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Original Research Article

Averting bankruptcies among the software development houses in Lahore, Pakistan

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Abstract:

With the first software development house established in 1977, Pakistan, the 4th largest technological market globally, is home to over 2000 registered software development houses. However, the industry has its challenges, and hundreds of these houses close yearly owing to insolvency, and even more crop up. To understand these houses' financial difficulties, a sample of 20 small-size and 20 medium-sized software houses has been taken from the hundreds in Arfa Software Technology Park in Lahore, Pakistan. Financial Blueprints of 2 projects per house per year for five years, i.e., 2018-2022, have been obtained. These case studies have been contrasted with those written and published in the developed world. It was found that there needs to be more costing and pricing mechanisms for software-related projects. This results in under/over-costing the cost and pricing of the projects, which is a leading cause of financial bankruptcy for most software houses. Activity-based costing, as the costing technique, and competitive pricing, as the pricing mechanism, may be adopted as the best practice in the software development industry. These solutions could significantly reduce the risk of financial bankruptcy among software houses, potentially transforming the industry's financial landscape.

Keywords: Information technology, Information and communication technology, Software development, Activity based costing, Competitive pricing, Software industry.

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1. Introduction

The global world has seen substantial development in industrialization during the post-World War II era. The technological development in the first half of the twentieth century was primarily war-phobia-driven. Once peace prevailed, technological advancement took its natural course toward economic development (Korinek & Stiglitz, 2021). The first half of the twentieth century witnessed a geometric progression in the development of mechanical technology, the motive of which was evident, i.e., the war. Cutting down the enemy communication played a pivotal role in attaining military supremacy, contrary to the post-war scenario, where building communication was considered a key to economic success. The old British doctrine prevailed in the last century, where conquering a land was followed by developing commerce.

The difference this time was e-commerce, not just commerce. Electronics and digitization of communication, processes, and procedures have found their roots. The snowball effect in the development of e-commerce ignited hypergrowth in the software industry. Like any other industry that experiences such a birth and initial development pattern is destined to find a rational and sustainable speed of growth, the software development industry also adjusted its growth in the last decade of the twentieth century. In layman's terms, this was termed a dot com bubble. The bubble burst at the start of the new millennium might have been seen as a setback to the software development industry, but such a burst or volatile growth pattern in a sector makes it prone to investment by pro-risk investors. Investment by such a group of investors adds fuel to the already volatile sector, shaking the trust of fundamental investors in the specific industry. The software industry globally, like in Pakistan, experienced the same phenomenon.

The software development industry in Pakistan is unique in one of its features, i.e., it has its in-roads into each industry which processes information. And in modern economic design, no industry does not process information. The information may be public, private, closely held, or confidential, but it is like blood to the human body. The disruption in flow sets the ground for igniting the problem. For a similar reason, the dot com bubble burst attracted attention, which is not expected to cause bankruptcy in other sectors of the economy. Under their long-standing presence, the rest of the sectors in any given economy have safeguard and insulation mechanisms. These mechanisms provide a cushion to the respective sector in case of unusual events/developments within or in other sectors. For instance, the subprime mortgage crisis in the United States impacted the rest of the sectors. Still, these effects did not spread much beyond financial markets, securities, and its regulatory environment. The financial sector and the rest of the sectors had safety mechanisms in place, which provided cushions to the other sectors in case a sector failed, and other sectors had such mechanisms in place in case any other sector failed.

The software development sector in Pakistan is growing fast and has yet to achieve the maturity level of the international standards. The maturity is less likely until the IT, ICT, and software development sectors take a smoother growth pattern (Zulqarnain, Wasif, & Iqbal, 2022). The present growth pattern does not exhibit so. This contradiction in the shock-absorbing mechanism of the software development sector and the rest of the sectors position the latter as a speculative and volatile sector for investment, profitability, and sustenance (Stylos et al., 2021). Also, risk vulnerability is attached to the software development sector as an inherent feature (Palombo et al., 2020).

In the backdrop of such an impression of the software development industry in Pakistan, it is imperative to investigate the validity and reason for such an impression and suggest corrective measures to make the software sector equally compatible with other sectors in terms of financial trust, risk orientation, and investment perspectives of the stakeholders. The investment and risk perspectives are driven by profitability and cash flows in any commercial proposition (Ilin et al., 2021). Therefore, it is considered pertinent to examine the profitability and cash flow of the software development process (Elghaish, et al., 2021). Profitability and cash flow are linked to the way software is priced.

2. Review of literature

Previous studies suggest that various models have been devised and used to ascertain the judicious cost of the software (Samal & Kumar, 2024). It seems to be a contended fact that all these methodologies of ascertaining cost are significant and used in practice for the service sector (Sahu et al., 2020). Further, the literature review reveals that costing is primarily an accountant's domain, and accounting is established with conservatism deeply rooted as a practice (Orthaus et al., 2023). During the literature review, the relevant case studies were also analysed in conjunction with the academic literature. The combination of theory and practice reveals some interesting findings and gaps.

It has been observed that Activity Based Costing (ABC) stands at a clear advantage over conventional costing in terms of ascertaining the correct cost of a product or service (Alahmari, 2023). Though the total price, for a period and all products aggregated, stands unchanged regardless of the costing technique used, the cost of individual products varies significantly when computed using ABC, contrary to that of conventional costing, which is based on the volume of the production (Sánchez et al., 2023).

Like other industries, the software development industry also seems tilted towards deploying the ABC to ascertain the cost of software development, especially in project-based assignments (Borges et al., 2024). The software industry, being the newer one relatively, coupled with its turbulent history, has not exhibited the use of accounting excellence for the determination of costs and prices (Cao & Yu, 2016). The literature has progressed toward using sophisticated accounting tools and practices for costing and pricing software development (Suliman & Kadoda, 2017).

The limitation of literature in the context of this study has been bridged with the selected case studies to ascertain the bottleneck in the actual cost and pricing of the software. Regarding software pricing, it has been observed that the software industry has gradually moved towards competitive pricing (Liu, H., & Zhao, H. (2022). This may be attributed to the growing number of software houses and developers in the industry (Francis, 2023). Still, the price disparity between software made in developed and developed economies is immense (Pearce, 2020). For the same reason, Indian developers claim a major share in the software development sector (Venumuddala & Kamath, 2023).

The costing and pricing issue becomes more acute in the context of its timings of computation (Krasner, 2021). It has been observed that costing and pricing are done at the time of documenting the client's requirement for the desired software (Kuutila et al., 2020). Unlike other industries, where tangible product exists as prototypes to ascertain the cost and price, software development cost and prices its output in terms of perceived service and its benefit.

The perception comes to reality once a prototype is developed, and the client sees the requirement being run in visible form once the prototype is in place (Khan & Zakarya, 2021). At this point, the refinement in the prototype takes place keeping in view the client' input.

This input can be absorbed into the prototype's functioning provided major cost escalations do not take place; otherwise, it becomes financially unfeasible for the developers to pursue the project further (Baek et al., 2020). At this stage, the developers have two options. First, to surrender the project. Second, to pursue its development for the non-financial benefit. In both cases, it adds to the financial strain on the developers/software houses, increasing the probability of bankruptcy / default. This raises the question of how a developer, or a software house can compute the cost of developing a software solution and ascertain the price for such a solution when the project is still in process and has not yet reached its final shape (Kasauli et al., 2021).

Furthermore, suppose the developer or the software house continues to develop the solution. In that case, the project may end up in loss because the cost incurred by the developer, or the software house might exceed the price perceived by the client. This dilemma needs a sustainable resolution (Islam & Ferworn, 2020). This study has proposed the adoption of Activity Based Costing (ABC) as the costing technique for software development and Competitive Pricing (CP) as the pricing mechanism for setting the sale price. The surplus of the price set based on CP and the cost ascertained based on ABC, is the true profit, and vice versa (Dong, et al., 2021).

The proposed ABC method draws its roots from the theory of Absorption costing and Marginal costing, where the limitation of theory gives origin to a new costing technique, i.e., Activity Based Costing (ABC). Similarly, Competitive Pricing (CP) finds its connection to the theory of cost-based pricing, which disregards the state of competition in the market. Like any other product or service, the software development industry exists in a globally competitive market where premium pricing may not be sustainable (Linde et al.,2021).

The ABC and CP might not offer aggressive growth to the industry but eliminate the chances of bankruptcy of the software houses, at least from the standpoint of financial reasons (Wu et al., 2023). The critical variables regarding the ABC would be the 'cost drivers' and the 'pool rate'. The least of both the variables would determine the minimum cost of the software development. Regarding the pricing, the key variable would be the market's state of 'competition'. The state of perfect competition might regress the profits, while a monopolistic state might lead to windfall profits.

3. Methodology

Considering the need to generate an in-depth and multi-faceted understanding of the costing and pricing of software development outputs in Pakistan, the case study approach has been adopted for this study. This approach also supplements the study objectives, keeping in view the maturity of the software development industry in Pakistan, the dearth of structured secondary data, the quality of the available data, and the suitability of such data for this study. The approach is selected based on its constructivist paradigm. The approach chosen suits the scope of this study for the reason of avoiding the imposition of researchers' perception of the meaning of the phenomenon under investigation. This has presented a challenge for creating a research strategy framed according to the respondent rather than the researcher.

This challenge has been addressed by developing a case study based on the financial blueprints for each of the 20 software houses, each from the small and medium categories, over the sample study period of five years, 2018-2022, both years inclusive. These case studies have been contrasted with similar sizes and natures developed for software houses in the United States and India. The number of case studies has been established keeping in view the established research practice in the domain of study, whereas India and the USA has been selected to address the scale of economic development. Selection of the Indian and The US economy covers the concerns of software developers, regulators, pricing, and costing the software. Whereas the cases study research strategy for this study has helped assessing a subject of investigation to establish its key features and draw generalizations.

The time horizon has been kept to five years, keeping in view the speed of change the software sector experiences during a given period. The data has primarily been secondary in nature, except where further understanding of the instances in the case studies has been viewed for its application through interaction at various levels with the software houses accessible for this research.

Though various designs exist to achieve the desired research intent, this study has focused more on the explanatory part to establish the effectiveness of Activity-Based Costing (ABC) and Competitive Pricing (CP) as measures to avert the bankruptcy in the software development sector in Pakistan.

Finally, the selected case studies and the interaction with the concerned staff at the software houses locally accessible have been analysed for their content to either support or reject the proposition of using the ABC and the CP for sustainable software development and averting bankruptcies in the software development sector.

4. Analysis and discussion

Like any other product or service, the software development industry in Pakistan must have a reliable costing and pricing mechanism in place. The content analysis of the selected case studies reveals that the industry does not have an established costing and pricing mechanism. The prevailing mechanism caters to financial reporting, that too, fractionally.

Furthermore, the current financial reporting mechanism needs to be more comprehensive, and the financial data being reported is insufficient to be used for any financial analysis purpose, leaving aside being used for costing and pricing purposes. Not only has the reliable costing and pricing mechanism been found absent in most scenarios, but the timings of costing and pricing have also been significant reasons for inappropriate costing and pricing. This inappropriate costing and pricing have made the software industry volatile in terms of its expansion, growth, market share, and performance. In most instances, this volatility has led to bankruptcy/default of the software houses. The problem also rests with the timing at which costing and pricing should be done in addition to its technique.

The situation is better for software development in the US for a reason most likely attributable to the code of financial governance in the country rather than developed based on the need of the software development sector. The contrast in the financial reporting mechanism in place at the software houses in two divergent economies adds to the volatility in the financial performance of the software houses having the same financial portfolio. The software houses

in developing economies bid for the assignments for the wealthier clients from the Western economies without carrying on the financial due diligence, improving their financial position.

Not only this but their inability to perceive the technical depth and regulatory compliance requirements of the project tends to undercut the project, hence underbidding it, too. The situation only becomes clear when the repetitive re-work to meet the regulatory and technical requirements of the projects shoots the cost over the price. This leads to financial volatility and instability, over and above the damage to the repute of the software house.

Such instances cause financial polarization within the software development industry, bringing software developers either to the top or the bottom of the industry regarding their economic strength. Scrutiny of the subject of investigation reveals that most software development houses are either in a very good or worse financial position. This is in contrast with many commercial organizations in various sectors of the economy, where the top performers and financially struggling organizations are very few, while most of the firms tend to perform on average.

This contrast between the software and other sectors has made it prone to relatively volatile financial performance, where phenomena like windfall profitability and unalarmed bankruptcies become common. Such perception of any industry makes it prone to speculative investment. Speculators in various markets look for opportunities for some windfall gain. Content analysis of the case studies selected for this study reveals that given less than enough opportunity for speculation in the market, speculators' target sector has a consistent demand for their products.

Consistent demand usually exists in the sectors related to goods and services counted as necessities. These necessities earlier, could include access to basic amenities like food, clothing, housing, education, justice, and security. The entry of speculative sentiment in any of these provisions may cause volatility in the price or the cost of provision of these services. Sub-prime mortgage crises in the US and their subsequent spread to the rest of the world may be one good example of such speculative sentiment.

Though massive restructuring in the regulatory framework followed the sub-prime mortgage crises, but the financial and economic damage caused, is usually irreversible. Similar instances may be witnessed in the commodities sector, where the volatility in the prices of, perishables, metals, grains, and natural resources could not be justified with the basic demand and supply information in the sector, hence proving the presence of substantially compelling speculative sentiment in the market.

The food sector is evident from the volatility in the prices of various grains and perishables. These established sectors were exposed to speculative phenomena because of the weak regulatory framework. In the current information age, IT and ICT, as are other necessities, are an integral part of an economy. And software development is key to the IT and ICT solutions. The software development sector being new, is less likely to have a rugged and time-tested regulatory framework in place. Speculators may take advantage of the weak regulation and make multiple attempts to make some quick gains. The sector, being a service sector, would also have the factors of intangibility at speculators' side.

Therefore, it is imperative to put the regulation in place, in-time. This study has taken up the issue of costing and pricing the software. The less than adequate way of costing and pricing is

more likely to make the software development industry prone to the entry of speculative sentiment, which would cause no good to the industry, instead making it vulnerable to financial risk leading to default / bankruptcy.

5. Conclusion and recommendation

The software development industry lacks the use of established accounting tools and techniques to determine the cost and establish the sale price for the software. Though the literature review revels that such techniques are desirable, they are used on a very limited scale, that too only by established software houses. The industry is likely to adopt established costing and pricing criteria, given the realization that these techniques may diminish the probability of more and more software houses succumbing to bankruptcy.

It is recommended that the software houses adopt established costing and pricing techniques such as ABC and CP. Not only the adoption of these established techniques is imperative, but the importance of the timing at which costing and pricing in unrefuted. The current practice in the hands of software developers in developing economies is at the time of knowing users' expectations rather than finalizing them after the dry run of software or the development of the prototype. Though not a practice at present, and the arguments against pricing at the time of passing of the prototype may have their rationale, the software developers suffer financially in aligning the user expectation with that of the software performance, which is less likely to be possible before the development of the prototype.

The high rate of cost overshoots or under-pricing is because of the expectation shock which users get once the prototype is run first. The developer proposes to develop a prototype for computing costs and negotiating the selling price. If the price is loosely agreed as a range before the development of a prototype and finalized once the prototype is exhibited and run for clients, it will not only help in aligning clients' expectations with the actual performance of the software, but also help in negotiating a realistic cost and fair price for the task of software development.

It is recommended that the software development industry, specifically in developing economies, use Activity-Based Costing (ABC) and competitive Pricing (CP) as the established accounting practice for costing and pricing their software development services and ensuring a reasonable and realistic profit margin.

The software development industry needs to adopt the practice of developing prototypes to negotiate the reasonable cost and fair price. The fair price to determined keeping in view the state of competition in the sector, i.e., the Competitive Price (CP) technique. Meanwhile, the cost of developing prototypes may be considered as a sunk cost, which at present, the industry incurs as research and development cost, but books it as the product cost, unnecessarily overbooking the software development cost.

Competitive Pricing (CP) would enable the software development sector to harvest monopolistic advantage and survive in times of stringent competition.

This slight improvement in the booking cost and price method is expected to bring more financial stability to the software development industry.

6. Limitation and direction for future research

This study is limited to its scope in terms of identifying the financial reporting and planning reasons for the short-term existence of many software development business entities in developing countries. There may be many other reasons, in addition to the cost and pricing of the software development, left to other studies to do so. Projects' financial planning, surveillance and execution is another pertinent area in this regard. The scope has also been limited to develop and the developing countries, for which USA has been sampled for developed, while India and Pakistan for developing countries. The issues and the strategies for resolution for such issue may differ for other economies in developed and developing economies.

Furthermore, the adoption of different research philosophy, approach, strategy, time horizon, and data analysis technique than the one adopted for this study may yield different results and add to the body of knowledge about investigation.

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