



## AN APPROACH TO HUMAN RESOURCE DEVELOPMENT OF NUCLEAR SECURITY FORCE: BANGLADESH PERSPECTIVE

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(Received: 30<sup>th</sup> June 2020; Revised: 22<sup>nd</sup> September 2020; Published: 28<sup>th</sup> October 2020)

**Abstract:** Bangladesh, the 33<sup>rd</sup> Member State of Global Nuclear Club, is committed to establish Nuclear Security Regime before commissioning its first Nuclear Power Plant (NPP) in 2023. Therefore, Bangladesh has formed Nuclear Security and Physical Protection System Cell (NSPC) under Bangladesh Army in 2017. However, NSPC could not formulate a formidable Nuclear Security Force (NSF) yet. Absence of an appropriate Human Resource Development (HRD) model for NSF in literature, heterogeneous force composition, feeble legal and regulatory framework, scanty HRD infrastructures and expertise in the field of Nuclear Security, insignificant research in Bangladesh caveat, etc. are generally identified as major impediments. At this backdrop, a non-experimental, exploratory research has been conducted to explore HRD modalities for NSF of Bangladesh. Available literary contents, international, and International Atomic Energy Agency (IAEA) guidance, global best practices, opinions of the Subject Matter Experts (SME) and structured response of the Key Informants (KI) were the basis of the research. Both primary and secondary data sources had been accessed applying cross-sectional non-probability purposive sampling techniques. Based on the research, this paper has proposed an HRD model and suggests modalities appropriate for HRD of NSF in Bangladesh caveat. Proposed model is structured as a networked-wheel model centering Nuclear Security Strategy of Bangladesh. It has three interrelated functional pillars: Training and Development, Workforce Development, and Organization Development. Eighteen elements of these pillars are interconnected through a comprehensive Knowledge Network. It has also proposed modalities for restructuring existing system, inter-agency collaboration, international cooperation, technology integration, mass awareness, security mind-set and culture, etc. Propositions of this paper may immensely assist Bangladesh in developing Human Resource (HR) of its NSF.

**Keywords:** *Nuclear Power Plant, International Atomic Energy Agency, Nuclear Security Regime, Nuclear Security Force, Human Resource Development, and Nuclear Security and Physical Protection System Cell.*

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## INTRODUCTION

Bangladesh has taken a courageous step in conceiving nuclear power as a component of National Energy Policy through commencement of Rooppur NPP project and aspires to excel this initiative further. Construction of NPP has three intermingled dimensions: functional/operational, technology and technical including nuclear safety, and nuclear security/physical protection. IAEA's milestone approach suggests a holistic progression of all three dimensions (*IAEA, 2013a, p. 2*). Within these dimensions, IAEA delineated Nuclear Security as the State's responsibility (*IAEA, 2013b, p. 4*). Therefore, Bangladesh has established NSPC under Bangladesh Army in 2017 for ensuring Nuclear Security of Rooppur NPP (*Ministry of Science and Technology, 2018, p. 34*).

Though apparently, 'Nuclear Security' seems as 'gun-guard-gate' model, it is far beyond that in current time. IAEA defines 'Nuclear Security' as *"the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive material or their associated facilities"* (*IAEA, 2015, p. 18*). State needs to establish a Nuclear Security Regime through critical nurturing of interdisciplinary approach. Nuclear Security Regime encompasses number of elements and activities including Human Resource Management (HRM). IAEA guidelines have directed HRD, a function of HRM, as an essential element for ensuring sustainable Nuclear Security Regime of a State (*IAEA, 2018b, p. 11*). Though other sectors of nuclear power infrastructure have progressed substantially in Bangladesh, it lacks in developing HR of NSF.

Organization and employment of NSF varies from country to country. Landscaping global guidance and best practices in Bangladesh parlance, NSF can be defined as *"a disciplined force competent with required skills and expertise on ensuring security to nuclear materials and installations within the state regulated through an organization legally authorised to regulate Nuclear Security aspects of the State"*. NSPC is tasked to ensure Nuclear Security and organize NSF well before the commissioning of Rooppur NPP. However, HRD related infrastructures for NSF has not progressed substantially. Nuclear Security is a classified State affair and preparedness of NSF is specific to national threat assessment (*IAEA, 2018b, pp. 9*). Therefore, State needs to generate HRD modalities for its NSF indigenously. Being incumbent, Bangladesh needs to address multifaceted requirements that necessitate a wide-ranged research on the question: *"How the HR of NSF can be developed in Bangladesh?"* Therefore, a comprehensive non-experimental, exploratory research has been conducted in quest of answering the question. The research identified major impediments to develop HRD related infrastructures for NSF. Addressing those impediments, this research could explore an appropriate and applied HRD modalities for NSF of Bangladesh.

Findings of the research are the constituent of this paper. This paper firstly highlights the methodology followed throughout the research. It then discloses research results in the form of describing explored NSF structure and HRD model for NSF of Bangladesh. Finally, it discusses the mending modalities of identified challenges in implementing the explored HRD model in Bangladesh perspective. It also put forward a few recommendations on HRD of NSF and scope for further research in this field.

## REVIEW OF LITERATURES

Universally accepted definition for HRD is not available in literature due to its dynamic evolutions. Throughout eighteenth and nineteenth century, developing HR evolved through 'Apprenticeship Training' programs, DeWitt Clinton's 'Vocational Education', 'Factory Schools' programme and Charles Allen's four-steps instructional method - "show, tell, do, check". In late 1930s, 'Human Relations' was included in describing organization as a 'Social Structure'. During the World War II, HR training was established as a profession and by 1970s it expanded beyond classroom to include 'Interpersonal Skills' within it; the term 'HRD' came into being (*Werner and DeSimone, 2012, p. 4*).

Often HRD and HRM are synonymously used though HRM is broader in scope. HRM can be defined as "*the effective selection and utilization of employees to best achieve the goals and strategies of an organization, as well as the goals and needs of employees*" (*Werner and DeSimone, 2012, p. 8*). HRD is either one of the primary functions or a stand-alone function within the HRM department. Distinctions between HRM and HRD minimized when Pat McLagan proposed a major shift of HRD from traditional Training and Development (T&D) through integrating 'Career Development' and 'Organization Development' issues (*McLagan, 1989, p. 49*). Thus, HRD was defined as "*a process for unleashing and developing human expertise through organizational development and personnel training and development for the purpose of improving performance*" (*Torraco and Swanson, 1995, p. 10*). Paul Bernthal et al. further portrayed an expanded view of HRD where T&D, the core functions of McLagan's HR wheel, was extended by 'Learning and Performance' (Werner and DeSimone, 2012, p. 8). This expansion could establish more vivid relation between organizational functions and HRD (McLean, 2010, p. 318). In later days, Svensson, et al. proposed 'Strategic HRD' concept involving HRD professionals into strategic functions of the organization (*Svensson, et al., 2009, p. 772*). Recent evolution of Industry 4.0 concept added 'External Partnerships' as a new dimension to the sustainable HRD (*Stachová, et al., 2019, pp. 1-5*). Through repeated evolution, HRD has become a function of organization, human, social and strategic domain in the present-day context.

HRD in the field of Nuclear Security is complex in nature as it bears global scope and deals with multidimensional physical threats. Allocation of sufficient HR is an essential element for sustaining a Nuclear Security Regime (*IAEA,*

2013, p. 5) of a user State and developing those HR is one of the vital national sustainability objectives (*IAEA, 2018b, p. 4*). HRD in Nuclear Security primarily includes education, training, exercise, awareness raising, workforce management, knowledge management and knowledge networks (*IAEA, 2018c, p. 7*). HRD is a long-term activity (Akbar and Jolly, 2013, p. 19). Therefore, IAEA milestone approach on developing nuclear infrastructure may be a preferred option for any State (*IAEA, 2013, pp. 1-3*). However, modalities for HRD of NSF in Bangladesh caveat is absent in literature.

Due to the varying threat scenario in States, various nuclear user States are following indigenous HRD systems. Indonesia follows layered education and training approach applying indigenous Systematic Approach to Training (SAT) model and conducts exercises involving all stake holders of the State (*Haditjahyono, 2014*). Vietnam's education and training system is monitored by a National Steering Committee. It integrated indigenous nuclear institution and departments of five general universities in nuclear education discipline (*Nguyen & Vuong, 2016, p. 6*). Pakistan conducts courses for NSF personnel on fixed installations protection, transports escort and emergency response (*Iftakhar & Noor, 2017, p. 5*). Philippines and Thailand are frontrunners in HRD programmes within Southeast Asia (*Trajano, 2019, p. 1703*). Many nuclear user States have adopted indigenous force-on-force exercises as a tool to HRD (*Bunn, Roth, & Tobey, 2019, pp. 62-63*). As Nuclear Security is a classified State affair, modalities of these indigenous approaches are not available in public literature. However, due to the growing demand of trained Nuclear Security workforce, various global universities are also offering Master's and PhD degree following IAEA education program (*Islam & Ahmed, 2016, p. 2*) to establish a global common platform.

## METHODOLOGY

### Study Area and Target Population

All concerned Nuclear Security stakeholders of Bangladesh were the target population of this research. SMEs of this research were the members of Bangladesh Atomic Energy Commission (BAEC), NSPC, National Working Group for developing Physical Protection System (PPS) of Rooppur NPP, Nuclear Power Plant Company Bangladesh Limited (NPCBL), Military Institute of Science and Technology (MIST), Bangladesh Army, Atomic Energy Research Establishment (AERE) and military forces operating at Rooppur NPP. Contents of national and international best practices (Russia, China, Japan, India, Pakistan, Indonesia, and Vietnam), related books, journals, guiding instruments, IAEA publications, etc. were studied for the purpose of this research. Military officers with the experience and/or knowledge on Nuclear Security were the KIs for this research. However, due to the non-availability of

NSF in Bangladesh, this research could not access real-time working information related to the NPP.

### **Research Questions**

This research primarily focused to obtain answer of the question “*How the HR of NSF can be developed in Bangladesh?*” In doing so, it also sought for the answer of following secondary questions:

- What is the appropriate HRD model for NSF of Bangladesh?
- How national and international NSF are developing their security related HR?
- What are the HRD related nuclear security infrastructures available at Bangladesh?
- What are the initiatives that Bangladesh has undertaken to enhance its HRD capabilities for NSF?
- What are the challenges in implementing HRD process for NSF in Bangladesh?
- How the challenges can be mitigated to develop HR of NSF?

### **Data**

Both qualitative and quantitative data were collected. Primary data were collected through informal interview of SMEs. These were the key sources of qualitative data. Quantitative data were collected through structured questionnaire survey conducted on security experts of Bangladesh Army. Secondary data were obtained through content analysis of various national and international regulations, guidelines, recommendations, best practice sharing, etc. with special emphasis on IAEA. This research applied Non-probability Purposive data sampling technique and each sample were accessed following Cross-Sectional method.

### **Research Methods**

Mixed methods were followed in this research. Quantitative data were analysed through descriptive statistical method using Statistical Package for the Social Sciences (SPSS) Version-23. For qualitative data analysis content, narrative and discourse methods were followed.

### **Personal Experiences**

The researcher himself had experience of working in the field of Nuclear Security in Bangladesh. As professional commitment, he had visited various nuclear related installations of Russia. He also represented Bangladesh in a technical meeting on SAT at IAEA Headquarters (HQ), Vienna. These were

highly contributory to carry out this research in a more authentic tone and proposals/recommendations were more practicable.

### **Research Design**

It was a non-experimental, exploratory, and applied research. Initially the researcher explored a suitable HRD model for NSF of Bangladesh through analysing contents of existing literature and views of the SMEs. The researcher then collected data to identify impediments, in its implementation at Bangladesh. Based on the identified impediments the researcher sought for mitigation means through accessing SMEs, KIs, and global best practices.

## **RESULTS**

Outcome of the research was a comprehensive ‘HRD model’ for NSF of Bangladesh. It also explored an appropriate NSF structure for Bangladesh.

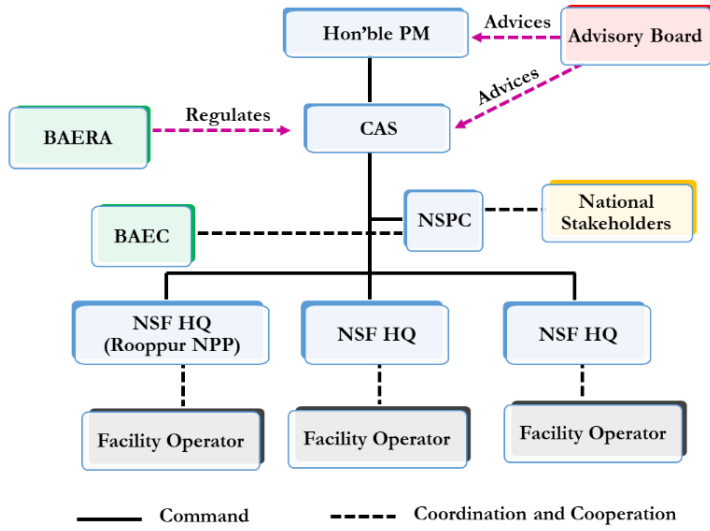
### **Proposed NSF Structure for Bangladesh**

Bangladesh has identified HRD as a priority area (*Shahid, 2019*), however, it is yet to finalize its NSF structure. Therefore, a functional structure for NSF is proposed in Figure 1. According to this proposition, the Honourable Prime Minister may command and administer all site-specific NSFs through the Chief of Army Staff (CAS). CAS may be answerable to Bangladesh Atomic Energy Regulatory Authority (BAERA) for all Nuclear Security affairs of the State.

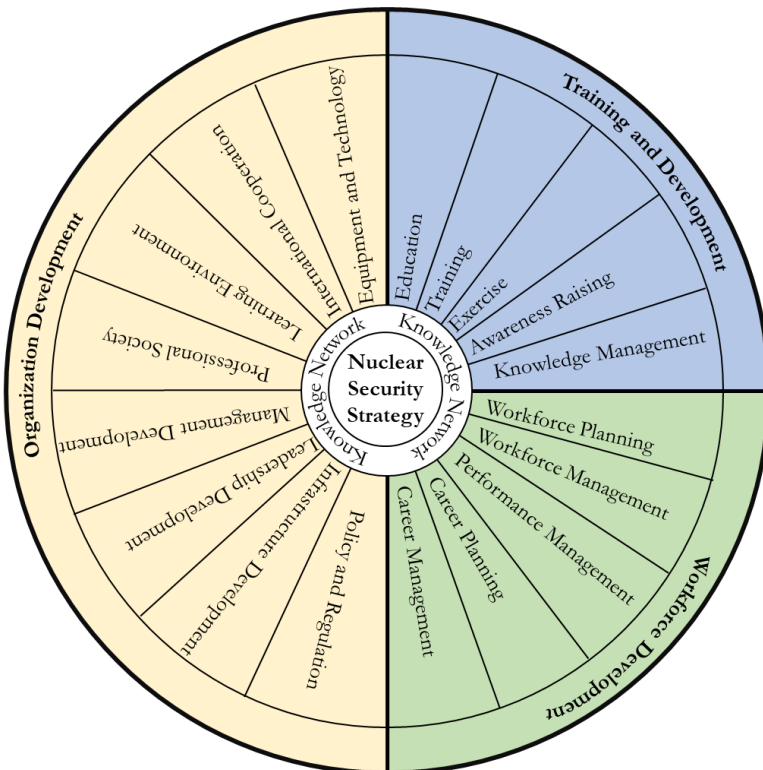
Each NSF may broadly be categorized into three units: Security Management Unit (SMU), Security Operations Unit (SOU) and Technical Security Unit (TSU) (*IAEA, 2018a, pp. 50-51*). Force HQ of NSF at sites should be considered as SMU. Units directly or indirectly engaged to on-site security of nuclear facilities may be considered as SOU and the establishments that will provide technical and other administrative assistance to the on-site force may fall under TSU. Unit members should be categorized in four groups: management level leaders (senior leaders beyond unit commanders), operation level leaders (officers as unit/subunit/detachment commanders), supervisors [Junior Commissioned Officers (JCO) and Non-Commissioned Officers (NCO)], and soldiers.

### **Proposed HRD Model for NSF of Bangladesh**

Figure 2 is the proposed HRD model for the NSF of Bangladesh. It is a networked-wheel model. Nuclear Security Strategy of the State is the foundation of this model. It has three core functional pillars, and each pillar is composed of numbers of related elements. Synergy among these functions and elements is accomplished through a comprehensive ‘Knowledge Network’.



**Figure 1:** Proposed Command and Control Structure of NSF

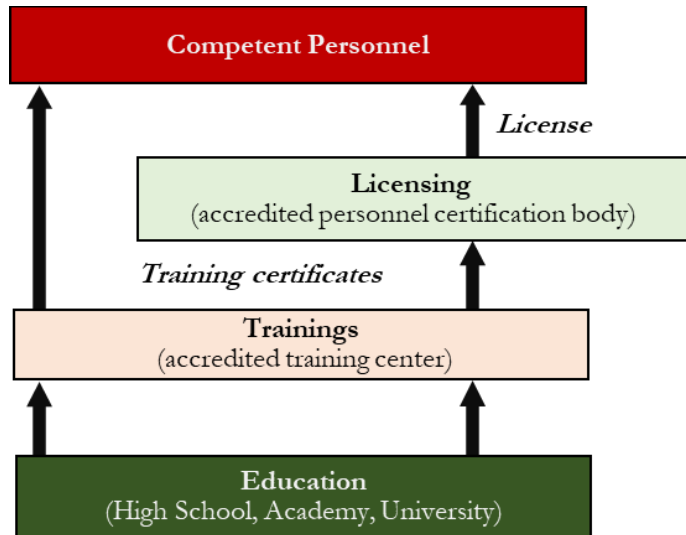


**Figure 2:** Proposed HRD Model for NSF of Bangladesh



### ***Training and Development***

T&D is the most important functional pillar for developing HRD of NSF. It will generate a competent person through imparting layered education and training as shown in Figure 3.



***Figure 3: Layered Competence Development for NSF***

**Education:** Education may be provided in the form of general awareness education through national education curriculum; occupational education programmes in the form of undergraduate education through technical or vocational institutions, graduation and advance degree through universities; and individual career development programmes including instructional ability enhancement programme. Bangladesh should conduct a need assessment and formulate national policy and strategy for Nuclear Security education encompassing all mode of education. NSPC and stakeholders should also formulate their education policy to strengthen Safety-Security-Safeguard (3S) interface. Soldiers of NSF should be educated through various cadres run by the NSF organization and Nuclear Security training institutions. Supervisors (JCOs and NCOs) should be either directly recruited with prerequisite undergraduate degree or made competent through technical and vocational institutions. Nuclear Security training institution may have the capability to run up to postgraduate programme. Officers should obtain minimum graduation on Nuclear Security discipline. Educational institutions of Bangladesh Armed Forces, i.e. MIST, Bangladesh University of Professionals (BUP), etc. may be utilized for such education. IAEA guidelines should be the basis of all education. NSPC, in collaboration with the Government, should establish



regional and international cooperation in the form of sending NSF members abroad and/or hiring foreign specialists. Distant learning may also be arranged with international network-based institutions.

**Training:** NSF training may be classroom and practical training, on-the-job training, train the trainer, virtual training, and collective training. Units may have adequate training aids to organize periodic refresher training. Separate wing of NSPC may monitor, coordinate, and assist training curriculum, and develop virtual training system in cost-effective manner. Collective training may integrate all stakeholders for enhanced 3S interface. Few military training institutions may be utilized for initial HRD. Nuclear Security training institutions may be established as a priority with assistance of Russian Federation, IAEA, and/or other countries. Selected NSF members may be sent abroad for 'Train the Trainer'. All training initiative should follow a functional SAT model.

**Exercise:** Exercises may be in the form of tutorial exercise, table top exercise, workshops, map exercise, communication exercise, decision making exercise, contingency plan validation exercise, tactical exercise without troops, force-on-force exercise, emergency response exercise, situation exercise, general field training exercise, etc. NSF may conduct standalone exercise and/or sometimes integrate on-site and off-site stakeholders, other related national agencies, regional or international alliances, etc.

**Awareness Raising:** BAERA may implement national awareness raising programmes focusing public, policy makers, operators, and authorized persons. Information sensitivity and 'need-to-know' rule should get preference. Awareness raising programmes of NSPC should develop desired behaviours and beliefs among NSF members and stakeholders. NSPC may adopt 'Centre of Excellence' approach to implement awareness raising through knowledge sharing.

**Knowledge Management:** BAERA may formulate National Nuclear Security Knowledge Management strategy and Ministry of Science and Technology (MOST) should operate a National Knowledge Database. NSPC should develop inter-connected knowledge management system including individual and organizational knowledge. Knowledge databases may have the capability to archive, retrieve, transform, interpret, disseminate, and protect acquired knowledge. It may connect education and training systems with controlled access.

### ***Workforce Development***

BAERA may define level of competences for NSF and NSPC should develop tailored strategies for workforce development. Strategy may ensure long-term availability of key HR in the nuclear facilities.

**Workforce Planning:** Planning should address both short and long-term needs. It may include recruiting-to-retirement cycle, force development, additional force requirement for emergency situation management, succession planning, etc.

**Workforce Management:** An independent board may initially recruit members from all the law enforcing agencies of Bangladesh with majority force from Bangladesh Army. Subsequent recruitment may be institutionalized through an independent in-house recruiting organization. Candidate may undergo a software and hardware based qualitative and quantitative examination that includes physical, educational, and psychological test. Both Intelligence Quotient (IQ) and Emotional Quotient (EQ) test should be given preference for selecting officers. Criminal records or tendency may be verified by Bangladesh Police and Directorate General of Forces Intelligence (DGFI). Recruiting strategy may attract competent and intellect candidates to join NSF through promoting opportunities and remunerations. Workforce may be regulated and managed through Nuclear Security Act and organizational Standard Operating Procedures (SOP). Stable and secure employment environment should be ensured through digitized HRM system.

**Performance Management:** NSPC may periodically evaluate performance needs, gaps, and reasons. Evaluation system should encompass long-term perspective to evaluate uneven development of individual skills. It may also identify functional deficiencies in the workforce management system and suggest corrective measures.

**Career Planning:** NSF career may be organized in various tiers following rank structure of Bangladesh Army, controlled by a separate wing at NSPC. “One must have institutional education and training on Nuclear Security” - should be a basic rule for leaders’ career progression.

**Career Management:** NSPC may arrange appropriate remuneration and reward that commensurate employees’ contribution. It may design and forecast clear career path towards higher positions to set individual professional goals and to strive for promotion. It may also organize competence-based assignment and skill development opportunities for NSF members.

### ***Organization Development***

Bangladesh may emphasize on developing organizational infrastructure for NSF to establish a sustainable Nuclear Security Regime.

**Policy and Regulations:** Bangladesh may enact Nuclear Security Act immediately. NSF should be authorized by law as ‘Competent Authority’, which will operate under the CAS. NSPC may formulate related SOPs for force management and pursue the Government for enacting subsequent laws and acts.

**Infrastructure Development:** Bangladesh may establish an indigenous Nuclear Security training institution; a university for educating all disciplines on nuclear science and technology, and 3S; and one or more vocational training institutions on nuclear disciplines. Nuclear Security department may also be opened in existing education institutions. Military and other law enforcing agency's training institutions may be equipped and staffed for ad hoc training of initial NSF members. International cooperation is necessary for foreign training, training aid procurement and hiring foreign trainers.

**Leadership Development:** NSF leaders should be both intellectually and emotionally robust. They should attain adequate knowledge on 3S, technology, national and international rules, and regulations, etc. Officers should attain graduation whereas JCOs and NCOs should have diploma degree on Nuclear Security. Soldiers should be trained on elementary leadership to independently manage crisis.

**Management Development:** Management system of NSF may ensure coherent and congenial relation among leaders and led to work in utmost synergy as a spirited team. Management may strike a balance between strictness to task performance and compassion to human problems.

**Professional Society:** BAERA, through other related ministries, may undertake national action plan for developing macro-level professional society on Nuclear Security. NSPC may develop micro-level professional society at facility sites through fostering Nuclear Security culture within the facility and its peripherals.

**Learning Environment:** Bangladesh may establish "Centre of Excellence" and connect with regional and international organizations. NSPC may conduct study period, seminar, training, workshops, etc. at facilities integrating local people also. Digital gadgets and secured network may be utilized for sharing knowledge among stakeholders.

**International Cooperation:** Bangladesh may extend international cooperation in the form of education, training, joint exercise, seminar, workshop, presentation, visit, procurement, etc. at various levels.

**Equipment and Technology:** HRD for NSF may be state-of-the-art technology driven. NSF members may be trained in handling modern technology-based equipment. Civil intellects may also be integrated in indigenous equipment development.

### ***Knowledge Network***

Bangladesh may develop National Knowledge Networks in the form of Nuclear Security Support Centre (NSSC), involving all stakeholders and specialized groups, for enhanced cooperation, coordination, and knowledge sharing. It may also be connected to the global knowledge networks on Nuclear Security. NSPC

may develop Organizational Knowledge Network for sharing knowledge among NSF members with common roles, responsibilities, good practices, etc.

## **DISCUSSIONS**

This paper has proposed an HRD model for NSF of Bangladesh through conducting a comprehensive non-experimental exploratory research. Basis of the research was the available contents, international and IAEA guidance, global best practices, opinions of the SMEs and structured response of the KIs. Proposed HRD model for NSF has three interrelated functional pillars: Training and Development, Workforce Development and Organization Development. All elements of these three pillars are interconnected through a comprehensive Knowledge Network. It has also proposed a hierarchy of NSF structured under the Honourable Prime Minister through the CAS. In implementation of the proposed HRD model and NSF structure, Bangladesh is likely to overcome few of the challenges. This research has also identified the challenges and their mitigation means. These are discussed in subsequent paragraphs.

### **Challenges in Implementing HRD System for NSF**

Bangladesh faces following major challenges in establishing Nuclear Security Regime and implementing HRD model for its NSF:

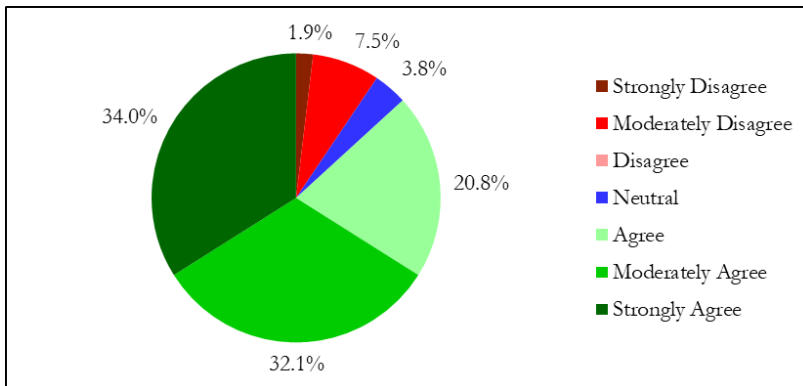
- Security overlooking psyche of the policymakers.
- Absence of inter-agency cooperation and coordination mechanism.
- Absence of holistic qualification requirements for initial NSF.
- Dilemma on career-cycle of initial NSF members.
- Insufficient international cooperation.
- Ad hoc structure and inadequate staffing of NSPC to address HRD issues.
- Inadequate focus and absence of Nuclear Security experts in BAERA and BAEC.
- Absence of joint working environment between BAEC and NSPC.
- Absence of an effective legal framework.
- Absence of education programmes and indigenous institutions.
- Training institutions of Law Enforcing Agencies are not equipped and staffed to train on Nuclear Security.
- Absence of a definite recruiting system.

## Ways Ahead for Bangladesh in Implementing HRD Modalities for NSF

Mending modalities of identified challenges to functionally implement proposed HRD model in Bangladesh caveat are highlighted in subsequent paragraphs.

### ***Awareness Raising***

BAERA and BAEC may minimize security overlooking psyche of top leaders and policymakers through undertaking a comprehensive awareness raising programme which may include various seminars and workshops, visit to nuclear facilities abroad, etc. 70.5% respondents opine that proactive engagement of NSPC with policymakers will raise awareness among senior leaderships on Nuclear Security issues (Figure 4). At organization level, NSPC may ensure flow of information through evaluation, remuneration and punitive measures. Awareness raising programme may be incorporated through training, motivation, poster, leaflets, e-message, etc.



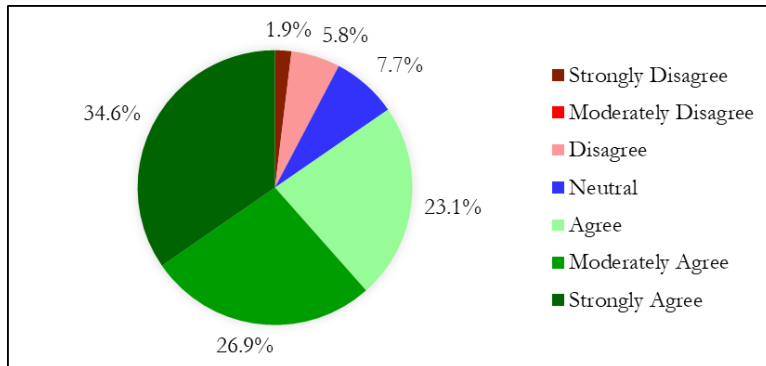
**Figure 4:** Respondents' Views on "Awareness Raising Needs Proactive Engagement of NSPC with Policymakers".

### ***Formulating Legal and Regulatory Framework***

Bangladesh, through Ministry of Law, may enact Nuclear Security Act on priority basis. BAERA, in coordination with BAEC and NSPC, may formulate supplementary regulations related to the HRD of NSF. Bangladesh may appoint Bangladesh Army as the 'Competent Authority' for Nuclear Security affairs of the State by law. Law may delineate the command and control structure in line with the proposition of this paper.

### ***Restructuring BAERA and BAEC***

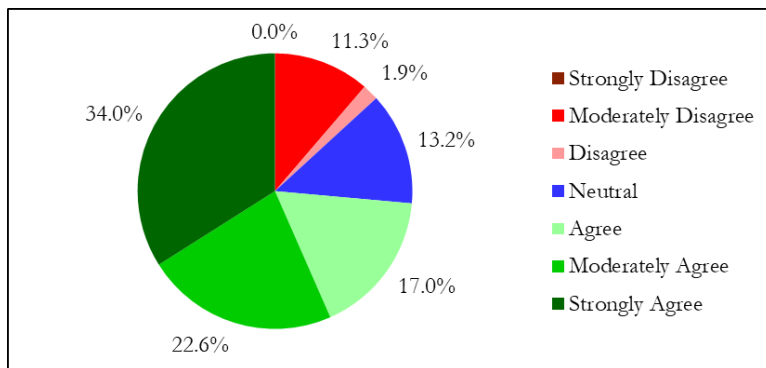
Both BAERA and BAEC need to be restructured and adequately staffed with Nuclear Security experts (Figure 5). Mission and role of both these organizations should incorporate Nuclear Security issues in clear terms including HRD aspects. Nuclear Security experts from Bangladesh Army, serving/retired, may also be deputed and/or appointed to BAEC and BAERA.



**Figure 5:** Respondents' Views on "Nuclear Security Experts at BAERA is Inadequate to Address HRD of NSF".

### ***Establishing Indigenous Training and Education Infrastructures***

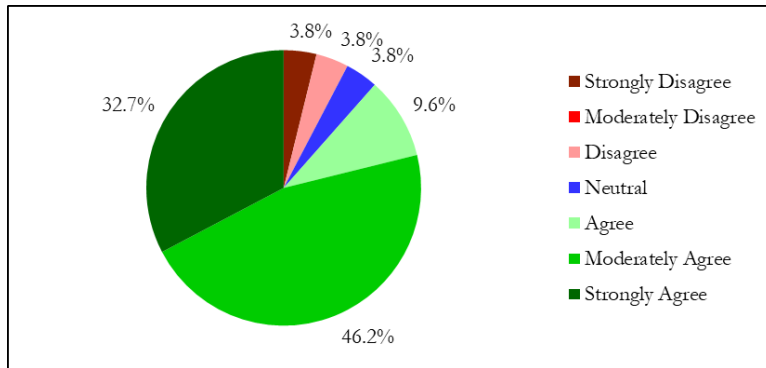
Generic Nuclear Security awareness lessons may be included into the textbooks of secondary and higher secondary standard (Figure 6). Ministry of Education may arrange diploma on Nuclear Security to few technical or vocational institutions, and graduation and advance degree in few public or private universities with preference to military institutes. Bangladesh should also establish indigenous Nuclear Security education and training institutions on priority basis with the assistance of IAEA and other expert countries.



**Figure 6:** Respondents' views on "Nuclear Security Lessons need to be included in National Education Curricula".

### ***Framing Inter-agency Coordination Mechanism***

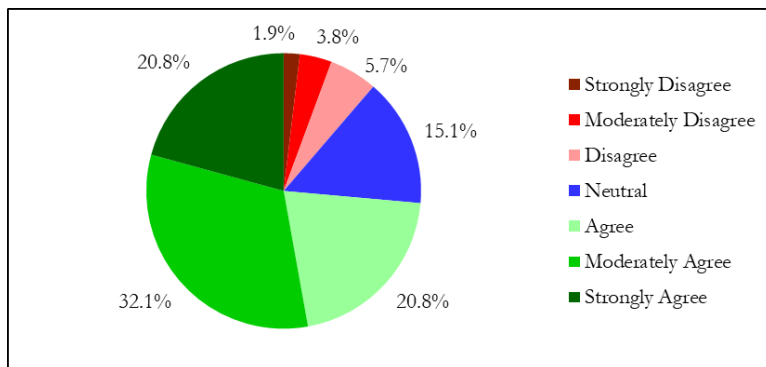
Bangladesh should initiate a functional mechanism for inter-agency coordination on Nuclear Security (Figure 7). Stakeholders may meet periodically to share their knowledge, observation, and concern. Inter-agency coordination may be enhanced through holistic training, social interactions, coordination cell at NSPC and BAERA, inter-agency posting, flow of information, publishing journals and periodicals, etc.



***Figure 7: Respondents' Views on "Bangladesh Needs an Inter-agency Coordination Mechanism for Nuclear Security".***

### ***Restructuring NSPC***

NSPC needs to be restructured and adequately staffed for managing all HR aspects of NSF (Figure 8). It may have various wings for addressing all HRD related activities as proposed in the HRD model for NSF.



***Figure 8: Respondents' Views on "NSPC Needs Restructuring to Accommodate HRD Aspects of NSF".***



### ***Planning and Management of Initial NSF***

Initial workforce may be generated through permanently recruiting from feeder organizations. Engineer Centre and School of Military Engineering (ECSME), Electrical and Mechanical Engineering Centre and School (EMEC&S), Bangladesh Infantry Regimental Centre (BIRC), East Bengal Regimental Centre (EBRC) and School of Infantry and Tactics (SI&T) may be equipped to train this workforce by procuring training aids on priority basis, hiring foreign trainers, ‘train the trainer’ abroad, etc. A common platform may be created to accommodate recruited members from diverged agencies.

## **RECOMMENDATIONS**

From the findings and discussions of this research, followings are recommended for the HRD of NSF in Bangladesh:

- Bangladesh, through its various organs, may implement the explored HRD modalities of this research for developing its NSF.
- NSPC may generate NSF for Rooppur NPP on immediate basis following proposed NSF structure.
- Ministry of Law, as a priority, may formulate Nuclear Security Acts and designate Bangladesh Army as ‘Competent Authority’ for Nuclear Security by law.
- Ministry of Education and NCTB may restructure existing education system of Bangladesh to integrate and accommodate Nuclear Security education at various tiers of national education curricula. NSPC may develop indigenous education and training infrastructures as a priority.
- BAERA, BAEC, and NSPC may be restructured for accommodating Nuclear Security aspects.

Followings are recommended for further outlook and research:

- Once NPP is operative, modalities proposed in this research may be revised incorporating opinions and experiences of nuclear workforce.
- Modern HRD encompasses cognitive domain, i.e. attitude and behaviour of the workforce and organizational culture. Further research may be conducted on cognitive domain of NSF.

## **CONCLUSION**

Any State wishing to peacefully utilize nuclear power is legally obligated to the international forum for ensuring its security in global terms. It may, therefore, establish a comprehensive Nuclear Security Regime within the State. Construction of NPP needs a balanced approach among all its dimensions. Though Bangladesh

could substantially progress in developing other dimensions of NPP, Nuclear Security aspects need expedite attention to harmonize overall efforts.

Nuclear Security is a classified State affair. Again, threat patterns are State/region centric and geo-politic dependent. Therefore, States need to develop HRD modalities for its NSF indigenously. To assist Bangladesh in developing its HR in the field of Nuclear Security, this paper proposed an HRD model explored through a systematic research. It also proposed a hierarchy of NSF structured under the Honourable Prime Minister through the CAS. The research identified that the proposed HRD model and hierarchy structure of NSF is the most appropriate approach in Bangladesh caveat.

This paper highlighted a few challenges in implementing the proposed HRD model that encompasses: policymakers' psyche, inter-agency cooperation and coordination, holistic qualification requirements, carrier-cycle of initial NSF members, international cooperation, structure and focus of NSPC, BAERA and BAEC, legal framework, recruiting system, indigenous education and training support structures, etc. It also articulated mitigation means for identified challenges. Mending modalities emphasized on awareness raising initiatives at all level, legal and regulatory framework formulation, indigenous training and education infrastructures development, coordination among concerned agencies, restructuring NSPC, BAEC and BAERA, and management of initial NSF.

Developing HR of NSF involves integrated effort of all related stakeholders where holistic planning, coordination, management, and implementation are essential ingredients. Drives of the policymakers and top-level management, and institutionalization of Nuclear Security culture into the members' behaviour and attitude can develop a functional HRD system for NSF of Bangladesh.

## ACKNOWLEDGEMENTS

The author would like to express his gratitude to the National Defence College (NDC), Mirpur, Dhaka, Bangladesh. He also presents his appreciation to the Editors and the anonymous reviewers of the *NDC E-JOURNAL* for their insightful inputs to improve the manuscript.

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