Aiding by Text Mining Approach to Gauge Innovation Pathways for two Solid Lipid Nanoparticles (SLNs) Applications

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Introduction
Solid lipid nanoparticles, or liposheres, are rapidly emerging as a new class of safer and more effective gene/drug delivery vectors. Considering their unique properties, such as small size and large surface area, scientists are attending to this domain in order to improve delivery performance of pharmaceuticals and therapeutic effects. As two important SLN applications, anti-cancer therapy and cosmetic production have advanced notably in recent years.

Methodology
In this paper, we adapt a text mining approach to treat the information gleaned from SLN patents (Derwent Innovation Index) and from a commercial dataset (ABI/Inform) to extract intelligence on key technology components and functions, major stakeholders, and potential markets.

Specifically we divide patent and commercial data into different time intervals and compare the research clusters (using keywords and IPC codes) to indicate temporal R&D patterns, convergence and divergence, cooperation modes among major market participants, and roadmap paths to particular applications (anti-cancer therapy and cosmetics). By tracing and comparing the innovation pathways for two applications, we then point out the potential developmental directions. Here, we also intend to engage domain experts to review and help interpret the observed patterns.
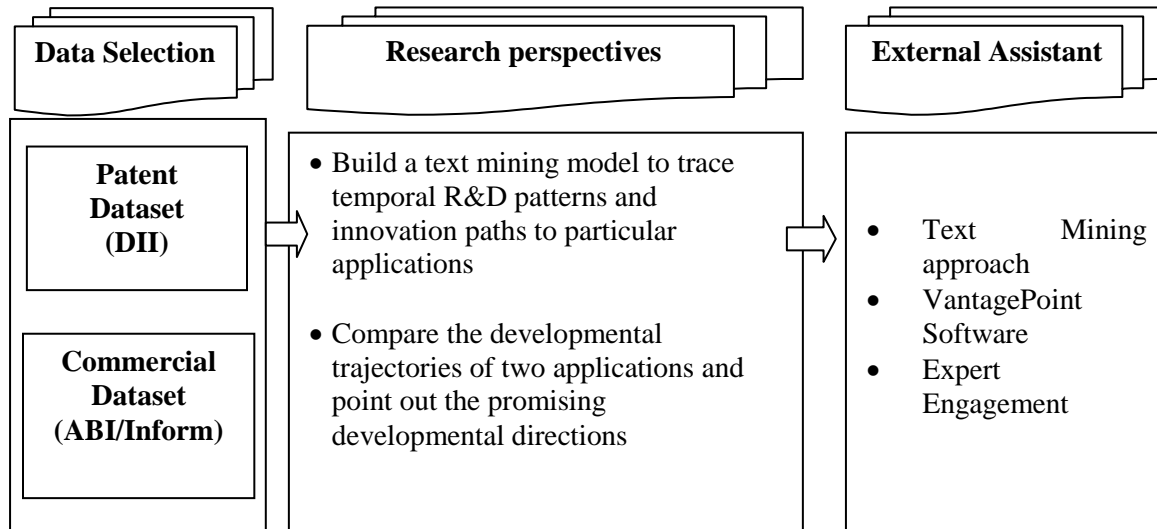
Based on such logic, the main contributions in this paper are as follows:

- Build a text mining model to combine information from patent and commercial activity datasets to trace temporal R&D patterns and innovation paths for particular SLN applications, with use of visualizations

- Compare the developmental trajectories of two applications and point out the promising developmental directions in the future.

Framework
The research framework for this paper can be seen in Figure 1. We are particularly interested in comparing developmental patterns to see if such analyses can offer "leading indicators" predictive of future trajectories.

- Figure 1 Analysis Framework

Data Selection	Research perspectives	External Assistant
Patent Dataset (DII) **Commercial Dataset (ABI/Inform)**	• Build a text mining model to trace temporal R&D patterns and innovation paths to particular applications • Compare the developmental trajectories of two applications and point out the promising developmental directions	• Text Mining approach • VantagePoint Software • Expert Engagement