

Research on Tech-Mining with Knowledge-based ST&I Strategy for Decision-Makers

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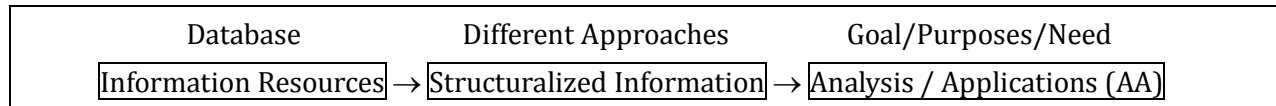
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Abstract

Tech mining is in nature knowledge mining as a method of foresight towards the future-oriented technology analysis (FTA) or a method of technology generation. In a Triple-Helix System of Innovation, funding to technology research and development relies on institutional arrangements involving policy supports. However, in a knowledge-based economy, decision-making under risks and pressures involves with both expert groups and non-expert groups. Some experts and scholars are listed in the talent dataset by the government sectors for selecting when confronting with decision needs. Two legitimate Research Questions are concerned in this paper: First, how technological development plans would be designed with whatever bases? And second, can experts for future technologies and non-experts communicate among one another? Notwithstanding, how can technologies be coped with human wants? Future-oriented technology analysis must deal with the problems of choices about technological development in that are there any ingredients about future demand for more humanistic technologies. For example, in an ageing society, programs of technology foresight and suggestion for policy help in developing new technology with friendly usage and application for elderly and kids (another issue related to inclusion). In actual, the development and applications of technology must be society-specific and also demography-oriented. In that sense, the so-called 'future-oriented' must be given with the (fifth) new sense for analysis, a la Porter (2010) and Weber et al (2012). With a matrix analysis, this paper discusses the possible improvement of FTA method from mining into future needs and suggests for further research.

Abbreviating Porter's (2010) family methods, forms of analyzing TFA include three categories: Technological intelligence (TI) evolved into critical technology intelligence (CTI), Technology forecasting and roadmapping, and Technology assessment and technology foresight. TFA methods may be specific to different research entities/goals with various structured information resources. Information resources (such as status and competitiveness of R&D activities or S&T development) are to be classified (into viable information structure) and analyzed (for analytical purposes) by using different approaches of TFA, as shown in the box diagram below.



TFAMWG (2004) demonstrates that TFA framework characterizes itself as systematic process to generate judgments about emerging technology elements, paths of development and potential impacts. Briefly, TFA methods are made applicable in suitably combining STI studies of technology foresight, technology forecasting and technology assessment, and with policy evaluation. The inspired and also implied methodological issue concerned in this paper is of two folds. The first aspect is regarding to the problem lying in the identification of goals, purposes, and the like. The matching between issues and purposes would be confirmed in advance to TFA actions. The problem may be easily solved for smaller organizations than the larger ones. The more complex a system involved with TFA, the less likely a single form of TFA method would serve for the multiple purposes of science, technology and innovation development. The second aspect is about the method of Tech-Mining. Tech-mining can be regarded as a more fundamental way for structuring information resources in the beginning stage. However, it becomes a more broadly connected to and complementary with other methods of TFA to be useful platform that opens to various potential approaches to combine with. Hence, tech mining would be an efficient way of dealing with open innovation and for the management of technology development, for firms and for nations. The TFAMWG (2004) displays a list of challenging questions recognizing critical contributions of TFA methods with some key notes:

- ✧ Some common features with standard practices
- ✧ Usage for multiple methods with mutual complementarity
- ✧ Uniqueness of expert opinions method with specificity
- ✧ Proposal with linear practice but looking for multivariate and non-linear interactions
- ✧ Time horizon matters with methodological appropriateness
- ✧ Scale matters with impact assessment
- ✧ Dual-way of mutual influence in technological development and socioeconomic impacts
- ✧ Process and product interplays are of important consideration for TFA being useful

Overall, TFA emphasizes evenly among information structure, methods, impacts and contextual mutuality to solve future-oriented STI development problems. That paper appeared in 2003, some ten years ago, tending towards maturing in 2013 so far. The new challenges faced TFA (as the fifth sense claimed above) would be complex process of innovation rather than complex network; multiple patterns of convergence rather than simulation modeling of complex adaptive system; and, big database with complex information structure rather than search of vast database.