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Structural Equation Modelling to Reinforce IAEA Safeguards Methodology and Effectiveness Evaluation

By revealing the effects of data collection, analysis of plausible acquisition pathways, safeguards criteria, and conducting safeguards activities on building a reference from safeguards conclusion to evaluation of verification activities and vice versa; valuable input to management will be valid to direct resources and prioritize efforts. This will help to establish clear distinction between evaluation of the state and evaluation of Secretariat's performance in applying safeguards activities, in particular activities with low detection probability (less than 20%). This will work to assure the conformity and consistency of the processed information, enhance the systematic approach, and reinforce effectiveness evaluation.

The research methodology requires building a proposed model consisting of factors from each of the following levels:

\- Data Collection,
\- Acquisition Path Analysis,
\- Selection of Safeguards Criteria and Activities Planning,
\- Conducting In-Field and HQ Safeguards Activities.

The relationships among the factors of each level are combined and studied in a multi constructs to explore the relationship among these factors.

Methods and technique that is used in this research is the Structural Equation Modelling (SEM). Multi-linear Regression model is used to create one model with different constructs. The validity of the proposed hypothesis is tested using the SEM.

Data collection includes information provided from the State, open sources, and State capabilities. Quantity goal and Timeliness goal are factors considered in each step in the Acquisition Path Analysis (APA) level to determine the time needed to accomplish each plausible acquisition pathway. Selection of Safeguards Criteria and activities planning Level includes factors like establishing and prioritizing Technical Objectives, identifying applicable Measures, and developing annual activities plan. Declaration and verification in Bulk-handling Facilities involve measurements like weighing, Destructive Analysis, and Non-Destructive Analysis that depend on lab procedures, equipment and calibration. Differences between different measurement will occur with or without mistakes and/or malfunctioning. Significance level, measurements and remeasurements, quality and uncertainty are factors considered in the level of conducting infield safeguards activities.

Data Analysis is conducted for the parameters to test of reliabilities and validation of the proposed model. Amos software is used to item measures for each factor on other factors.

Which "Key Question" does your Abstract address?

TEC3.6

Which alternative "Key Question" does your Abstract address? (if any)

TEC3.4

Topics

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