

Effects of Technology Cycles on Strategic Alliances

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Abstract

This study examines various issues related to the formation of strategic alliances by using the cyclical model of technological change constructed by Tushman & Anderson (1986). Technology cycles offer a useful evolutionary perspective on shaping technology trajectories. The evolution of technology is a result of technological, social and political factors. The four stages in the model include technological variation (stage I), era of ferment (stage II), technology selection (stage III), and technology retention (stage IV). Within each of the four stages, issues related to the formation of strategic alliances - motivations, governance modes, and the selection of partners - are explored. The association between the cyclical model of technological change and the formation of alliances is empirically tested in response to the statement that a missing link exists for empirically validating the model of technology cycles. Specific research questions include: How will the context of cyclical stages of technological change affect the formation of strategic alliances? In other words, will different types of resources and capabilities be most valuable at different stages of technological change? How well does Tushman and Anderson's theory of technology cycles explain technology's impact on the formation of strategic alliances? Data were 594 alliances in the semiconductor industry from the Securities Data Corporation. Findings showed that the model of technological change is a useful framework in studying strategic alliances. More specifically, at the technology variation stage, innovation-driven alliances are the most important motives. Firms lack of promising technologies tend to select firms with promising technologies. Firms with promising technologies tend to select firms with complementary capabilities. At the era of ferment, both innovation- and efficiency-driven alliances for old technologies are the most important motives. Dominant industry players in either the semiconductor industry or other industries surprisingly are not the favorable alliance partners. At the stage of technology selection, manufacturing-type of alliances for new technologies are the most important motives. The more frequently adopted alliance modes are the ones with high control mechanisms and with equity involvement. Partners located either upstream or downstream the focal firm are the most favorable choices. At the technology retention stage, market-driven alliances are the most important motives. However, firms in different industries or established

firms in targeted markets are not favorable alliance partners. This study contributes to the literature in two ways: First, it empirically tested the cyclical model of technological change by Tushman and Anderson (1986) and linked the effects of technology cycles with studies on strategic alliances. Second, it empirically validates the argument that certain types of resources are most advantageous under particular technological conditions at various stages of technology cycles. The model provides rich settings to study how firms cope with their technical environment.