CLASSICAL AND MODERN MOTIVATION THEORIES APPLIED TO RESEARCHER ENGAGEMENT IN COMMERCIALIZATION OF SCIENTIFIC-TECHNICAL PRODUCTS AT HIGHER EDUCATION INSTITUTIONS

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Understanding what motivates academic researchers to engage in the commercialization of scientific-technical products is fundamental to designing effective institutional policies and incentive systems. While universities worldwide have established formal structures for technology transfer, the participation rates of individual researchers remain highly variable. Some scientists actively pursue patents, licensing, and spin-off creation, while others remain exclusively focused on traditional academic outputs such as publications and teaching (D'Este & Perkmann, 2011). The question of researcher motivation in commercialization sits at the intersection of several theoretical traditions: organizational psychology, innovation management, and the economics of science. Classical motivation theories developed by Maslow (1943), Herzberg (1959), and Vroom (1964) provide foundational frameworks for understanding human motivation in organizational settings. More contemporary approaches, including Self-Determination Theory (Deci & Ryan, 2000) and the Porter-Lawler integrated expectancy model (Porter & Lawler, 1968), offer refined perspectives particularly relevant to knowledge workers and creative professionals. Empirical research has consistently demonstrated that academic scientists' motivations for commercialization are complex and multidimensional. D'Este and Perkmann (2011) found that there is a diversity of motivations for commercial engagement, and that many researchers engage for reputational and intrinsic reasons rather than primarily for financial rewards. Similarly, Lam (2011) identified that scientists' commercial engagement is driven by a combination of "gold" (financial), "ribbon" (reputational), and "puzzle" (intrinsic curiosity) motives.

Despite this growing body of research, there remains a need for a comprehensive theoretical framework that integrates classical and modern motivation theories specifically applied to the university commercialization context. This is particularly important for developing countries like Uzbekistan, where designing appropriate motivation mechanisms requires deep understanding of what drives researchers in specific cultural and institutional contexts.

The purpose of this study is to: (1) systematically review classical and modern motivation theories and assess their applicability to academic researcher commercialization behavior; (2) identify and categorize the specific motivation factors that influence researcher engagement in commercialization; and (3) develop an integrated

theoretical framework for understanding and enhancing researcher motivation in the HEI commercialization context.

Abraham Maslow's hierarchical model proposes that human needs are arranged in five levels: physiological, safety, belongingness, esteem, and self-actualization

1-table

Application to researcher commercialization:

Need Level	Manifestation in Academic Context	Connection to Commercialization
Physiological	Adequate salary, basic living conditions	Financial returns from licensing/patents
Safety	Job security, tenure, stable funding	Diversified income streams, industry connections
Belongingness	Research community, departmental belonging	Entrepreneurial communities, startup networks
Esteem	Academic reputation, peer recognition	Inventor recognition, successful products
Self-actualization	Scientific discovery, societal impact	Seeing research applied, solving real problems

Lam (2011) found that established professors (who have satisfied lower-level needs) are more likely to engage in commercialization for self-actualization motives — seeing their research make real-world impact — while early-career researchers are more sensitive to financial incentives addressing safety and physiological needs (Lam, A. (2011). Frederick Herzberg distinguished between hygiene factors (whose absence causes dissatisfaction) and motivators (whose presence creates satisfaction and motivation) (Herzberg, F., Mausner, B., & Snyderman, B. B. (1959). *The Motivation to Work* (2nd ed.). John Wiley & Sons).

Hygiene Factors (dissatisfiers if absent):

- Fair IP revenue distribution policies
- Clear institutional rules for commercialization
- Time allocation for non-teaching/research activities
- Administrative support for patent filing
- Absence of punitive consequences for failed commercialization attempts

Motivators (create positive motivation):

- Recognition as an inventor/innovator
- Achievement in bringing research to market
- Professional growth through industry experience
- Responsibility and autonomy in commercialization decisions
- Meaningful work — seeing research solve societal problems

Baldini et al. (2007) confirmed Herzberg's framework in the university context, finding that Italian researchers were primarily deterred from patenting by hygiene factors (bureaucratic procedures, unclear IP rules) rather than by lack of motivators. Victor Vroom's theory proposes that motivation (M) is a function of three factors: Expectancy (E) — belief that effort leads to performance; Instrumentality (I) — belief that performance leads to outcomes; and Valence (V) — value placed on outcomes. M = E × I × V (Vroom, V. H. (1964). *Work and Motivation*. John Wiley & Sons).

Application to researcher commercialization:

- **Expectancy:** Does the researcher believe their research can be successfully commercialized? (Affected by: TRL level, market awareness, prior commercialization experience)
- **Instrumentality:** Does the researcher believe that successful commercialization will actually lead to desired rewards? (Affected by: institutional policies, TTO transparency, trust in the system)
- **Valence:** How much does the researcher value the potential rewards? (Affected by: personal goals, career stage, financial situation, disciplinary culture)

Markman et al. (2008) applied expectancy theory to academic entrepreneurs and

Application to researcher commercialization:

The model suggests that researcher commercialization motivation depends on:

1. **Perceived value of reward** — both financial (royalties, equity) and non-financial (reputation, career advancement)
2. **Perceived effort-reward probability** — likelihood that commercialization effort will actually result in rewards
3. **Effort** — actual time and energy invested in commercialization
4. **Abilities and traits** — entrepreneurial skills, business knowledge
5. **Role perceptions** — whether researcher sees commercialization as part of their role
6. **Performance** — actual commercialization outcomes (patents, licenses, revenue)
7. **Perceived equitable rewards** — fairness of reward distribution
8. **Satisfaction** — which feeds back into future motivation

This cyclical model is particularly useful for understanding why some researchers disengage from commercialization after initial attempts — if performance does not lead to perceived equitable rewards, satisfaction drops and future motivation declines.

1. Seven major motivation theories (Maslow, Herzberg, Vroom, Porter-Lawler, SDT, McClelland, Adams) each provide partial but complementary explanations for researcher commercialization behavior. No single theory is sufficient; an integrated approach is necessary.

2. Self-Determination Theory offers the most comprehensive single-theory framework, with its emphasis on autonomy, competence, and relatedness needs and its prediction that external rewards can crowd out intrinsic motivation in creative professionals.

3. Researcher motivation factors fall into four empirically distinct categories: financial/material, reputational/professional, intrinsic/cognitive, and institutional/environmental. Intrinsic factors (intellectual challenge, desire to see research applied) are consistently the strongest motivators for sustained engagement, though financial factors serve as necessary baseline conditions.

4. The proposed four-level integrated framework (Foundation → Enablers → Activators → Sustainers) provides a hierarchical model for designing motivation mechanisms, where lower levels must be satisfied before higher levels can effectively motivate.

5. Key distinctive features of researcher motivation include: primacy of intrinsic motivation, tension between academic and commercial identities, career stage effects, and disciplinary differences. Effective motivation mechanisms must account for these specificities rather than applying generic organizational incentive models.

6. For developing country HEIs such as those in Uzbekistan, the most critical immediate priority is establishing Level 1 foundation conditions (clear policies, fair sharing, basic support), followed by building Level 2 enablers (training, mentoring, networks). Level 3 financial activators will only be effective once the foundation is in place.

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