millennials in business (e.g. CSR) and in education (e.g. artificial intelligence and other technologies) (Ahmad, 2019c; 2020; forthcoming-a, b). I close with the thought that the future of “classrooms” would have students sitting from different departments trying to solve problems using their interdisciplinary and entrepreneurial approach.

**Limitations and future research direction**

Only one university has been used in this research, which is one of the major limitations of this study. The author’s future research direction is to replicate this study in other universities and also include student interviews in future research.

**References**


Further reading


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Awareness of financial institutions’ employees towards Islamic finance principles in Russia

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Ahmad Rafiki
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Department of Business Administration, University College of Bahrain,
Manama, Bahrain

Abstract
Purpose – This study aims to evaluate the awareness level of Islamic finance principles among employees of financial institutions in Moscow, Russia.

Design/methodology/approach – A quantitative method is used with a Likert scale questionnaire. A survey was conducted to 310 financial institutions’ employees to determine the level of their awareness of major Islamic finance principles. The sample population is selected using the judgment sampling technique. A descriptive analysis with frequency, percentage and weighted mean are used to analyze the data.

Findings – The study finds that the level of awareness of financial institutions’ employees towards Islamic finance is low. This is probably due to the minority of the Muslim population and geographically far from the countries where Islamic finance is being implemented. All respondents have a good education background, thus implementing some training sessions for its employees or hiring some outside specialists could transfer the knowledge and widespread the adoption of Islamic finance instruments.

Originality/value – The academic institutions such as universities in Russia could play a pivotal role to offer Islamic finance-related subjects, while the government as a regulatory body, should support the Islamic finance initiatives.

Keywords Awareness, Employees, Financial institutions, Moscow, Russia, Awareness

Paper type Research paper

1. Introduction
Today, people live in the fast-changing world – the world where everything changes from personal values to geopolitical environment. Not that long ago the world observed the fall of...
communism with Soviet Union collapse as an alternative to capitalism. This event left the world economy with only one financial system – free market system. In 2008, this system was deeply shaken by the financial crisis that influenced absolutely everyone on the planet. Some researchers drive a parallel between the collapse of United Soviet Socialist Republic (USSR) and economic difficulties in European Union.

We make a point by point comparison with Europe today, and come to the conclusion that its situation does not differ all that much from the imploding USSR. As a matter of fact, the parallels are often startling (Goldonomic, 2011).

This crisis became systematic with much more rapid collapses. This instability of the world economy hits first those that are at the bottom level of economic chain. These people pay the biggest price for the mistakes of government leaders and economists who blindly follow their greed and unstoppable desire to consume. These people pay the price of lost jobs, broken families and lives, unachieved goals and dreams. This unstoppable financial crisis had “foreclosed” one of the most expensive things that people had – hope.

International economy clearly needs to evolve. It needs an alternative way of running the world economy with some fresh ideas. These ideas could be taken from Islamic financial system. The Islamic financial system is still relatively very young and small. For example, during the crisis in 2008, the size of Islamic banking sector was only US$750bn in 75 countries (Sanusi, 2008). The fact that Islamic financial instruments are widely present in most of the countries that are considered as financial leaders in the world economy and that most of the biggest banks already opened their own branches that operate according to Sharia principles clearly show that there is a demand for Islamic financial products and services. It also could be used in combination with existing world financial system to develop a new and more effective financial system.

Today, there are already many Islamic financial institutions all over the world. Most of them are located in Muslim countries. However, with the rise of Muslim population in the western countries, Islamic financial services became available in many western countries as well. For example, there are 25 Islamic financial institutions in the UK and 20 in the USA as of 2010 (Nazim, 2011).

It is clear that there is a huge potential for the development of Islamic financial system in Russia and that most of the financial institutions in Moscow are very interested in Shari‘ah-compliant financial instruments but unfortunately cannot develop steps needed to begin working in that direction because of three main reasons (Niyazov, 2009).

First, the biggest financial institutions are owned by the Russian government and cannot implement such decisions regarding their involvement into Islamic financial industry without a political will from the government. Therefore, there is a need of a political decision made by the Russian political leaders to begin the preparation of a government plan to develop an infrastructure for Islamic finance.

Second, there are no specialists in Moscow financial institutions that could develop segments in these institutions, such as independent Sharia Supervisory Board that is needed for development of Sharia-compliant instruments. Therefore, these institutions must either hire capable employees from abroad or develop trainings for their own employees in Islamic finance field.

Third, there is no a judicial infrastructure available in Russia for financial institutions to implement Shari‘ah-compliant instruments. Russian banks cannot issue most of the Shari‘ah-compliant instruments in Russia because it goes against Russian laws – especially Tax law. Therefore, without such an infrastructure, Russian financial institutions must use foreign infrastructures to offer Shari‘ah-compliant financial products. Again, to develop
such an infrastructure there must be a political decision and an involvement of Central Bank of Russia. At this point, there is a prohibition for Russian banks to participate in manufacturing, trading and insurance activities (Zabrodin, 2013). This crucial fact makes it very difficult or even impossible for Russian banks to participate in such Islamic finance instruments such as Murabahah, Istisna and Takaful, which are some of the most important Shari’ah-compliant financial instruments.

For example, Istisna is a manufacturing/construction contract where producer must produce a certain product using its own materials and deliver it at an agreed fixed price at a certain point of time with an agreed quality and quantity. This contract is very important for Russian economy since there were many construction projects that took place in Russia such as Winter Olympic Games in 2014 in Sochi, World Cup 2018 and other infrastructure and tourist projects all over the country. Istisna, especially when it is structured as Sukuk, could bring in financing from wealthy Islamic countries such as the GCC countries.

Based on the above background and problems, this research focuses on the level of awareness of Islamic finance principles among Russia’s employees in Moscow financial sector, which is one of the problems claimed by Niyazov (2009) that hinder the development of Islamic finance in the country. The result of this study is expected to be used as a key indicator of the platform for development of Islamic financial system in Russia since Moscow is the capital of the country. The evaluation of level of awareness of Islamic finance among employees of Moscow financial sector is important for the industry players to understand the current status; so that they are capable of determining further steps to be taken to develop Islamic financial instruments. It also can be used as a means to determine the need of trainings and/or bring specific specialists in the field from abroad. This study is also beneficial for people that work in the financial sector by providing a good picture of the level of awareness in Islamic finance among employees in Moscow financial sector (Neary, 2013).

2. Literature review

2.1 Islamic finance development

More and more economies with conventional financial system are starting to work with Islamic financial institutions due to the increasing value of trade and investment activity in the past years with Muslim countries and possibility to attract some financing from the oil-rich GCC countries (Ayadi and Gadi, 2012). Every country in the Gulf that had acquired some shares of the world natural resource market began to grow economically and some of the most luxurious projects such a Burj Al Khalifa took place. According to Williams (2013), in the Middle East, there were planned development projects in total worth of US$1.56tn in 2013. This is an important financial indicator that represents the growth of the economy in the region. Most of these projects required financing from the government, mutual funds and some private investors. As a result, some of these financial transactions were structured in accordance with Sharia principles.

It is not a surprise that the wealth of GCC countries is derived from the sale of oil-based products. Overall, as the GCC production of oil fell by 1-2 per cent, the GCC economic growth fell to 3.6 per cent in 2013 from 5.4 per cent in the previous year (Nazim, 2011). However, these are still very good indicators comparing to very low economic growth of most of the western economies.

Nazim (2011) mentioned that Islamic financial industry grew by 7.6 per cent or US$58bn in 2010 and continued to grow in 2013 by at least 10-15 per cent annually. This economic growth of the GCC and forecasted development of Islamic financial sector indicate that there is a potential to grow and export Islamic financial services and products to the neighboring
countries. Such countries could very well be from the former USSR states known as the CIS region. Russia as the biggest and most influential country among the states of former USSR could be the most potential country for the development and implementation of Islamic finance.

There is a huge potential for the development of Islamic finance in the CIS region. At this point the biggest player in Islamic finance among the CIS countries is Kazakhstan. There are two primary reasons why Kazakhstan is the leader in Islamic finance among the former USSR states. First, Kazakhstan’s laws became suitable for issuance of Shari’ah-compliant securities after Kazakhstan’s government adopted a legislation to facilitate Islamic banking and finance (Maggs, 2011). This is a very important matter since there is no need to conduct any reforms today to make an issuance of Shari’ah-compliant securities possible. Any reform that is directed specifically to allow a development of Islamic financial system must have a political and social resonance. This is a very sensitive topic because the population and some neighbors such as Russia are very skeptical when it comes to any movement towards “Islamisation” because of the lack of understanding what Islamic finance is and what positive economic value it can bring to the country. During the past years, in Kazakhstan, the legal framework was created to make it easier to work with Sukuk, Mudharabah, Musharakah and Ijarah instruments. This is especially important in the field of taxation.

Second, Kazakhstan has a large Muslim population which represents 47 per cent of total population of over 17 million people[1]. Despite all the tensions in the southern parts of the country, there is a potential for growth of Shari’ah-compliant financial products and services. In simple words, there is a demand for such products and services. As the golden rule of economics states when there is a demand there is a supply. In July 2012, The Development Bank of Kazakhstan (DBK) issued a US$75.5m five-year Sukuk Al-Murabahah to Malaysian and Kazakh investors. The DBK is owned by the government. This security was listed on Kazakhstan Stock Exchange. During the preparation of this offering, a decent amount of time was spent on educating financial institutions regarding Islamic instruments, especially Murabahah structure (Lee, 2012). The most important thing is that Kazakh’s government and central bank were eager to help and complete this transaction. This is a key indicator that Kazakhstan continues to attract more investors using Islamic financial instruments and that it holds on to the leadership in CIS region for Islamic finance.

On the other hand, in September 2011, the first successful deal with Murabahah was closed in Russia between AkBarz Bank (Russia) and Islamic Development Bank (Saudi Arabia) to obtain a US$660m Shari’ah-compliant financing to fund an infrastructure project (Ak Bars Bank, 2012). However, the second-largest bank in Russia – VTB was preparing to raise US$200m by issuing Sukuk but unfortunately, these plans are still unrealised. Similarly, Gazprombank, which is the part of Gazprom Group, which, in turn, is the largest gas exporter in Russia and the second biggest company after Rosneft, announced in 2011 that it was planning to arrange Shari’ah-compliant deals with Russian companies to obtain financing. Unfortunately, these plans did not go through (Y-Sing and Ho, 2013). Finally, Tatarstan region in Russia was planning to issue Sukuk in 2013 to attract US$1bn Shari’ah-compliant financing during five years for its project called Smart City Kazan – a 650-hectare development. Again, these plans were constantly being delayed[2].

All these attempts in Russia to get involved in Islamic financial system and become a leader in the industry in the CIS region had failed because there is no Islamic finance infrastructure in Russia as well as insufficient specialists in this field. Therefore, all the deals with Shari’ah-compliant financial instruments involving Russian companies must go through Luxemburg, London and other foreign platforms. The government of Russia shows
no intent to make any reforms to allow Islamic financial infrastructure to develop in Russia. There is also a clear negative attitude towards Islamic finance because of the terrorist activity in North Caucasus regions such as Dagestan and Chechnya. The population, as well as the government officials, do not fully understand the potentials of Islamic finance and consider Islamic finance as something that could destabilise the situation in the regions in which Muslim population is significant.

Since Russia has the biggest population among the CIS countries and 15 per cent of its population are Muslims there is a demand for Shari’ah-compliant products and services. In addition, Russia is also very rich in natural resources and there are many construction projects that could have been very attractive for investors that prefer Shari’ah-compliant instruments such as Ijarah or Sukuk. There is a huge potential in Russia for Islamic finance development but unfortunately, this is still only a potential while many of Russian neighboring countries such as Kazakhstan and Azerbaijan are actively getting involved in Islamic financial system.

2.2 Awareness in Islamic finance
Awareness is the ability to perceive, feel, or be conscious of events, objects, thoughts, emotions or sensory patterns[3]. Basically, awareness is the level of being aware of something or knowing something.

The concept of awareness in legal system is very important and could influence an ongoing trial, for example, when a common situation where a court orders a defendant to deliver a certain document to plaintiff. The defendant passes a huge pack of documents to plaintiff. The plaintiff is not aware of which document among all those that he or she received was necessary for the trial process. With the proper definition of concept of awareness, the judge could have specified, which was the exact document necessary to be passed by defendant to plaintiff, and therefore, speeds up the trial process[4].

The level of awareness of social finance (which is a part of ideology of Islamic finance) is very low in financial sector of Canada[5]. An opportunity of social finance has proven itself during the crisis of 2008 where microfinance sector proved to be one of the few profitable sectors of financial system and many global investors.

A study conducted by Imaeva et al. (2014) measured the awareness of insurance products among the Russian population. The results revealed that in average more than 12 per cent of the respondents were not aware of insurance products available in the market. In average, the awareness by men is 11 per cent more than the awareness of women. Meanwhile, a study held by National Agency for Financial Studies (2011)[6] in determining the level of public awareness of Russian banks found that the number one recognised bank was Sberbank with level of awareness of 86 per cent.

Faisal et al. (2012) measured the awareness and attitude of Indian Muslim and Non-Muslim about Islamic banking instruments and details. In total, 152 respondents participated in the survey. It is revealed that Non-Muslim respondents had no idea about fundamental financial instruments of Islamic banking except Sukuk and only few of them had awareness on the concept of sharia. While most of the Muslims, they have awareness of fundamental terms of Islamic finance such as riba, sharia, Islamic contracts and takaful. In contrast, a study by Hamid and Nordin (2001) of 967 commercial bank’s customers in Kuala Lumpur found that almost all of the respondents were aware about the existence of Islamic banking and 50 per cent were actively using it. They could identify clearly the difference between interest-free and conventional banking.

Hidayat and Al-Bawardi (2012) focussed on Non-Muslim respondents among expatriates in Saudi Arabia. There are only 11 commercial banks in Saudi Arabia financial system and
only three banks are operating in accordance only with Sharia principles. The study indicated that 100 per cent of respondents were aware of Islamic finance and its pillars. Most of the respondents were using Islamic financial services because it is cheaper than conventional services in Saudi Arabia. It was suggested to set up workshops to educate Non-Muslims about the functionality of Islamic Banking services, provide discounts for transactions in Islamic banking to attract additional customers.

Abiah and Wabekwa (2012) conducted a survey on perception towards Islamic banking in Nigeria with 134 respondents. It is found that 77 per cent of the respondents have heard about Islamic banking before the survey took place where the remaining 23 per cent have never heard about Islamic banking before. More than half of the respondents do not understand the concepts of Islamic banking. The survey revealed that 26.12 per cent of respondents realise that Islamic banking involves an interest-reward system, 33.58 per cent do not know if the Islamic banking involves interest reward system and rest 40.31 per cent understand that Islamic banking system is interest-free system. The result of the survey also shows that 46.26 per cent know that Islamic financial system involves profit and loss system and the rest of respondents either do not know or understand this concept incorrectly. In total, 17.91 per cent of the respondents said “yes” and 38.81 per cent do not know whether Islamic banks can invest in pork industry, similar responses (15.67 and 38.06 per cent) were made on the question whether Shari‘ah-compliant banks can venture in excessive speculative ventures such as gambling. Finally, 47.02 per cent of the total sample population does not know whether Islamic banks can invest into hotels while 21.64 per cent answered “yes” and 31.34 per cent replied “no”.

Hassan (2007) conducted a research in Pakistan among 600 respondents of bank account holders, both Islamic bank (IB) and conventional bank (CB). Majority of both CB and IB account holders replied that they understood what Islamic banking was and what Riba meant. Majority of the IB and CB account holders agreed that Islamic banking had higher profit distribution comparing to conventional banks. The research states that Islamic banking was more popular among young educated people with high monthly income. The study concludes that there are still some people with Islamic banking accounts that are not aware of the concept of Riba.

All of them used the self-assessed questionnaire as a research tool. The statistical tools used to measure the results were percentage and frequency. Only Hidayat and Al-Bawardi (2012) used a Likert scale as a tool to analyze the result.

2.3 Financial institution in Russia
Islamic institutions including banks are newly established, and thus, only few banks are recorded as follows:

In 1990, VneshTorgBank (Bank of Foreign Trade) or VTB was established in Moscow by Russian government with sole purpose to support external economic transactions of Russia. Today, VTB bank is a part of VTB Group, which controls four banks such as VTB, VTB-24, TransCreditBank and Bank of Moscow, leasing, insurance and many other entities. VTB bank together with its banking entities has 96 offices in Russia. It is also widely present in CIS. It has over 95 thousand employees[7].

VTB is a second-largest bank in Russia and it had plans since as late as 2008 to be a first Russian bank to issue Sukuk (Omar and O’Brien, 2011). The plan was to issue a US$200m Sukuk through a subsidiary in Dubai. Unfortunately, the issuance of this security was constantly postponed.

Sberbank is another government-owned bank in Russia. Sberbank controls 17 other local banks with 18,482 branches all over the country. Sberbank is represented all over the world
in more than 10 countries. As of 30th June 2013, Sberbank had 289,027 employees. Sberbank is the largest bank in Russia that has a huge potential in Islamic finance. Sberbank is expanding in CIS region and looking for new opportunities in Islamic finance. Unfortunately, there is a lack in understanding the concepts of Islamic finance among top executives in Sberbank and in Central Bank of Russia. Sberbank is looking to expand in Middle East and as a result to get involved in Islamic finance.

Vnesheconombank is a state corporation performing functions of the Bank for Development. It is ranked as number four in Russia by total assets. Bank focusses on investment projects in Russia and abroad. Its chairman Vladimir Dmitriev is also a chairman of the Russian chapter of the Russia-Bahrain Business Council.

The previous studies described above concluded that there is a lack of awareness in Islamic financial sector by respondents. This study adds value to those studies described above by adding results using similar methodology in a non-Muslim country’s financial sector. The results of this survey could be compared with the results of the previous studies and describe the level of awareness of Islamic finance in Moscow financial sector, Russia.

3. Methodology

The quantitative research method was chosen because it was necessary to measure numerically the knowledge of Islamic financial system in Moscow’s financial center. The measurement was to be conducted in numbers consisting of data analysis, namely, frequency, percentage and weighted-mean analysis of collected data. Through this descriptive analysis, the demographic profile and respondents’ understanding on Islamic finance could be elaborated.

Like Hidayat and Al-Bawardi (2012), this study used a Likert scale survey questionnaire as a research tool except in Questions 1-6 as the demographic profile items. In the second part, 15 questions were about the knowledge of Islamic financial system.

The items in the questionnaire were selected from the previous studies and textbooks. The six demographic questions originally adopted from Faisal et al. (2012). The awareness in this study indicates as the level of knowledge in Islamic finance. Question no.7 was developed based on the prohibition of Riba and permission to trade, as said in Qur’an verse 2:275. Question no. 8-14 were adapted from a study by Halim and Nordin (2001). The rest of the questions were adopted from a study by Hassan (2007), Abiah and Wabekwa (2012) and Hidayat and Al-Bawardi (2012).

3.1 Data collection and sample selection

Moscow is the biggest city in Russia, which is used as a representative or sample of the entire Russia. Moscow is a financial center of Russia, where more than 80 per cent of wealth is being concentrated. All major banks, insurance companies, government agencies, financial regulators and major corporate banks’ customers are located in Moscow. If Islamic finance wants to start on a full scale in Russia – Moscow is a proper city where it will begin developing.

The population consists of employees of Moscow’s financial center of all ranks, age and religious background. The total of 310 questionnaires was distributed and has 97 per cent of respond rate or 300 questionnaires. The judgment sampling technique was adopted, which means the sample selection was based on judgment.
3.2 Statistical tools

Weighted average mean, frequency and percentage methods were used as statistical tools. All of the questions designed to measure the level of knowledge of Islamic financial system using a Likert scale of 5 to 1 with 5 being strongly agree and 1 strongly disagree (Table I).

Formulas used in analysis:

Weighted mean of question n
\[
\frac{\text{Weighted mean of question } n = \frac{\#\text{ of replies to strongly agree} \times 5 + \#\text{ of replies to agree} \times 4 + \ldots}{\text{Total number of respondents (300)}}
\]

Percentage of people answered a certain question with a choice n
\[
= \frac{\text{Number of answers with a choice } n}{300}
\]

4. Findings

4.1 Demographic profile

The analysis of religious beliefs of the respondents was done to understand what religion belief is dominant among the sample population in Moscow financial sector. The result shows that the majority of respondents were Christians (56 per cent), followed by other beliefs (24 per cent), Judaism (12 per cent) and Muslim (8 per cent). The survey indicates that there are very few Muslims among the workforce in Moscow financial sector. This is essential as most of the basics of Islamic finance are more likely unknown to believers of other religions due to the absence of these basics in their religious traditions and absence of Islamic finance in Moscow financial sector in general. Basically, most people may have not heard anything about the Islamic finance and its basics. The next item is the occupations in the financial sector, which showed that 97 per cent of total amount of respondents actually do work at financial sector and the rest of 9 respondents used to work in the financial sector so they still possessed necessary experience and knowledge to be involved in the survey.

The analysis of the length of employment in the financial industry shows that most of the respondents were in the middle of their career path in the Moscow’s financial sector. Most of the respondents were employed in the financial industry from 3 to 6 years (44 per cent). The rest of respondents were used from 6 to 10 years (12 per cent) and more than 10 years (8 per cent) accordingly. The further analysis confirms that most respondents were at the middle in the corporate ladder. For instance, it is found that 91 per cent of ages of respondents were from 21 to 30 years old; and 32 per cent had a monthly income of 0 – US $2,000 and 38 per cent had an income of US$5,000-15,000. According to Antal Russia (2013),

<table>
<thead>
<tr>
<th>Table I. Verbal interpretations used in weighted mean analysis</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted mean</td>
<td></td>
</tr>
<tr>
<td>0.00-1.49</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>1.50-2.49</td>
<td>Disagree</td>
</tr>
<tr>
<td>2.50-3.49</td>
<td>Neither Agree nor Disagree</td>
</tr>
<tr>
<td>3.50-4.49</td>
<td>Agree</td>
</tr>
<tr>
<td>4.50-5.00</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>
which is a leading executive recruitment consultancy firm in Russia, the salaries of mid-career employees at financial sector after the currency reevaluation approximately vary from US$2,000 to 13,000. The last analysis is on educational profile, shows that majority of respondents; 46 per cent have their Bachelor Degree and 49 per cent with Masters’ Degree. The level of education represents that all of the respondents are well-educated. The level of education also indicated that most of the respondents are young professionals and qualified to participate in the survey (Table II).

4.2 Test results
The results of simple questions, which are questions 7 to14 of the questionnaire are represented in Table III below. Questions 15 to 21 are difficult questions and the results are shown in Table IV.

<table>
<thead>
<tr>
<th>Respondents profile</th>
<th>Frequency</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Religious beliefs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Judaism</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>Christian</td>
<td>168</td>
<td>56</td>
</tr>
<tr>
<td>Muslim</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>72</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of people who work in financial sector</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>291</td>
<td>97</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td><strong>Length of the employment in the industry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 3 years</td>
<td>108</td>
<td>36</td>
</tr>
<tr>
<td>From 3 to 6 years</td>
<td>132</td>
<td>44</td>
</tr>
<tr>
<td>From 6 to 10 years</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td><strong>Age of respondents</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 21 years old</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>21-25 years old</td>
<td>174</td>
<td>58</td>
</tr>
<tr>
<td>25-30 years old</td>
<td>99</td>
<td>33</td>
</tr>
<tr>
<td>Over 30 years old</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td><strong>Income profile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US$0–2,000</td>
<td>96</td>
<td>32</td>
</tr>
<tr>
<td>US$2,000-5,000</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>US$5,000-15,000</td>
<td>114</td>
<td>38</td>
</tr>
<tr>
<td>Over US$15,000</td>
<td>66</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td><strong>Educational profile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>138</td>
<td>46</td>
</tr>
<tr>
<td>Masters/MBA</td>
<td>147</td>
<td>49</td>
</tr>
<tr>
<td>PhD</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II. Demographic data
The questions regarding level of knowledge on the related subjects in Islamic finance such as Riba and speculation prohibition, hedging, prohibition of investments in hotel industry, existence of risk-sharing system, credit cards, debt financing, avoiding uncertainty, “gold for gold” principle, Musharakah principles, Murabaha principles, Salam principles, Takaful principles and Ijarah principles.

Below are the elaborations of each question above:

- In total, 36 per cent of the respondents do not know the answer on one of the basics of Islamic financial system about the absence of interest reward system and 24 per cent thought that there is an interest reward system in Islamic finance. Only 22 per cent agreed to the statement that there is no interest reward system in Islamic finance. The prohibition of Riba is one of the pillars of Islamic finance. An average weighted mean of 3.35 shows that most respondents do not know the concept of Riba in Islamic finance;

- Most of the respondents (39 per cent) that they do not know whether the speculation in stock is allowed in Islamic financial system, while 23 per cent disagreed to this question and 38 per cent of respondents agreed that speculation is prohibited in

---

### Table III.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Total</th>
<th>Weighted mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Do you agree that the Islamic financial system prohibits an interest reward system?</td>
<td>66</td>
<td>51</td>
<td>108</td>
<td>72</td>
<td>3</td>
<td>300</td>
<td>3.35</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>22</td>
<td>17</td>
<td>36</td>
<td>24</td>
<td>1</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>8. Do you agree that speculation in stock is prohibited in Islamic financial system?</td>
<td>78</td>
<td>36</td>
<td>117</td>
<td>63</td>
<td>6</td>
<td>300</td>
<td>3.39</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>26</td>
<td>12</td>
<td>39</td>
<td>21</td>
<td>2</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>9. Do you agree that there are hedging instruments in Islamic financial system?</td>
<td>48</td>
<td>33</td>
<td>108</td>
<td>69</td>
<td>42</td>
<td>300</td>
<td>2.92</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>16</td>
<td>11</td>
<td>36</td>
<td>23</td>
<td>14</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>10. Do you agree that it is allowed to invest in hotel industry in Islamic financial system?</td>
<td>27</td>
<td>95</td>
<td>168</td>
<td>9</td>
<td>3</td>
<td>300</td>
<td>3.44</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>9</td>
<td>31</td>
<td>56</td>
<td>3</td>
<td>1</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>11. Do you agree that a risk-sharing system is allowed in Islamic financial system?</td>
<td>48</td>
<td>123</td>
<td>78</td>
<td>33</td>
<td>18</td>
<td>300</td>
<td>3.50</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>16</td>
<td>41</td>
<td>26</td>
<td>11</td>
<td>6</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>12. Do you agree that there is such a thing as credit card in Islamic financial system?</td>
<td>42</td>
<td>105</td>
<td>114</td>
<td>27</td>
<td>12</td>
<td>300</td>
<td>3.46</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>14</td>
<td>35</td>
<td>38</td>
<td>9</td>
<td>4</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>13. Do you agree that there is a debt financing in Islamic financial system?</td>
<td>39</td>
<td>162</td>
<td>72</td>
<td>18</td>
<td>9</td>
<td>300</td>
<td>4.77</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>13</td>
<td>54</td>
<td>24</td>
<td>6</td>
<td>3</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>14. Do you agree that uncertainty is prohibited of Islamic financial system?</td>
<td>69</td>
<td>36</td>
<td>141</td>
<td>18</td>
<td>36</td>
<td>300</td>
<td>3.28</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td>23</td>
<td>12</td>
<td>47</td>
<td>6</td>
<td>12</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Note: Average weighted mean for Questions 7-14: 3.51
Islamic finance. Riba, Gharar and Maysir are prohibited in Islamic finance. An average weighted mean of 3.39 shows that most respondents do not know the concept of prohibition of speculation in Islamic finance;

- In total, 36 per cent of the respondents do not know if there are hedging instruments in Islamic finance, while 37 per cent disagree with this statement. An average weighted mean of 2.92 indicates that most of the participants of this survey do not know the whether there are hedging instruments or not;

- In total, 40 per cent of the respondents agree that it is permitted to invest in the hotel industry, while 56 per cent do not know the answer and only 4 per cent disagree with this statement. Among Russians, many Muslim countries such as Egypt, Turkey and UAE are very popular tourist locations and as a result, most of the respondents could draw a logical conclusion that investments in hotel industry are not prohibited in Islamic financial system. An average weighted mean of 3.44, so majority of respondents do not know that it is allowed to invest into hotel industry in Islamic finance;

### Table IV.
Likert scale and weighted mean on knowledge of Islamic financial system (part II)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Total</th>
<th>Weighted mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Do you agree that is allowed in Islamic financial system to trade 1 kg of gold for 2 kg of gold (same quality gold)?</td>
<td>18</td>
<td>33</td>
<td>201</td>
<td>18</td>
<td>30</td>
<td>300</td>
<td>2.97</td>
</tr>
<tr>
<td>Frequency</td>
<td>6</td>
<td>11</td>
<td>67</td>
<td>6</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Do you agree that in Musharakah contract the profit is not guaranteed?</td>
<td>3</td>
<td>12</td>
<td>246</td>
<td>12</td>
<td>27</td>
<td>300</td>
<td>2.84</td>
</tr>
<tr>
<td>Frequency</td>
<td>1</td>
<td>4</td>
<td>82</td>
<td>4</td>
<td>9</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Do you agree that seller must inform the buyer about how much of costs were included in the sale price in Murabaha?</td>
<td>18</td>
<td>9</td>
<td>246</td>
<td>6</td>
<td>21</td>
<td>300</td>
<td>2.99</td>
</tr>
<tr>
<td>Frequency</td>
<td>6</td>
<td>3</td>
<td>82</td>
<td>2</td>
<td>7</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Do you agree that the payment in Murabaha sale could be both on the spot and deferred?</td>
<td>6</td>
<td>12</td>
<td>252</td>
<td>3</td>
<td>27</td>
<td>300</td>
<td>2.89</td>
</tr>
<tr>
<td>Frequency</td>
<td>2</td>
<td>4</td>
<td>84</td>
<td>1</td>
<td>9</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Do you agree that Salam contract is mostly used in agricultural industry?</td>
<td>0</td>
<td>3</td>
<td>276</td>
<td>6</td>
<td>15</td>
<td>300</td>
<td>2.89</td>
</tr>
<tr>
<td>Frequency</td>
<td>0</td>
<td>1</td>
<td>92</td>
<td>2</td>
<td>5</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Do you agree that Takaful contract is used as an alternative for conventional insurance?</td>
<td>27</td>
<td>6</td>
<td>261</td>
<td>0</td>
<td>6</td>
<td>300</td>
<td>3.16</td>
</tr>
<tr>
<td>Frequency</td>
<td>9</td>
<td>2</td>
<td>87</td>
<td>0</td>
<td>2</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Do you agree that Ijarah contract is mostly used in leasing?</td>
<td>0</td>
<td>0</td>
<td>273</td>
<td>3</td>
<td>24</td>
<td>300</td>
<td>2.83</td>
</tr>
<tr>
<td>Frequency</td>
<td>0</td>
<td>0</td>
<td>91</td>
<td>1</td>
<td>8</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Average weighted mean for Questions 15-21: 2.94
In total, 171 respondents agreed that there is a risk-sharing system in Islamic finance, 26 per cent do not know the answer and 17 per cent think that there is no risk-sharing system in Islamic finance. An average weighted mean of 3.50 indicates that most of the respondents agree that there is a risk-sharing system in Islamic finance; 

In total, 49 per cent agreed that there are credit cards in Islamic finance, while 38 per cent of respondents replied that they do not know the answer and 13 per cent disagreed with this statement. An average weighted mean of 3.46 indicates most of the respondents did not know that there is such a thing as credit card in Islamic finance; 

In total, 67 per cent of the respondents agreed that there is a debt financing in Islamic financial system, while 24 per cent do not know anything about it and 9 per cent disagreed with the statement. An average weighted mean of 4.77, so overwhelming majority strongly agrees that there is debt financing in Islamic finance; and 

In total, 35 per cent agreed that uncertainty is prohibited in Islamic financial system, 47 per cent do not know and 18 per cent disagreed with this statement. An average weighted mean of 3.28 indicates that more people of the respondents do not know that avoiding uncertainty is one of the principles of Islamic finance.

Below are the elaborations of each question based on Table IV above:

- More than 200 respondents replied that they do not know whether it is permitted to trade 1 kg of gold for the same quality 2 kg of gold or not. In total, 17 per cent agreed with the statement and 16 per cent disagreed with that statement. An average weighted mean of 2.97 indicates that the majority of respondents do not know whether it is allowed or not to trade 1 kg of gold to 2 kg of same quality gold.

- Overwhelming 82 per cent of the respondents did not know one of the principles of Musharakah, 5 per cent of the respondents agreed with the statements and 13 per cent disagreed with the statement. An average weighted mean of 2.84 indicates that majority of the respondents do not know that in Musharakah contract the profit is not guaranteed.

- More than 80 per cent did not know the principle of costs in Murabaha contract, while 28 respondents agreed with the statement and 27 respondents disagreed with it. An average weighted mean of 2.99 indicates that majority of the respondents do not know that seller must inform the buyer about how much of costs were included in the sale price in Murabaha.

- More than 80 per cent did not know the principle of payment in Murabaha contract mentioned in the question below, while 6 per cent agreed with the statement and 10 per cent disagreed with it. An average weighted mean of 2.89 indicates that majority of the respondents do not know that the payment in Murabaha sale could be both on the spot and deferred payments.

- In total, 92 per cent of the respondents did not know the answer to the question described below. Only 1 per cent agreed with the statement if Salam contract was mostly used in agricultural industry and 7 per cent disagreed with it. An average
weighted mean of 2.89 indicates that majority of the respondents do not know that Salam contract is mostly used in agricultural industry.

- Only 11 per cent agreed that Takaful contract is used in insurance industry and 2 per cent disagreed with this statement. Overwhelming 261 respondents did not know the answer to this question. An average weighted mean of 3.16 indicates that majority of the respondents do not know that Takaful contract is mostly used in insurance.

- Not a single respondent agreed that Ijarah was mostly used in leasing. In total, 27 respondents disagreed with the statement and 273 respondents did not know the answer to this question. An average weighted mean of 2.83 indicates that majority of respondents do not know that Ijarah contract is mostly used in leasing.

The study found that the level of public awareness towards Islamic finance is low in Moscow financial sector. The results are not in line with the findings of previous studies by Faisal et al. (2012), Hidayat and Al-Bawardi (2012), Hassan (2007) and Hamid and Nordin (2001). This is probably due to the fact that previous studies were made in regions with a higher Muslim population and geographically close to the countries where Islamic finance is being implemented.

The overwhelming majority of the respondents to the questionnaire of this survey do not possess any awareness in Islamic finance. For Questions 7-14 of the questionnaire that intend to measure the level of awareness of the main principles of Islamic finance such as prohibition of Riba, the total 37 per cent of all respondents answered that they do not know the answer and 45 per cent agreed that they were aware of these principles. While an average weighted mean for those 8 Questions is 3.51. This means that the respondents in average agree to the questions. Even though that the result is just by few digits away from “neither agree nor disagree” the results show that the respondents have some knowledge of principles in Islamic finance.

The rest of the questions were more complicated and involved terms and situations, which needed a deeper understanding of the Islamic financial system that could be obtained through education and/or special trainings. The overwhelming majority (83 per cent) of respondents answered “Neither Agree nor Disagree” to the questions; and approximately one half of the rest 17 per cent agreed to the questions and another half answered disagreed with it, with average-weighted mean of 2.94. This is a very strong indicator that majority of the respondents were not aware of Islamic financial contracts. These contracts are the key instruments in Islamic financial system. If one wants to work in Islamic financial sector, then he or she must have the knowledge of key contracts that are the foundations of any structured deals in Islamic financial industry whether banking or insurance.

The average weighted mean for Questions 7-21 was 3.25, therefore it indicates that most of the respondents have the answers of “Neither Agree nor Disagree” to the questions, especially to more difficult ones. The highest weighted mean of 4.77 was to a question 13 (Do you agree that there is a debt financing in Islamic financial system?) and lowest weighted mean of 2.83 was to question 21 (Do you agree that Ijarah contract is mostly used in leasing?), which both are from a difficult group of questions. Therefore, it could be concluded that majority of the respondents do not know the answers to such difficult questions.
5. Conclusion and recommendation

Although there was about 8 per cent of Muslims in the sample pool, the results were very different from the previous studies. Muslims in Moscow financial sector work in conventional finance and are not aware of major Islamic financial contracts such as Salam for instance because it is considered unnecessary knowledge at their work. All respondents have a very good education and each of them represented experienced professionals in the financial industry of Russia. This is important as it indicated that the respondents were capable of participating in the survey and as a result this survey got credibility in terms of quality of the respondents. All these findings indicate that the level of awareness of Islamic finance among employees in Russian financial sector is still low.

To improve the situation, below are the recommendations on the improvements of the level of awareness of Islamic finance among employees in financial institutions in Russia:

- Financial institutions could implement some training sessions for its employees by hiring some outside specialists in that field or by sending the employees to some educational programs in other countries that have the experience in Islamic finance.
- In Russian universities, there could be additional courses offerings especially those that teach the principles of Islamic finance to the students of financial department.
- Russian financial institutions could partner with some financial institutions that operate in Islamic finance and implement a sort of an “exchange of knowledge” program where teams from such institutions share their experience and knowledge.

This study also comes out with some suggestions for further studies. Next researcher could focus on certain areas of Islamic finance that were described in this study to make a more detailed research. For example, the researcher could pick one out of many financial instruments and continue a research focusing only on this instrument and its varieties or focus on a larger sample from other geographical regions of Russia or other countries and different professional field since this study focuses on financial employees from Moscow only.

Islamic banks could use this study when deciding either to enter Russian financial market or otherwise. This study gives an idea on what level the Islamic finance is developed in Russia and whether there is a market for its development or otherwise. It is also beneficial for Islamic banks to use the results of this study to have a competitive advantage in Russian market in Islamic banking by using its experience in this field in other countries.

Notes

10. Quran, 2:275: “Allah has allowed (profit from) trade and prohibited Riba.”

References


Ak Bars Bank (2012), “AK BARS bank Murabaha Islamic financing facility has been awarded the Europe deal of the year by the Islamic finance news awards”, *Ak Bars Bank*, pp. 3-4.


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Impact of surface acting and deep acting techniques on teachers’ organizational commitment

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Abstract
Purpose – This paper aims to examine the relationship between surface acting (SA), deep acting (DA) and organizational commitment (OC).
Design/methodology/approach – Guided by affective events theory, the study adapted emotional labour scale and three components model to profile 373 teachers from 30 schools around Peninsular Malaysia. A list-based simple random sampling technique was used to select respondents. Structural equation modeling (SEM) was used to test hypotheses, and the proposed model was assessed through renowned fit indices.
Findings – OC was hypothesized as a second-order construct. SEM result indicates that both SA and DA have significant negative relationship with OC. Fit indices of the hypothesized model showed $\chi^2/df$ ratio (560.069/265) = 2.113, RMSEA (0.055), and CFI (0.936). This result provides empirical support for the data collected.
Research limitations/implications – The study provides new insight on the ongoing debate about SA and DA. Therefore, it advances body of research in this regard. The implication for HR managers is that strategic polices can be institutionalized to buffer the consequences of SA and DA. This is due to the fact that SA and DA may not be abolished for service employees like teachers. The practical implication for teachers is the understanding that emotional regulation process is inevitable because teaching is profoundly an emotional activity job. Besides being a cross-sectional study, the sampled population may have limited the study’s outcomes.
Originality/value – Given existing inconsistent results on the consequences of SA and DA, this study shows that not only SA can lead to negative after-effects, DA can also cause the same. Future study can explore spiritual intelligence to examine how best SA and DA can be performed at reduced consequences on OC.
Keywords Malaysia, Teachers, Organizational commitment, Deep acting (DC), Surface acting (SA), Emotional labour (EL)

Paper type Research paper

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Introduction
Supposedly, teachers are saddled with multiple roles, ranging from being a mentor, colleague, friend or supervisor. Kulshrestha and Singhal (2017) assent that teachers’ role includes integration and application of knowledge. However, based on affective events theory (AET), researchers posit that some factors are within the work environment that can diminish these functions. Weiss and Cropanzano (1996, p. 12) note that AET “focuses on the structure, causes and consequences of affective experiences” in the workplace. Therefore, the theory identifies factors that can cause different employees’ emotional reactions on the job and how these reactions affect the employees.

Researchers (Lam and Chen, 2012; Wegge et al., 2006) submit that AET is based on some assumptions. Firstly, it recognizes the distinct role of emotions in relation to employees’ organizational behaviour. Secondly, it proposes that emotional episodes are responses to series of emotional experiences triggered by work events. Thirdly, it theorizes that both current emotions along with emotional history surrounding a work environment affect job commitment. Fourthly, it asserts that, as emotions fluctuate, so does commitment. Lastly, the theory posits that emotions are sometimes incompatible with behaviours required to do a job.

In this regard, Ashkanasy and Humphrey (2011) view emotional labour as one of such factors that can trigger employees’ emotional reactions to a number of performance variables such as organizational citizenship behaviour, organizational commitment (OC), intentions to quit, workplace deviance and absenteeism. This provides possible expectations that teachers can be vulnerable to psychological (emotion) and physiological (physical) experiences as a result of EL (Yin et al., 2017; Gökyer, 2018). Hochschild (1983) notes that SA and DA are two techniques of EL. Previous studies indicate that these techniques can have negative impacts on employees’ wellness (Indregard et al., 2018). Hence, they are likely to weaken OC.

Against this backdrop, Letendre and Wiseman (2015) proposed the need to understand teachers’ emotional experiences and how these experiences impact their organizational functions. Most studies on SA and DA techniques were conducted among health professionals (Indregard et al., 2018; Lartey et al., 2019), tourism and hospitality workers (Prentice, 2014), front-desk service employees (Sonar and Paliwal, 2018; Walsh et al., 2019) and security personnel (Van Gelderen, 2013). Except in Lee and Van Vlack (2017), little is known about how SA and DA determine teachers’ OC based on their emotional experiences. This study focuses on Malaysian teachers and intends to adopt a quantitative approach. Previous studies that examined teachers’ emotional experiences mostly used qualitative approach (Zembylas, 2003; Dunbar and Baker, 2014) or are conducted outside Malaysia (Hagenauer and Volet, 2014; Mazer et al., 2014). To this end, this study advances body of knowledge theoretically, methodologically and contextually.

Literature
Emotional labour
Emotions are spontaneous, crucial and undeniable (Prentice, 2014). However, for positive organizational reasons (Richard and Converse, 2016), some forms of emotions may not be expressible in the workplace (Grandey and Sayre, 2019). Hence, there was the emergence of the EL concept three decades ago. EL is “the process of managing feelings and expressions to fulfil the emotional requirements of a job, such that displayed emotion will enhance expected performance” (Hochschild, 1983, p. 7). It is presumed that allowing emotional liberty may hamper organizational activities (Yin et al., 2017) or lead to irrationality (Verhoef and Terblanche, 2015). So, EL process is usually designed to regulate employees’ emotions,
behaviours, thoughts and actions to conform with organizational desired emotions (Christoforou and Ashforth, 2015; Huys and Renz, 2017; Pillay et al., 2019).

Emotions are categorized into six basic types, e.g. anger, fear, joy, love, sadness and surprise (Greenberg and Baron, 2008). However, teachers are mostly required to engage in positive emotions like joy and love (Trigwell, 2012). Given this expectation, teachers may sometimes experience emotional harmony. This is when they actually feel the emotions required by the job (Addison, 2017). In this same vein, they may experience emotional discord. This is when job expected feelings are incongruent with self-feelings (Indregard et al., 2018; Kwak et al., 2018).

Hochschild (1983, p. 90) argues that when priority is given to organizational desired emotions, “display is what is sold”. Impliedly, emotions become commercialized in return for wages, profit, good customer experiences, and so forth (Diefendorff et al., 2011; Grandey and Sayre, 2019). Consequently, employees become liable for their “behavioural expectations on which emotions ought to be expressed and which ought to be hidden” (Rafaeli and Sutton, 1987, p. 27). This is particularly true for teachers who are required to follow certain norms in the discharge of their responsibilities (Lee and Van Vlack, 2017). The two techniques seemingly used in this regard are discussed below.

**Surface acting**

Surface acting (SA) means “the body, not the soul, is the main tool of trade” (Hochschild, 1983, p. 37). It occurs when teachers only alter their emotional expression to correspond with normative patterns, by faking an emotion they do not really feel (Grandey et al., 2013; Addison, 2017). By inference, only outward behavioural expressions require modification while genuine feelings remain intact (Benita et al., 2016; Walsh et al., 2019). Some studies likened SA to façade acting (Andrews et al., 2016) or deliberative dissonance (Zapf, 2002). Deliberative dissonance “is the ability to maintain emotional display even when experienced emotions are different” (Zapf, 2002, p. 246). For instance, an expression of pleasantry by teachers may not necessarily mean happiness or joy, but just acting out to conform with organizational display rules.

**Deep acting**

Deep acting (DA) is a form of “real feelings that has been self-induced” (Hochschild, 1983, p. 35). DA relates to “changing one’s feelings regarding an interaction so that emotional expressions naturally fall in line with expectations” (Grandey et al., 2013, p. 207). So, rather than mere faking unfelt feelings, individuals actively alter inner feelings to express the emotion they wish to display or that is required by a job (Mann and Cowburn, 2005). To accomplish this, Ashforth and Humphrey (1993) posit that employees need to put effort to stimulate memories, images or thoughts to feel or suppress specific emotions at the workplace. By doing so, they will be able to feel, think and act organizationally desired emotions (Schirmer and Adolphs, 2017). For instance, teachers may induce pleasant memories to alter feelings of irritating in the course of teaching. Within this process, they would have re-defined any disturbing situation.

**Dysfunctional aspects of surface acting and deep acting**

Both techniques offer possibility of certain outward appearances which portray teachers positively. In spite of their benefits, existing studies suggest that the techniques can have some negative consequences. These include the following:
Health consequences

SA and DA are known to alter expressive behaviours (outward emotions), but most times, not the inner self (Grandey et al., 2015). So, the techniques often result in emotive dissonance (Richard and Converse, 2016). Emotive dissonance comprises feelings of unease which are due to “persistent structural discrepancy between displayed emotions and what is felt” (Yagil, 2015, p. 158).

Researchers argue that faking (SA) or inducing (DA) unfelt feelings commonly lead to self-denial, poor self-esteem or estrangement from self (Dunbar and Baker, 2014; Yin et al., 2017). These experiences are health-risk-related problems which can cause depression, exhaustion and mental distress in employees (Indregard et al., 2018). Other studies mentioned that these forms of emotional denial can cause certain “pernicious psychological effects” (Ashforth and Humphrey, 1993, p. 89) which are detrimental to well-being (Kim and Han, 2009).

Gross (2002) notes that any persistent experience of emotional discrepancy can increase the chance of physical-health-related problems, such as headache, sleeplessness and cardiovascular problems. Others argue that employees may be susceptible to emotional exhaustion (Yilmaz et al., 2015), particularly, when they are psychologically and physically depleted (Mishra and Kumar, 2016).

Performance consequences

When employees are depleted psychologically and physically, continuous acting can become counter-productive (Kinman et al., 2011). So, rather than SA and DA facilitating task performance, redundancy may likely occur (Yilmaz et al., 2015; Lee, 2017). Redundancy can occur when work demands exceed employees’ coping mechanisms (Karatepe and Olugbade, 2009; Chen et al., 2012). Hence, employees become stressed. Studies have established negative links between stress and task performance (Mann and Cowburn, 2005). Yin et al. (2017) submit that employees who suffer physical and emotional stress as a result of feeling burnout or feeling frustrated are likely to have reduced task performance.

Task performance is equally affected when employees resort to obtaining leave of absence, voluntary resignation, arbitrary absenteeism and so forth (Mariesa and Rockoff, 2012; Mafukata and Mudau, 2016). These acts are usually done to avoid total depletion of their self-autonomy or self-esteem (Grandey and Sayre, 2019), particularly when they cannot put up anymore with the acting strategies.

Social-economic consequences

Because the emotions for acting cheery, pleasant or smiling cannot be quantified, both techniques are usually undercompensated (Hülsheger et al., 2015). This is due to the fact that the techniques are intrinsically motivated acts. Grandey et al. (2015) note that employees are faced with interactional injustice through unapologetic customers, and any attempt by employees to engage in emotion deviance (display genuine emotions) might lead to punitive measures, such as job loss, pay cut, reprimand, suspension or dismissal (Hagenauer and Volet, 2014; Yagil, 2015; Richard et al., 2016).

Emotional deviance occurs when expressed emotions clash (or are incongruent) with organizational display rules (Richard and Converse, 2016). It is when employees disregard the rules to express their authentic emotions. This often leads to counter-productive work behaviour (Hunter and Penney, 2014). In most cases, the erring employees bear the brunt (Dahling, 2016). Socially, the ripple effects can cause transferred aggression among peers, colleagues or repercussion at home (Krannitz et al., 2015; Wagner et al., 2014), e.g. work-family or domestic conflicts (Erdamar and Demirel, 2014; Isa et al., 2018).
Organizational commitment

OC is the “extent to which an individual identifies and is involved with his or her organization and/or is unwilling to leave it” (Greenberg and Baron, 2008, p. 234). Individuals with perceived high OC take pride in considering themselves a part of an organization. Hence, it is about employees’ attitudes and behaviours, placed on a continuum (Ko et al., 1997; Dixit and Bhati, 2012), towards the organization in which they work.

Meyer and Allen (1991, p. 61) contend that “commitment is a psychological state” experienced within three components model (TCM). These include commitment as a desire (affective), a need (continuance) and an obligation (normative). These components have been widely applied within the last two decades (Garland et al., 2014; Jaros, 2017; Sonar and Paliwal, 2018). Each of the components in the TCM is discussed in the next sub-section.

Affective commitment

Affective Commitment (AC) is “the strength of a person’s desire to work for an organization because he or she agrees with it and wants to do so” (Greenberg and Baron, 2008, p. 236). It is linked to employee’s belief in organizations’ core values such as the mission and vision statements (Robbins and Judge, 2007). Sonar and Paliwal (2018) say that AC involves a show of willingness to exert effort to remain with the organization. Hence, it is a form of employees’ emotional attachment to the organization. Researchers (Meyer and Allen, 1991; van Gelderen and Bik, 2016) consider values like equity in reward distribution, organizational support, delivering quality services, role clarity and decentralization of decision-making as reasons for employees’ AC.

Continuance commitment

Meyer et al. (1993) modelled Continuance commitment (CC) along Becker’s (1960) side-bet theory of commitment. Becker (1960, p. 33) notes that commitment is employees’ disposition to engage in “consistent lines of activity” as a result of accumulation of “side-bets” that would be lost if the activity is discontinued. Meyer and Allen (1991, p. 64) say side-bet occurs when “something of importance to an individual (e.g. pension) becomes contingent upon continued employment”. In this regard, CC can be referred to as “perceived economic value of remaining with an organization compared to leaving it” (Robbins and Judge, 2007, p. 80).

Research equally indicates that CC measures “high sacrifices’ and “low alternatives” (Jaros and Culpepper, 2014, p. 70). This means that employees’ CC is determined not only by fear of losing side-bets (e.g. incentives and investments) but also by low availability of other jobs (Ko et al., 1997; Powell and Meyer, 2004). Shore et al. (2000) posit that social costs might contribute to employees’ side-bets, e.g. friendly co-workers. In essence, CC may be due to fear of losing benefits or perceived lack of alternative jobs (Dixit and Bhati, 2012; Jaros and Culpepper, 2014). Therefore, employees may continue with an organization because it is perceived too costly to leave.

Normative commitment

Normative Commitment (NC) deals with the “desires of employees to continue working for an organization because he or she feels the obligations from others to remain” (Greenberg and Baron, 2008, p. 236). The obligation to remain with an organization might be due to ethical or moral reasons (Robbins and Judge, 2007), or due to thoughts on the perception of co-workers (Meyer and Allen, 1991). Employees with this form of mindset put into consideration their perceived responsibility to their organizations.

NC can be likened to a “reasoned-action models of behaviour” (Meyer and Allen, 1991, p. 66), an “indebted obligation” (Jaros, 2007, p. 12), or a form of psychological contract
where employees believe that their continued stay with an organization is the right thing to do. For instance, employees whose organization have granted scholarship or training skills may feel it is ethically and morally important to remain with the institution until the expirations of the agreed working terms and conditions.

Hypotheses development
Findings from previous studies on employees’ SA and DA techniques are not consistent. For instance, Lartey et al. (2019) found a negative relationship between SA and job attitudes. But, reported no significant relationship for DA. Lee and Van Vlack’s (2017) extended research on teachers’ emotions, EL techniques and teachers’ efficacy, revealed that SA relates negatively with teachers’ efficacy, whereas, DA correlated positively. Chen et al. (2012) show that SA relates negatively with job satisfaction but positively with burnout, whereas DA was positive with job satisfaction but negatively related with burnout. In the latter case, the researchers argued that incessant DA can have some negative after-effects.

Xin et al. (2017) found that SA does not necessarily lead to burnout because the technique can immediately be discarded. Therefore, it has no significant impact on employees’ outcomes and attitudes. However, DA can cause burnout because it is prolonged. Garland et al. (2014) argue that when service workers experience burnout, organizational activities can negatively be affected. To buttress this, Prentice (2014) found that emotional exhaustion, depersonalization and lack of accomplishment can make an employee distance himself or herself emotionally or cognitively from work. Prentice (2014) linked these findings to the negative impact of SA and DA on employees’ emotional state of being. However, in the study of Lee (2018), only DA was reported to be positive with employees’ attitude to work and job satisfaction. The study found no significant relationship with SA.

Based on conservation of resource (COR) theory (Hobfoll, 1989), Van Gelderen (2013, p. 65) asserts that SA and DA can “have negative valence”. It was argued that employees with low energetic resource level will find it difficult to regulate their emotions, particularly for DA. Studies show that in most situations, employees are prone to spiral resource-loss because the time frame for DA is undetermined (Zapf, 2002; Burić, 2019; Walsh et al., 2019). Kwak et al. (2018) contend that resource-loss often makes employees cynical towards work because it threatens their psychological well-being. This arouses feelings of dissatisfaction and can diminish their OC.

Walsh and Bartikowski (2013) argued that employees’ organizational involvement can fluctuate based on emotional experiences. For instance, Grandey et al. (2015) submit that both SA and DA involve suppression of felt emotions. Researchers (Kidwell et al., 2011; Pillay et al., 2019; Yin et al., 2019) assent that suppressing felt emotions for organizational required emotions often contribute to employees’ feelings of detachment from the organization. Brotheridge and Lee (2003) note that suppressing emotions can inhibit employees’ sense of belongingness, connectedness with colleagues or organizational goals. In essence, both techniques are not free of negative consequences.

In view of the aforementioned, consistent with the assumptions of AET, this study hypothesized as follows:

\[ H1. \] SA relates negatively with OC.

\[ H2. \] DA relates negatively with OC.

Methodology
Study participants
Through a list-based simple random sampling technique, teachers from 30 secondary schools around Peninsular Malaysia were randomly selected.
Sample size
A total of 450 teachers were expected to respond to the 27 items questionnaire. The adequacy of the sample size is within the recommended threshold of a minimum of five respondents per item for exploratory factor analysis (EFA) (Hair et al., 2010; Tsang et al., 2017).

Measure (instruments)
Surface acting and deep acting techniques. Brotheridge and Lee's (2003) ELS was adapted. The scale has 3 items for SA and DA respectively. However, to justify the minimum of four items per construct for confirmatory factor analysis (CFA) (Hair et al., 2010), relevant items were sourced from Näring et al. (2007) D-QEL scale. This brought SA and DA to 5 and 4 items respectively. Items were anchored on a Likert-type scale of (1 = “never” to 5 = “always”). Item example include: “I pretend to have the emotions that I am not actually feelings”.

Organizational commitment. (Meyer et al., 1993) TCM was adapted. It was tapped on a five-point Likert scale of (1 = “strongly disagree” to 5 = “strongly agree”). This study adapted TCM as a second-order construct with three dimensions. They are effectiveness, affective, continuance, and normative commitment. Each dimension has six items. Item example include: “the organization has a great deal of personal meaning for me”.

Data collection
Data was collected electronically. Sekaran (2003, p. 250) posits that through electronic means “more reliable data are likely to result since the respondents can go back and forth, and easily change a response.” In addition, electronic means “guaranteed informed consent and data confidentiality” (Antunes et al., 2017 p. 5). Data collection was between May and August 2019.

Statistical analysis
IBM SPSS 24.0 software was used for demography frequencies and EFA. AMOS 24.0 software was used for CFA data validation and SEM hypotheses testing.

Results
Response rate
From 450 expected responses, 35 respondents participated in the pilot study instrument adaptation stage. Main study had 415 participants, out of which 389 responses were received. This gave a response rate of 93.74 per cent. “Straight-lining or satisﬁcing” responses were invalidated with respect to Ron et al. (2015, p. 688) recommendations. So, 16 responses were invalidated. In this regard, only 373 valid usable responses were analysed, giving a usable response rate of 89.88 per cent. This high response rate was due to several follow-up measures (e.g. phone calls, emails and visitations). The convenience of responding to an electronic questionnaire also contributed to the high response rate.

Social-demographic characteristics (main study)
Participants are mostly between the years of 30 and 45 (M = 2.35; SD = 1.02). With respect to Table I, 52 (14.0 per cent) men and 167 (44.8 per cent) women have master’s and bachelor’s degrees, respectively, 122 (32.7 per cent) women have spent over 10 years in the teaching profession, out of which 176 (47.2 per cent) were married.
The social-demographic table demonstrates an unequal representation of gender as teachers. It can be inferred that there are more female teachers than their male counterpart (see Malaysia Ministry of Education Report – 2018, p. 26)[1].

**Questionnaire characteristics**

From Table II, the aggregate average score shows that teachers from time to time practice SA ($M = 2.57; SD = 1.26$) and periodically use DA ($M = 3.16; SD = 1.12$). The internal reliability scores for each construct suggested the existence of a strong internal consistency among all questionnaire items. Therefore, each item actually measures what it intends to measure. Values of skewness and kurtosis (not shown here due to space) revealed that most questionnaire items fell within the acceptable value range of $z = \pm 1.96$ ($p < 0.05$) (Pallant, 2007). These outcomes suggest that data are normally distributed.

**Psychometric validation report**

**Exploratory factor analysis**

All constructs were adapted. So, they were subjected to principal component analysis (PCA). Prior to performing PCA, the suitability of data for factor analysis was examined. For

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Mean</th>
<th>SD</th>
<th>Alpha (α)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>5</td>
<td>2.57</td>
<td>1.26</td>
<td>0.94</td>
</tr>
<tr>
<td>DA</td>
<td>4</td>
<td>3.16</td>
<td>1.12</td>
<td>0.80</td>
</tr>
<tr>
<td>OC</td>
<td>18</td>
<td>3.97</td>
<td>0.86</td>
<td>0.90</td>
</tr>
</tbody>
</table>

**Source:** SPSS output table (2019)
instance, observation of correlation matrix revealed the presence of coefficients \( r \geq 0.3 \). KMO was 0.877 and 0.847 for EL techniques and OC, respectively. These values exceeded the recommended value of 0.6 (Kaiser, 1974). Bartlett’s Test of Sphericity \( (p < 0.05) \) reached statistical significance (Bartlett, 1954). Data adequacy was equally proven with items having communalities values above 0.3 recommended threshold (Pallant, 2007). These preliminary outcomes lend credence for data factorability.

In this regard, varimax normalized rotated component matrix retained a two-factor solution (SA and DA) for EL techniques. SA has five items with Alpha (\( \alpha \)) value of 0.94 and DA has four items with Alpha (\( \alpha \)) value of 0.80. Rotation maintained a 3-components-18-items solution for OC. They are AC (\( \alpha = 0.77 \)), CC (\( \alpha = 0.84 \)) and NC (\( \alpha = 0.81 \)). Each has six items. The alpha values (\( \alpha \)) attached with each construct implies that the factored solution demonstrated acceptable measurement properties (Nunnally, 1978). Cronbach (1951) notes that high alpha values indicate strong reliability. Theoretically, this provides support for further statistical analysis.

Confirmatory factor analysis
The measurement model was validated through maximum likelihood method (Bentler, 1983) using renowned goodness-of-fit (GOF) indices. Results revealed that \( \chi^2/df \) ratio \( (467.264/263) = 1.777 \), RMSEA (0.046) and CFI (0.956). Results provided evidence of a reasonable and good data-fit model (Marsh and Hocevar, 1985; Browne and Cudeck, 1993).

Further examination of the measurement model for construct validity through convergent validity, discriminate validity, construct reliability (CR) and average variance extracted (AVE) also supported the proposed model. Two items from OC are dropped because of low estimate loadings. So, only 25 items were assessed. Standardized estimate loadings for the 25 items were above 0.5 and \( \leq 0.96 \). Taken together, all assessment values are within recommended acceptable ranges (Schumacker and Lomax, 2012) (Table III). Hence, construct validity is supported. This provides further support and validity for the proposed model.

Structural equation modelling
Having established the construct validity, the structural model was assessed to empirically test the study’s hypotheses. GOF results are slightly different from the measurement model (Table IV). Still, the structural model has reasonably GOF indices. Its \( \chi^2/df \) ratio \( (560.069/265) = 2.113 \), RMSEA (0.055) and CFI (0.936). All indices fulfilled the recommended thresholds (Hair et al., 2010; Kline, 2011). This implies that the hypothesized structural model represented the sampled population.

In Figure 1, parameters standardized path estimates reveal that SA and OC relate significantly negatively with each other \( (H1: \beta = -0.23, p < 0.05) \). It also indicates that DA and OC have significant negative relationship \( (H2: \beta = -0.20, p < 0.05) \). These results provide sufficient support to the study’s proposed hypotheses. This establishes that \( H1 \) and \( H2 \) are valid and significant. Therefore, it can be upheld that not only SA leads to negative after-effects, DA can also lead to same.

Discussions
The study investigated the relationship between SA, DA and OC. Though, there are known benefits embedded in applying SA and DA, such as promoting good customers’ experiences (Hofmann and Stokburger-Sauer, 2017), enhancing task accomplishment (Becker and Cropanzano, 2015), encouraging customer retention (Chen et al., 2012), boosting business success (Zou and Dahling, 2017) or promoting organization’s good image to the public (Christoforou and Ashforth, 2015), the consequences of the techniques can be demoralizing for teachers.
### Table III.
CFA validity assessment tests

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>SA Standardized estimate loadings</th>
<th>DA</th>
<th>OC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.75</td>
<td>0.68</td>
<td>0.79</td>
</tr>
<tr>
<td>SA</td>
<td>EL1</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL2</td>
<td>0.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL3</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL4</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL5</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA</td>
<td>EL6</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL7</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL8</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL9</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>OC1</td>
<td>0.71</td>
<td>0.260</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>OC2</td>
<td>0.69</td>
<td>0.519</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>OC3</td>
<td>0.75</td>
<td>0.526</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>OC4</td>
<td>0.69</td>
<td>0.467</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>OC5</td>
<td>0.79</td>
<td>0.925</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>OC6</td>
<td>0.72</td>
<td>0.811</td>
<td>0.81</td>
</tr>
<tr>
<td>CC</td>
<td>OC7</td>
<td>0.69</td>
<td>0.290</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>OC8</td>
<td>0.79</td>
<td>0.512</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>OC9</td>
<td>0.72</td>
<td>0.946</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>OC10</td>
<td>0.61</td>
<td>0.160</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>OC11</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>OC14</td>
<td>0.68</td>
<td>0.290</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>OC15</td>
<td>0.75</td>
<td>0.290</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>OC16</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OC18</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thresholds</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVE ≥ 0.50</td>
<td>Supported</td>
</tr>
<tr>
<td>CR ≥ 0.70</td>
<td>Supported</td>
</tr>
</tbody>
</table>

### Table IV.
GOF indices

<table>
<thead>
<tr>
<th>GOF</th>
<th>CFA Measurement model</th>
<th>SEM Structural model</th>
<th>Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square ($\chi^2$)/df</td>
<td>467.264/263</td>
<td>560.069/265</td>
<td>Sensitive to size</td>
</tr>
</tbody>
</table>

**Absolute fit measures**

- $P$-value: 0.000
- Normed chi-square (CMIN/DF): 1.777
- Root mean sq. error of appr. (RMSEA): 0.046

**Incremental fit indices**

- Comparative fit index (CFI): 0.956
- Tucker–Lewis Index (TLI): 0.950

Source: AMOS Output Table (2019)

Notes: *Ratios not greater than 5 indicate a reasonable fit (Marsh and Hocevar, 1985); **Values of about 0.08 or less would indicate a reasonable fit (Browne and Cudeck, 1993); ***Values closer to 1 indicate a very good fit (Bentler, 1988; Jan, 2012; Zainudin, 2014)
This study’s findings are consistent with previous studies. Extant literature documents that prolonged engagement in either SA or DA can cause “pernicious psychological effects” (Ashforth and Humphrey, 1993, p. 89). Meyer et al. (2002) highlight work stressors on employees’ health and well-being as one of the negative antecedents of OC. Barber et al. (2011) identifies emotion regulation as a prime cause of employees’ stress, particularly when they are emotionally exhausted. This implies that employees will possibly record a low level of OC when stressed emotionally. Cropanzano et al. (2003) discussed that regulating employees’ emotions can increase their turnover intention and lower their AC.

In spite of the aforementioned benefits, SA and DA can be “psychologically demanding” (Becker and Cropanzano, 2015, p. 198). Researchers (Kwok, 2011; Dahling, 2016) argue that modulating between felt and expected emotions often come with certain perils to the actors. This was evident through the outcome of this study wherein both SA and DA show significant negative relationship on OC. Seemingly, engaging in SA and DA implies that “emotions are bought on the one hand and sold on the other” (Hochschild, 1983, p. 118). This implies that employees give up control over how the work is done by allowing the organization to set the standard practices on how work is to be carried out. Mostly, this process is not free of emotional setbacks.

The fact remains that emotion is an integral inalienable part of human personality (Kim and Han, 2009). So, employees’ reaction or behaviour is sometimes hard to conceal even with SA and DA techniques. The reason is that emotions are “experienced physically as well as mentally” (Houghton et al., 2012, p.222). In this regard, both SA and DA often lead to self- alienation (Hulsheger et al., 2015; Benita et al., 2016), numbness and poor self-esteem (Ashforth and Humphrey, 1993), self-strangement (Wagner et al., 2014; Kramnitiz et al., 2015), distributive, procedural and interpersonal injustice (Grandey et al., 2015), burnout (Xin et al., 2017), loss of tacit knowledge or intention to quit (Chen et al., 2012), health-related problems such as heart attack (Mesmer-magnus et al., 2012) and lack of autonomy (Zou and Dahling, 2017).

Inability to internalize expected emotions can lead to emotional experiences like frustration and anxiety. As a result, employees often resort to task avoidance (Garland et al.,
2014), arbitrary absenteeism (Karatepe and Choubtarash, 2014), tardiness (Walsh and Bartikowski, 2013), leave of absence or voluntary resignation (Mariesa and Rockoff, 2012; Mafukata and Mudau, 2016) and so forth. When taken together, these occurrences can portend diminishing effects on OC.

**Conclusion**

The current study suggests that Malaysian teachers view that SA and DA can hinder their OC. Particularly, when the techniques are used unabated or not mediated. This was evidenced through the outcome of this study. It was discussed that conflict in emotional experiences (i.e. discrepancy between felt emotions and required teaching emotions) often lead to negative consequences such as self-alienation, self-detachment, internal tension and emotional exhaustion. These phenomena can reduce the likelihood of teachers’ commitment to their job. To this end, the SA and DA can weaken employees’ intrinsic urge for OC.

**Implications/contributions**

The study provides insight on the shared problems associated with both SA and DA. Literature studies have been engulfed with debate about whether SA is negatively related to employees’ organizational outcomes, DA is positively related to employees’ organizational outcomes or there is no significant relationship between these workplace events. In this regard, the study’s findings clarified these mixed feelings. Theoretically, this extends emotional labour and organizational behaviour research. The findings also have important policy implications. Because ending SA and DA techniques are “seemingly unrealistic” (Kwak et al., 2018, p. 17), HR managers may possibly come up with strategic policies/programmes to mediate the consequences of the techniques. For instance, organizing family re-treat, counselling session, paid oversea vacation trips and so forth. Lastly, the practical implication of the study’s findings is that employees who engage in diverse emotional display are aware of the shared problems associated with both SA and DA. Hence, they can devise self-strategy, like developing spiritual intelligence, to cope with the negative after-effects of the techniques. By so doing, employees can abide with organizational required emotions without hassle.

**Limitation and future areas of research**

Firstly, the study is cross-sectional. So, data collection was on a one-time basis. This may have subjected the study’s outcomes to common method bias. Future study can collect data on a longitudinal time frame to establish a proper cause-and-effect relationship. Secondly, the study was limited to secondary school teachers. Future study may consider other service employees, or perhaps, other contextual setting to re-confirm this study’s outcomes. For instance, university lecturers can be examined. Because this group of employees interacts with young adults, it may be that the intensity of SA and DA required will be seemingly reduced when compared with that required in secondary school teachers that interact with teenagers.

Future study may equally seek for ways to minimize the consequences of SA and DA on employees. This is important because the wellness of employees’ emotions can have positive ripple effects on their work performance. Supposedly, when quality attention is given to the heart, it spontaneously anticipates giving quality to the body. Besides, the aim of employees is not only to be rewarded at month-end but also to find meaning and value in workplace activities (Khaliq and Ogunsola, 2011; Feng et al., 2017; Fontaine, 2018; Ogunsola, 2018). In this regard, future study may consider investigating variables like spiritual intelligence to mediate the negative impacts of SA and DA on OC. Certainly, when employees feel good, there is hardly anything that is better at that moment; however, the instance when that feeling is disrupted, it takes a toll on the individual and possibly those around.
References


Impact of surface acting and deep acting techniques


Further reading


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