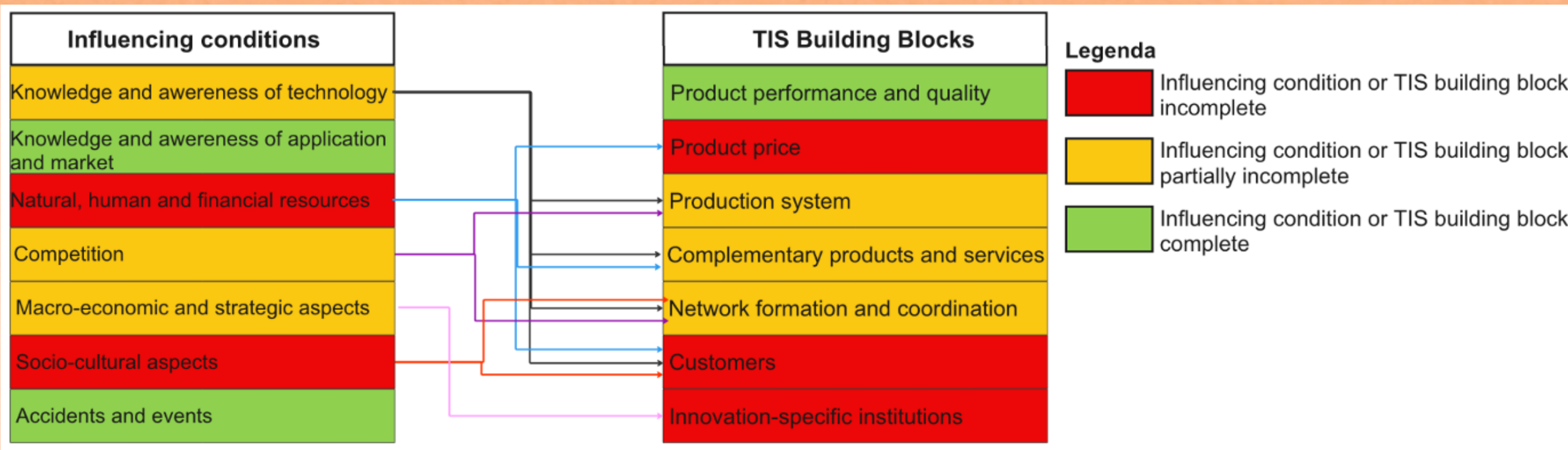


# INTRODUCTION STRATEGIES FOR SUSTAINABLE GREENHOUSES IN MOROCCO

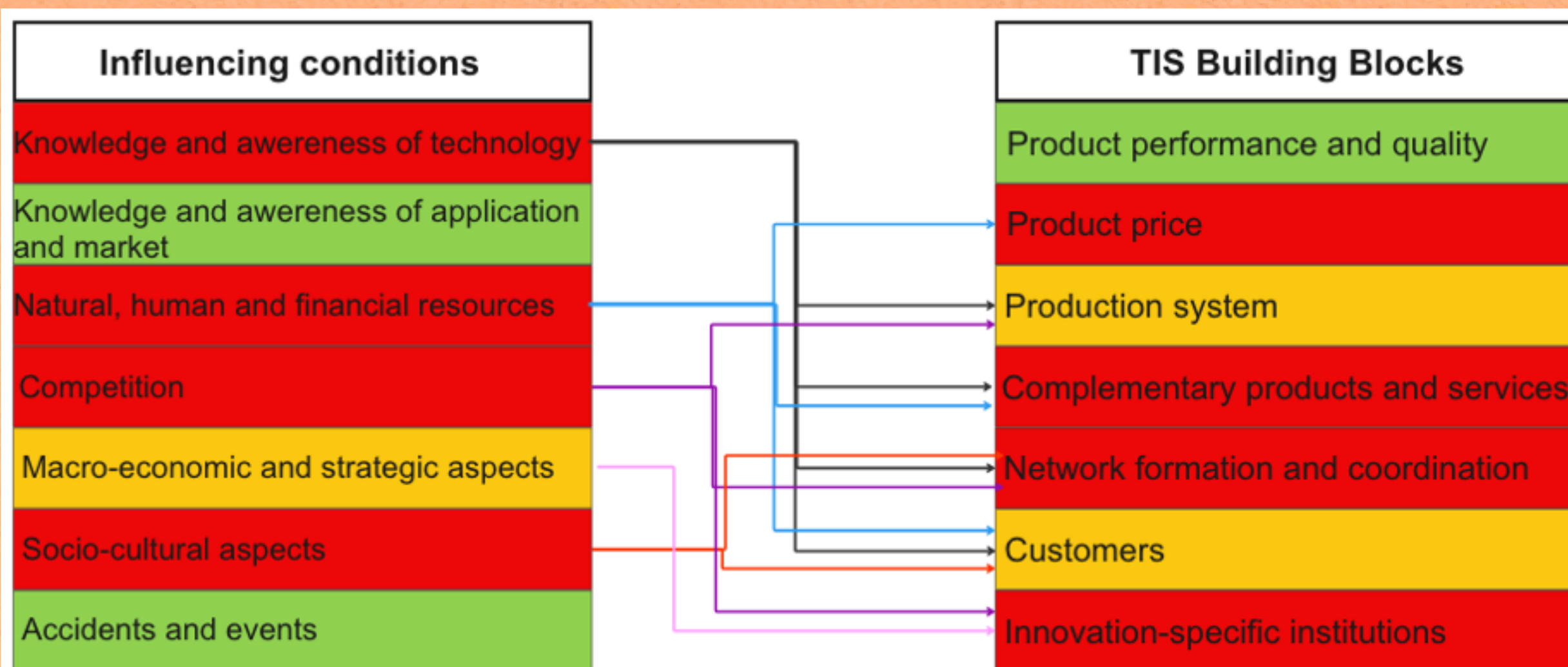
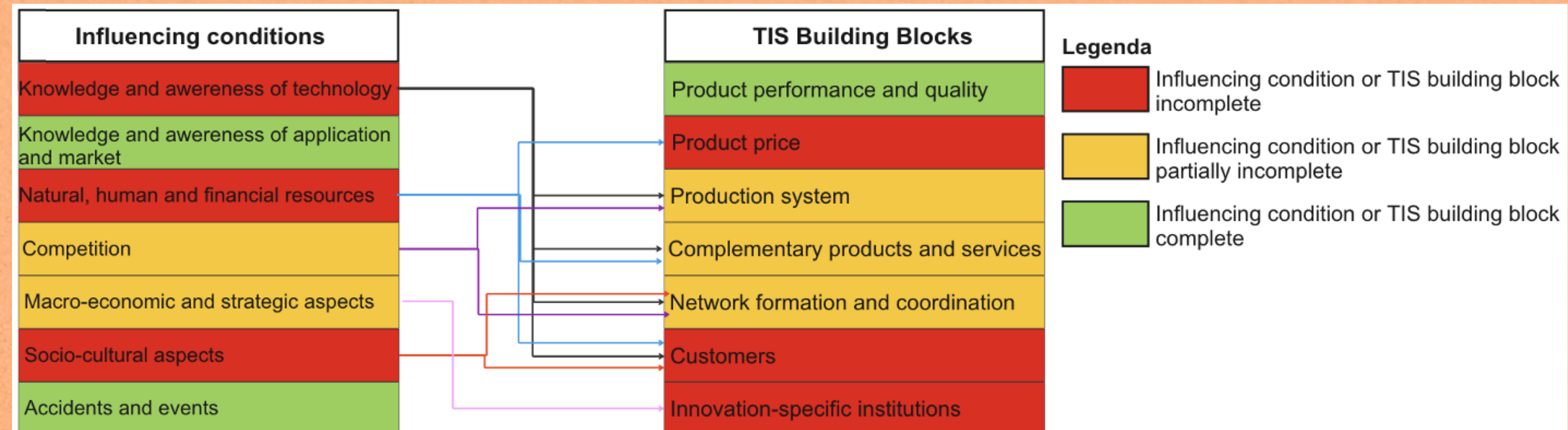
This study utilizes the Technological Innovation System (TIS) framework, developed by Ortt and Kamp (2022), to analyze the barriers and influencing conditions for the large-scale diffusion of Sustainable greenhouse technology (SG). The TIS framework consists of seven building blocks and seven influencing conditions, which provide a comprehensive understanding of the innovation context. By examining these components, tailored niche introduction strategies can be developed to address the specific challenges and opportunities in Morocco's adoption of Sustainable greenhouses. This application of the TIS framework in the Moroccan landscape, particularly in the context of technology transfer from the Netherlands, is a novel and valuable contribution to the limited literature on niche introduction strategies for Sustainable greenhouses in Morocco.



## DIFFUSION ANALYSIS FOR SUSTAINABLE GREENHOUSE FOR TOMATO PRODUCTION



## DIFFUSION ANALYSIS FOR SUSTAINABLE GREENHOUSE FOR SOFT-FRUITS PRODUCTION

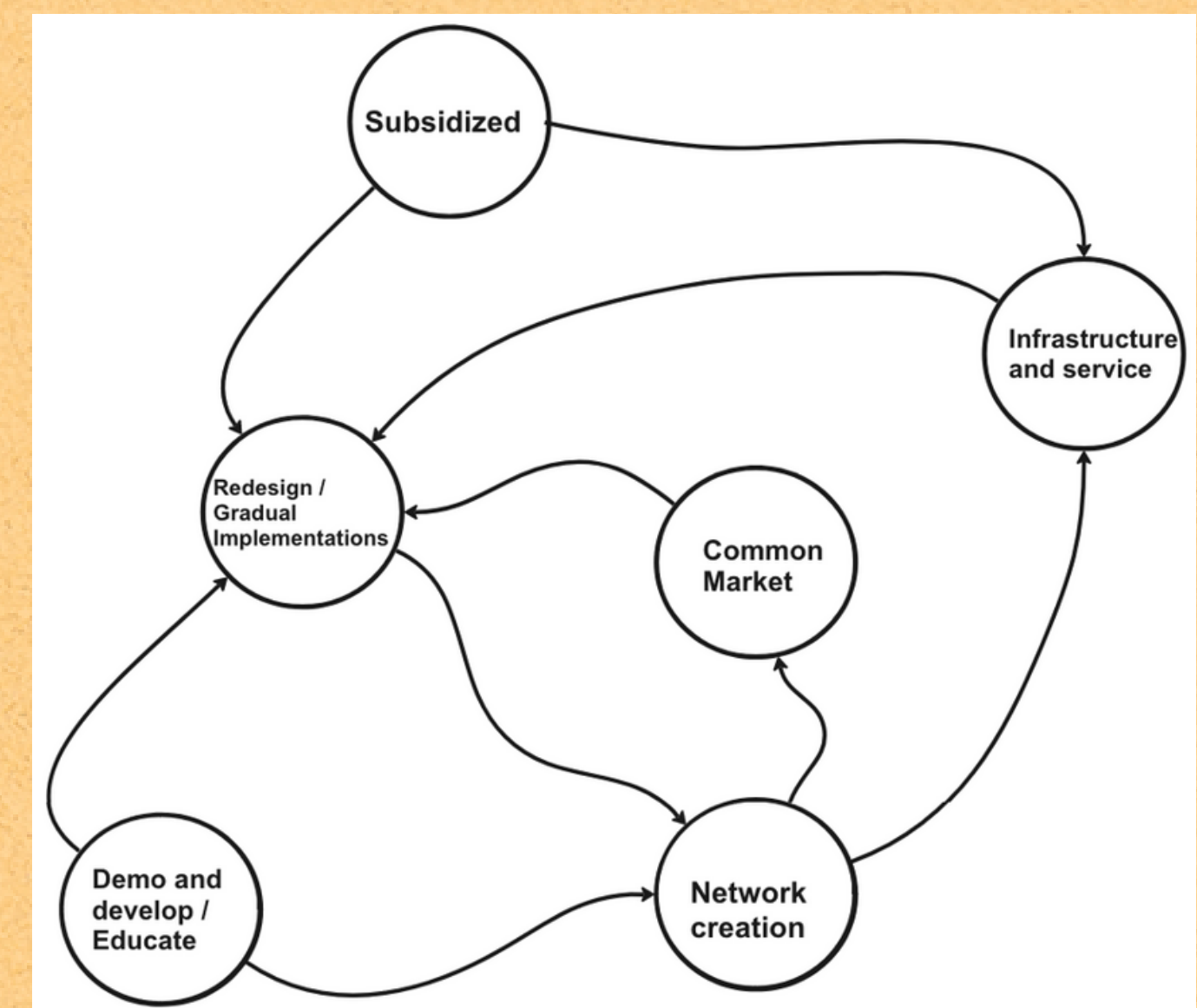


## DIFFUSION ANALYSIS FOR SUSTAINABLE GREENHOUSE FOR HERBS PRODUCTION

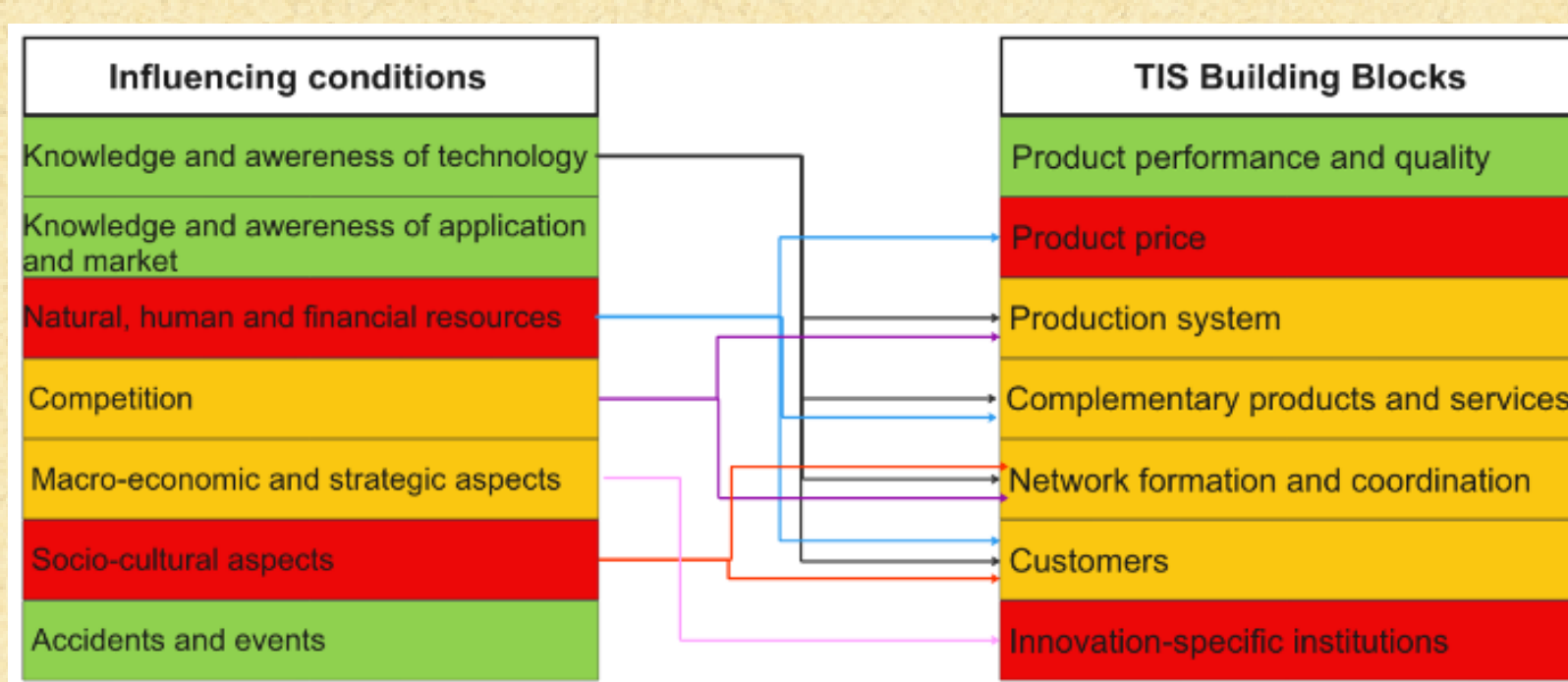


### The niche introduction strategies

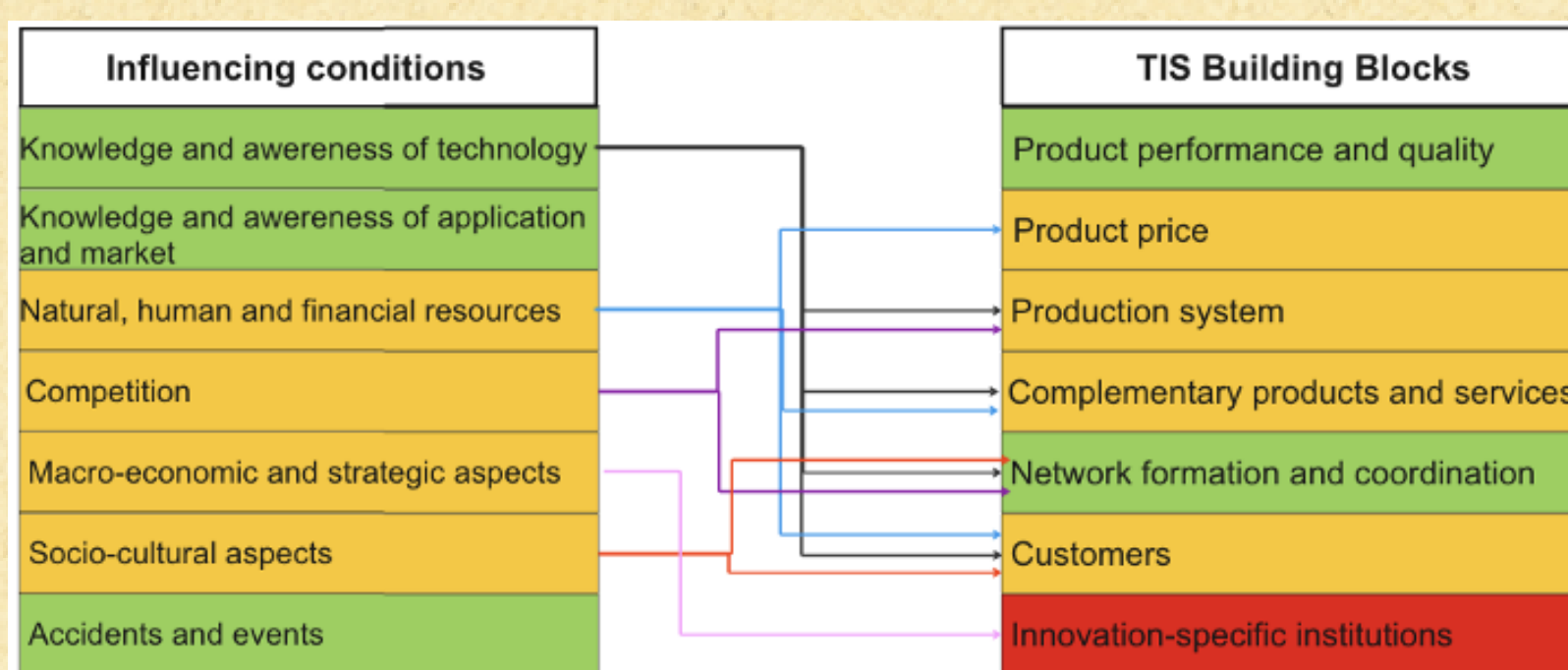
- Adoption of Demo and Develop and Educate niche strategies generates knowledge and showcases the benefits of Sustainable greenhouse technology, leading to increased adoption by company managers and growers.
- The Network creation niche strategy establishes connections among growers, facilitated by the initial interactions within universities where knowledge and information are exchanged.
- The NTW (Network creation) strategy is reinforced by the implementation of Redesign and Gradual Implementation niche strategies, which reduce costs and encourage collaboration between universities and local technology providers, resulting in more affordable and high-quality components.
- The government's role is crucial in speeding up the adoption of locally developed technology through awareness campaigns and goal-oriented subsidies, which can be facilitated by a strong network among growers and effective communication with governmental offices.
- The development of a strong network among growers and government enables the valorization and development of lacking water and energy infrastructures, promoting the diffusion of Sustainable greenhouse technology.
- The Common market niche strategy fosters innovation and collaboration among large exporting companies, creating a national value chain and exporting association. This facilitates direct access to international retailers and increases profitability by exporting high-quality products.



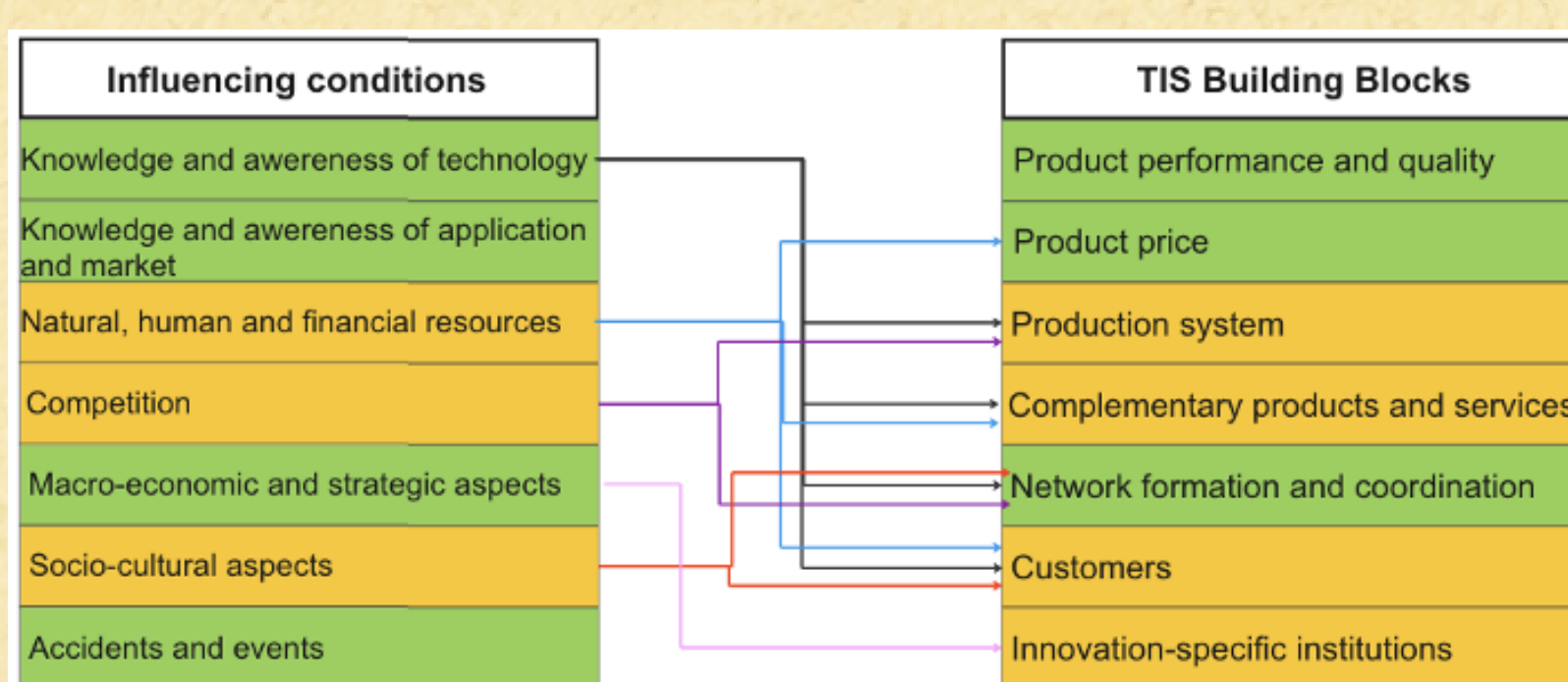
### Example of Applications of the NIS for Sustainable Greenhouse for tomato production in Morocco



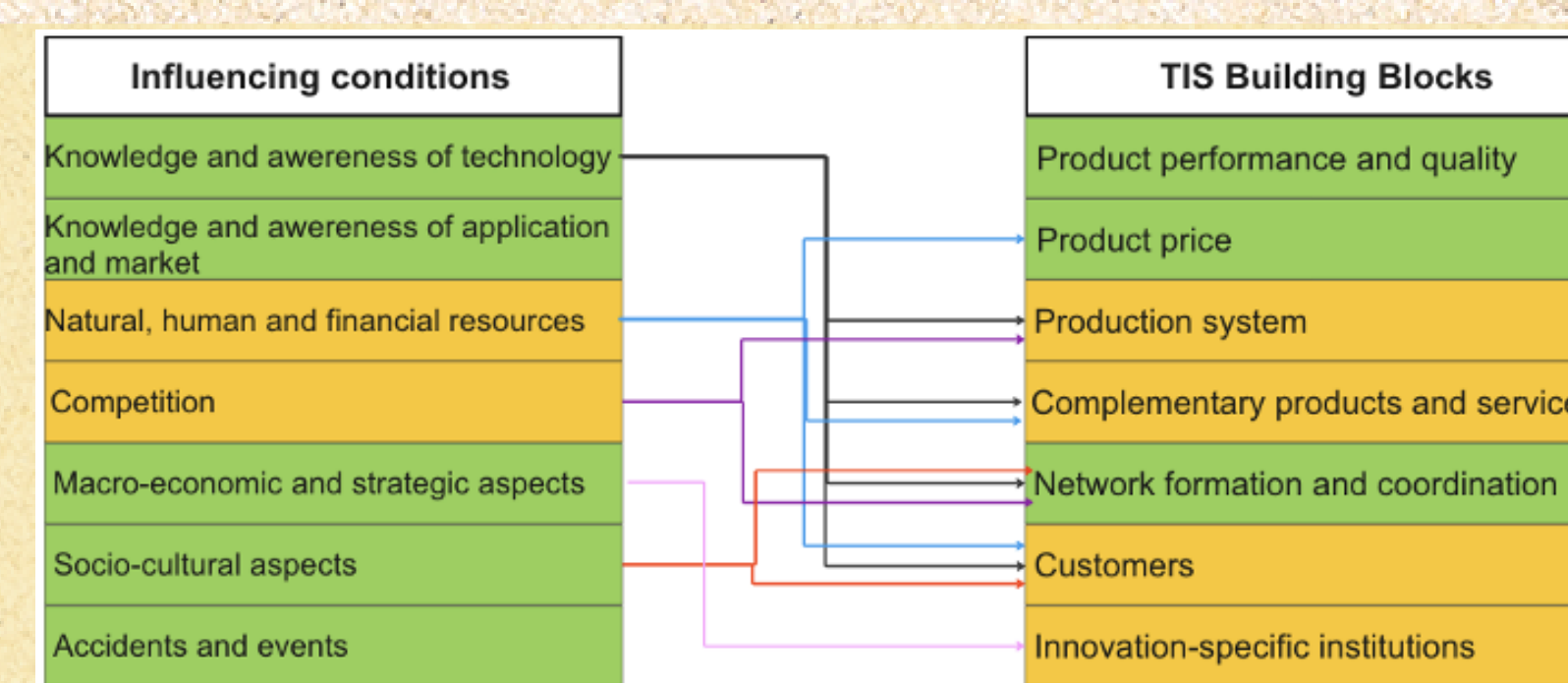
- The implementation of Demo and Develop and Educate strategies leads to the completion of the Knowledge and awareness influencing condition.
- The Niche introduction strategy addresses the lack of know-how by showcasing the technology and its benefits, resulting in increased customer knowledge and awareness.
- The customer's building block is influenced by the knowledge factor, with many growers hesitant to adopt the technology due to limited understanding of its functionality and operations.



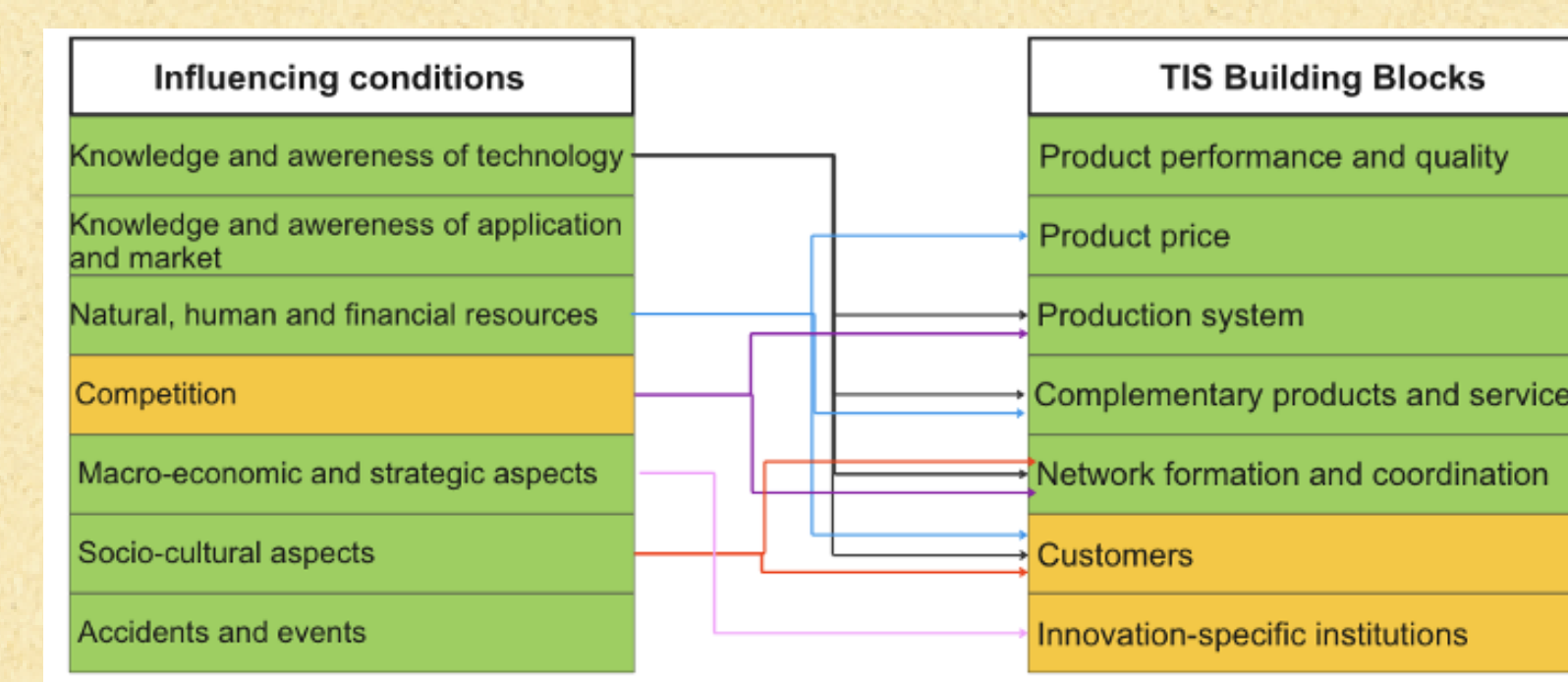
- The implementation of Redesign and Gradual Implementation niche strategies impacts two influencing conditions.
- The Natural, human, and financial resources influencing condition is addressed through the development of locally produced technology adapted to Moroccan conditions, reducing import costs and reliance on scarce resources.
- The Redesign niche strategies lower the technology costs by avoiding imports and offering cheaper alternatives through local development.
- The Gradual Implementation niche strategy encourages small and medium growers to gradually adopt the technology, considering return on investment, which increases the adoption rate of Sustainable greenhouses.



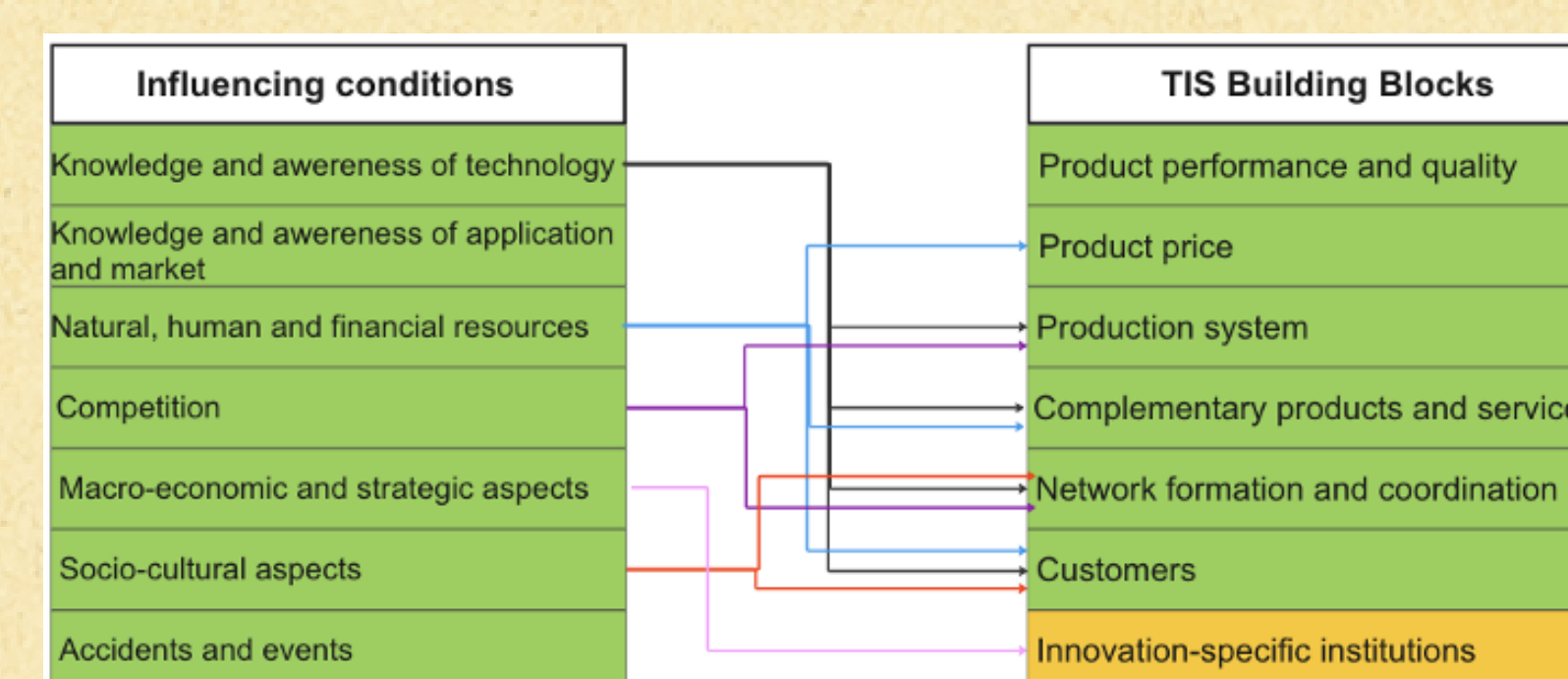
- The Subsidized niche strategy and governmental strategies address the Macro-economic and strategic aspects influencing condition.
- These strategies aim to expedite bureaucratic processes and promote the development of a shared long-term vision within the government for sustainable horticultural practices.
- The Subsidized niche strategy plays a role in fostering innovation by offering goal-oriented subsidies to growers.
- By addressing this influencing condition, the Innovation-specific institutions building block is partially resolved.



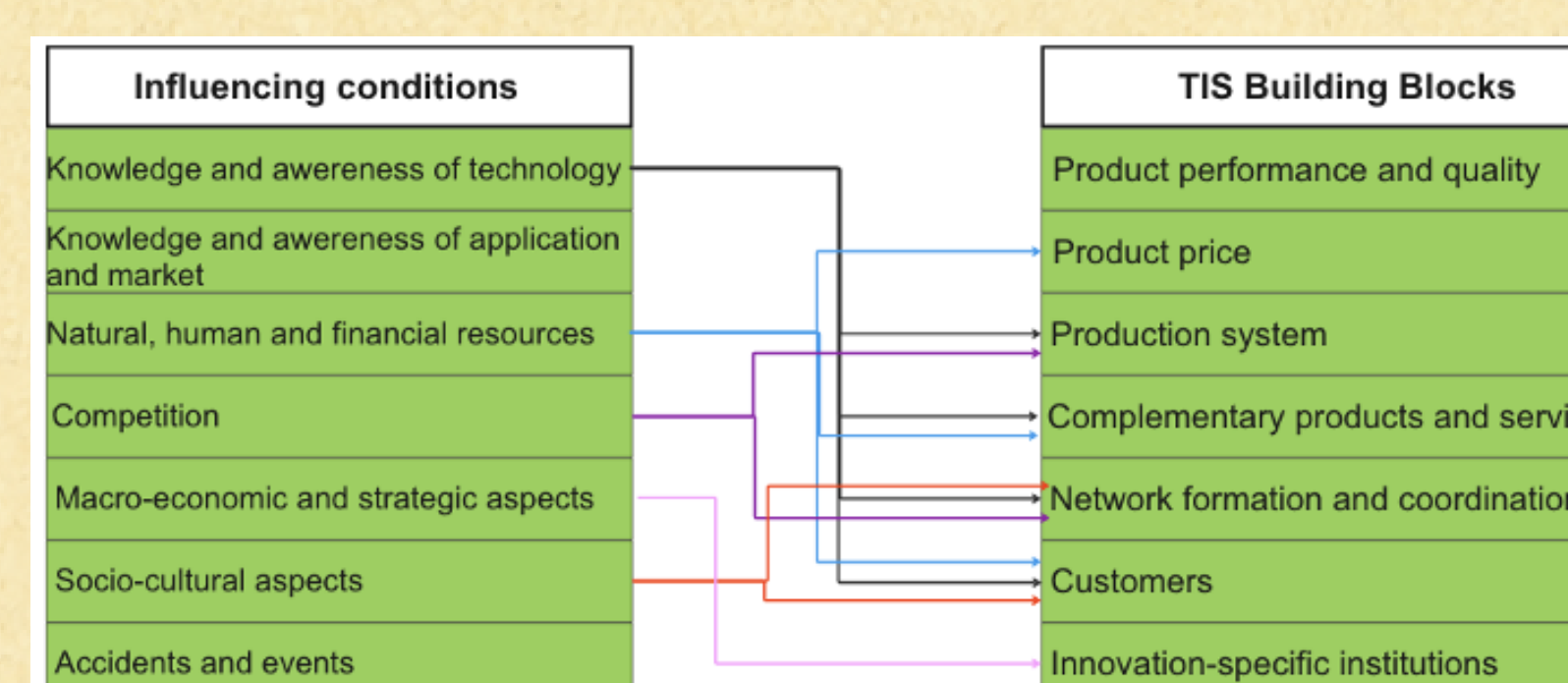
- The Network Creation niche strategy is implemented to address the Socio-cultural aspects influencing condition.
- The establishment of a strong cooperative network accelerates the diffusion of knowledge among growers.
- This NIS encourages collaboration among companies and facilitates effective communication with the government as a unified entity.
- While a strong network does not directly solve a specific building block, it significantly enhances the success of future niche introduction strategies.



- The infrastructure and service niche strategy is introduced to address the Natural, human, and financial resources building block.
- In the case of Sustainable greenhouse for tomato production, this strategy is not as crucial due to the region's existing water and energy infrastructure.
- However, applying this strategy can still contribute to maintenance operations and further expansion of the infrastructure in the Souss-Massa region.
- By addressing this influencing condition, the complementary products and services building block is targeted for resolution.



- The current competition acts as a barrier to technology diffusion and limits knowledge sharing among companies in this market application.
- By implementing the Common market strategy, Sustainable greenhouse companies can collaborate to develop a national value chain and export their products together, thus increasing their profit margin.
- Additionally, establishing a common market for tomato production reduces hesitancy towards adopting Sustainable greenhouse technology and enables Moroccan companies to expand their market influence beyond quotas, pending negotiations with foreign governments.
- Solving the competition condition also leads to the resolution of the customer building block for this specific market application.



- Governmental intervention is necessary to address the Innovation-specific institutions barrier.
- Financial support and economic incentives provided by the government can help overcome institutional barriers hindering the widespread adoption of Sustainable greenhouse technology.
- The government's involvement in knowledge dissemination, capacity-building programs, and policy reforms contributes to creating an enabling environment for technology diffusion.
- Collaboration between Sustainable greenhouse companies and the government is essential to effectively address the TIS innovation-specific institutions building block and ensure successful technology diffusion at a national scale in Morocco.