Implementing Subscription Wise Profit and Loss Statement in Investigating the Emerging Markets

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The telco industry is seeing a rapid growth in users in developing countries due to price erosions on equipment and end-user prices expanding their footprint into low-income groups. The global optical backbone boom in the 1990s was mainly fueled by exuberant investors ploughing in capital, but is this the case for the mobile last-mile / access network for the bottom of the pyramid? Or are we seeing signs that the operators fund the expansion using earnings from high-end subscribers to cross-subsidize these new consumers? In this article we have tried to answer this question by applying a method for allocating both costs and revenues on each and every subscription. We used first hand data for Grameenphone while deploying several allocations methods to estimate the same figures for the other operators in the Bangladeshi mobile industry based on secondary financial and market information sources. The results show that there is a significant cross-subsidy from older and high-end users to new and low-end subscribers, but the industrial investors also contribute to the growth into these BoP customers (reflected in the low-return, long term yields). Hence the subscription-wise income statements were able to prove that the current expansion in the emerging markets is not entirely like the IT-bubble in late 1990s – in this new boom the operators enable high-end customers / early adopters to effectively help in closing the digital divide.

1 Introduction

With a prepaid ARPU of USD 21[1)] for Telenor Norway or USD 18[2)] for Vodafone UK, there are signs that the western world telecom market still earns oligopoly profits. But in developing countries like Bangladesh, it is different and with a declining ARPU of USD 5 for prepaid[3)] Grameenphone (with approximate 60 % revenue and subscription market share) faces certain challenges to maintain the desired EBITDA margin. This paper explores whether smarter ways to look at already available information can help in optimizing strategic decisions

The objective of this paper is to introduce a model that allocates revenues and costs directly on the individual customers in contrast to the much used cost-center or activity based modeling. The model described in this paper is a down-stream costing allocation method in contrast to the conventional accounting on the company's internal functions or processes. The model makes the customer or a group of customers accountable for the costs, enabling a segment-wise profit and loss statement. This allows in fact a true customer-wise, bottom-up financial income statement if implemented fully.

The capability of the model is shown by applying the down-stream costing on the total Bangladeshi mobile industry to see to what extent the operators cross subsidize new and low RPU[4)] customers using margins from older subscriptions and high RPU consumers. Defining the lower RPU-limit that the industry can absorb while maintaining a reasonable payoff will be the main take-away from the study. The study is limited to investigating a single case by applying the model in two dimensions/views (cross subsidy occurring over network AGE and RPU). We will not speculate whether the fiscal policy and the number of competitors/networks in Bangladesh are maximizing the social welfare or not. This is an interesting, and much needed study in itself, though it is believed that such research could be based on the modeling introduced in this paper[5)].

In the following section the downstream costing model will be explained and definitions will be listed. In section three we elaborate on how the total industry figures are generated. Section four deals with the theory and explains how we have applied the model on a real situation: in this section we outline the reasoning for the chosen cost accounts as well as the

1) *End of Quarter 3 2007, wireless intelligence, https://www.wirelessintelligence.com*

2) *Ibid*

3) *End of Quarter 3 2007, wireless intelligence, https://www.wirelessintelligence.com*

4) *Revenue Per User (henceforth RPU)*

5) *Such a study must also include models for market development, handset prices (together with culture the major consumer barrier for entry) and a wide set of macro economic assumptions.*

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assumptions behind the allocations for both revenue and cost. In section five the results are represented. In the last section we conclude.

We have converted all figures to USD with a conversion from BDT of 1:70. Note also the difference between a 'subscriber' and a 'subscription' – we do not claim to measure profitability of a consumer, but the cost and revenues associated with a particular SIM card / subscription.

2 Deriving the Subscription-wise Profit and Loss Model

The model is not an accounting model nor does it involve any changes of the charts of accounts, it is simply a report principle. This model shows what a given subscriber is incurring in loss or profit based on that particular customer's behavior, contrary to classical accounting systems that measure financial performance of the company as a whole. The model derives 100 % data from cost accounting and revenue reporting. The model can thus generate profit and loss statement on individual subscription level (which, for big operators can be substantial).

This model has the flexibility to give views from any angle that is important for the management to take in strategic decision-making by giving a new dimension to the available financial information. A few examples of output are; individual subscription's profit or loss statement, subscriptions grouped into segments to attain segment wise profitability, certain products' profitability in a certain location, break-even churn rate for new subs, RPU bucket wise profit to observe the break-even RPU, base station-wise profitability, campaign analyses to check whether a given promotion was profitable or not, subscription life-cycle or age wise profitability analysis, etc.

In telecom industry with different types of billing system and data storage and reporting models it is not possible to fetch all the required data from a single source. The major challenges for data sourcing are; data on cost are mostly available on consolidated statements (in accounting / ERP[6)] systems made for traditional accounting), not on individual subscribers wise as required, different cost and revenue information is collected from different sources like ERP, DWH[7)], mediation / billing gateway system, matching the data collected in different time cycles and reconciliation of data with financials, as available. Our implementation of the model fetches required data, mainly revenue information from DWH and costs from ERP. DWH collects data from pre and post billing systems in the form of CDRs[8)] and groups them into subscriber-wise and hour-wise data. Whereas ERP provides ledger-wise cost and revenue figures on an aggregate or cost center level.

Subscription wise profit and loss statement is derived in four phases; i) data collection; ii) allocation of income, capital (henceforth denoted CAPEX) and operational expenses (henceforth denoted OPEX); iii) report generation, e.g. on-the-fly profit and loss statement generated on a weekly basis; and iv) adjustments with financial statements from the accounting system on monthly basis. It was observed in our systems that it takes at least seven days' time for individual subscriber data to take a stable form, for which the cycle to calculate profitability has been set to seven days.

Data collection and allocation of revenue are two different processes. Most of the revenue is delivered subscriber-wise as well as hour-wise by DWH. Subscription wise usage pattern is taken from DWH to allocate consolidated CAPEX and OPEX cost on to individual subscriber level. In addition to that, the existing model has the option to split revenue into outgoing and incoming minutes. This means the revenue is sub-divided into 50-50 on both 'Caller'[9)] and 'Receiver'[10)] in case of on-net outgoing minutes. This also gives us the flexibility to split the network costs into the two parties (Caller & Receiver). This ensures that the model is consistent over charging regimes and makes sure the value of a call terminated is correctly priced (it takes two to make a call).[11)] For off-net calls 'Caller' gets the whole share of revenue generated.

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6) *Enterprise Resource Planning (ERP) systems integrate (or attempt to integrate) all data and processes of an organization into a unified system. A typical ERP system will use multiple components of computer software and hardware to achieve the integration. Ideally, ERP delivers a single database that contains all data for the software modules.*

7) *Data Warehouse. According to Wikipedia, a data warehouse is the main repository of an organization's historical data, its corporate memory. It contains the raw material for management's decision support system. The critical factor leading to the use of a data warehouse is that a data analyst can perform complex queries and analyses, such as data mining, A data warehouse might be used to find the day of the week on which a company sold the highest prepaid product in May 2006, or how the change in tariff for a particular hour in May 2005 has changed the usage behavior of subscribers.*

8) *Call Detail Record.*

9) *A party, outgoing and caller are used here interchangeably.*

10) *B party, incoming and receiver are used here interchangeably.*

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Data collection and allocation of Cost is a complex process as subscriber-wise cost is not available from any system sources, the consolidated cost is allocated on individual subscriber based on certain logics. Three smaller methods have been developed to allocate costs onto individual subscribers; Direct (or Averaging), Linear/Unit-wise cost allocation and something we have termed "Profit measure". A brief overview of these methods is reviewed in the following paragraphs.

Direct or Averaging Method allocates costs on to the applicable number of subscribers, i.e. instead of projecting the cost roughly on every active subscriber it will be allocated on relevant group of subscribers. For example, Bill printing cost will be equally distributed among the active postpaid subscribers. The linear cost allocation model is applied to those costs that depend on every unit sold or intake; for example, SIM card cost. Direct allocation may raise some confusion for which only the activated SIM counts have been considered. What if the SIMs are in distributors'/ retailers' inventory? So all SIMs delivered within a time frame may not be activated within that period. Moreover some previous stocks may get diluted in that period's total activation. In such instances the accounting system's total cost will not match with the total cost allocated on each subscriber using unit-wise costing method. The remedy is to adjust the figures with a multiplier for each and every subscriber that will 'force' the accumulated Subscription wise Profit and Loss statements to be equal to the monthly Financial Income statement.

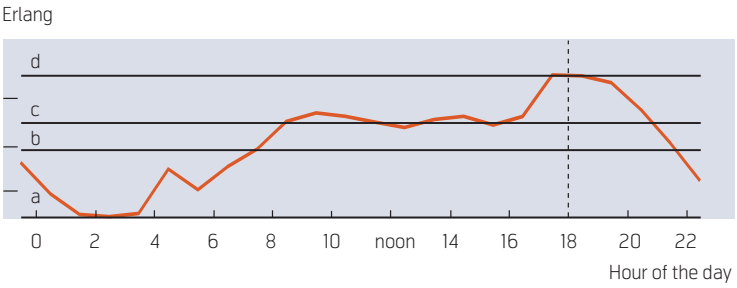

Figure 1 Allocation of Network CAPEX on different subscribers based on their usage behavior

Marginal Costing Method:
Following the figure above, if we consider point a *then we see that the cost incurred for handling this level of capacity should be allocated over all the day's 24 hours as it is the minimum capacity needed throughout the day. Then the hourly cost portion will be further allocated on to individual subscription according to their usage in that hour. At the other extreme, point* d *(from 6-7 PM) is the busy hour traffic, the subscriptions calling in that hour will bear this hour's additional cost (the investment needed to build capacity to handle the difference between busy hour and the second most trafficked hour) and thereafter share the cost portion of the remaining 23 hours.*

Following the same methodology point users calling in an hour demanding capacity b *(let's say this is the 16th less busy hour during the day) will be allocated the proportionate cost of that hour along with the cost portion of the 15 less trafficked hours as well, and for point* c *capacity users will be allocated the proportionate cost of that hour and also share the cost portion of 11 other hours.*

Profit Measure Method is the base for allocation of capital expenditures such as Network elements and billing system related costs. This method needs input from three sub models; i) Actual outgoing Minutes of Usage (henceforth denoted MoU); ii) Actual incoming MoU; and iii) Marginal Costing Method. Logic for allocating Actual Outgoing MoU has been essential in determining on-net- vs. off-net-wise and peak vs. off-peak-wise costs. For example, a subscriber calling to POTS[12)] will have to bear the expenses of a point of interconnection[13)] as for them the equipment needs to be installed. Cost for Actual incoming MoU is allocated by giving less cost on the on-net call receivers compared to off-net. Although for off-net Receiving Minutes opoerator receives interconnection charges of USD 0.006, the total network usage cost is greater than the interconnect revenue, hence in this Profit Measure allocation method a higher cost is allocated for receiving off-net incoming calls compared to on-net calls. Both actual outgoing MoU and incoming MoU have been derived from Marginal Costing method.

Marginal Costing Method allocates network costs according to usage pattern of different subscribers (outgoing and incoming minutes of usage). In this method the network cost that operators incur in order to build extra network capacity for a specific user is considered. A subscriber calling at an odd hour would bear the appropriate portion of cost based on his/her usage as the operator needs to build extra network capacity to support the calling pattern during that specific time. Figure 1 explains. Note that this method is most relevant for operators with almost full coverage as in effect, it says that only increased capacity should be allocated, and not additional coverage. This can be changed but for simplicity we have assumed that for Bangladesh the cost of cover is already sunk.

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11) *"T-Mobile hypothesized that if there were no inbound calls available, there would not be the current level of subscribers on the network and many subscribers would not be interested in the service. It added that people subscribe to mobile networks because of the ability to receive calls. T-Mobile argued strongly that in reality it was both inbound and outbound calling that drives subscriber costs and that the levels of such expenditures would never be incurred without both being available. (http://www.competition-commission.gov.uk/rep_pub/reports/2003/fulltext/475a7.9.pdf)"*

12) *Plain Old Telephone Service*

13) *For example, PCM expenses*

Missed calls and erroneous call setups resemble the non revenue generating calls occupying significant network capacity. In Bangladesh there are more Missed Calls than established ones. There are some eight different types of Miss Call / Error setup, and to identify subscriber-wise costs for this section, all sorts of missed call related data are being captured for one specific day. Subscribers are grouped into different RPU bucket based on their usage pattern, and cost is allocated for missed calls and error generation ratio into different bucket based on their usage pattern.

The last step to derive the profit and loss statement is 'Adjustments' with the published financials. Different assumptions are being used for allocation methods and the period of cost occurrence may differ from realization period (same classic example: SIMs delivered to distributor out will trigger taxation thus realized in a period different from when it will be activated – the latter 'cost when activated' is considered in this model as all revenues and costs are pushed down-stream to an end-customer). Usually official financial data becomes available in different periods, like on a quarterly or monthly basis. To ensure that both the forecasted cost and revenue of different operators match, revenue/cost item wise individual subscriber's figures are adjusted with different financials as they get available.

3 Data Collection on the Industry

The described model was fully implemented on Grameenphone, but to get 'Profit and Loss Statement' of the subscribers of the whole mobile telecom industry it was necessary to collect data from all the operators. None other than the regulatory body have access to all necessary financial information (and sometimes not even them), hence we were forced to make estimates for the free variables. Explaining the available data, methods used for estimation and accuracy of the aggregation (from a single company to the whole industry) is the aim of this section.

The bottom-up (or 'Base Company' as denoted henceforth) method includes several market share calculations such as subscription, capacity and revenue, taking a given base company as the standard for approximations of the others. These methods are complex in themselves, but are tested and tuned with public data for years and are taken as exogenous input to the model. Base company is the most used method to find details like inter-bucket caller/receiver ratios as well as interconnect minutes.

The top-down method is used when one knows the total but not details for all companies. In this study we had access to 100 % of the information for 60 % of the market (Grameenphone) and for certain parameters cost information is also available through reporting from other players, but not from the total industry. Having the total (and 60 %) it is possible to allocate reasonable ratios for the rest of the players using for example market share ratios or most resembling / equal known player.

There are three main types of data sources, apart from the subscription-wise income statements, with different levels of accuracy. The most reliable are the reported financials which can be drawn from the local reporting or from the consolidated reporting of the mother company. Government data are still considered reliable, though some of the reporting on subscriptions is inaccurate as there is no consistent definition of an active subscription. Further, there are third parties, research and news agencies, providing information such as spending on advertisement and promotions (A&P).

Check and balance is done in mainly two ways; if data is available one can do a top-down, bottom-up or vice-versa depending on the available information. But this is rather the exception so the most deployed control is to see if the four views yield the same bottom line results. The costs and revenues are allocated differently, but the total (such as total industry EBIT) must be exactly the same in all dimensions. Thus, if there is something wrong in the allocations the bottom line will not match if not by freak coincidence. The unfortunate aspect of this control method is that it cannot give you a clue as to where the error is, as the top-bottom-top method will.

Due to the unstable reporting of customer base by the regulator and with inconsistent churn definition we have chosen to rely on the 90-days-active definition for subscription count; total customers from all operators are estimated using unique MSISDN[14)] from call records (with a likelihood estimation of hidden subscribers who only call on-net).

4 Implementation

Quarter 2 of 2007 is used as the base year for the model as that was the latest complete data set when we implemented the model. The industry had in quarter 2 2007 a penetration of 18.7 %, an ARPU of USD 3.51[15)] and an EBITDA per user of USD 0.94.

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14) *Mobile Station International Subscriber Directory Number*

15) *The exchange rate used throughout the model is USD 1.00 = BDT 69.00 (as per rounded figures from Q2 financials of base company.*

Cost heading	Cost estimation method	Check & balance	Source
Manpower	Top Down Approach: salaries & benefit expenses for employees under the payroll of the company (regular, contractual and part-timers)	Bucket-wise figures are cross matched with the total figures in reported financials	Financial statements & Manpower records
SAC	Bottom-up (or Base Company) Approach: Cost of the SIM card and taxes paid for each new subscription	Adjusted with the multiplier for each and every subscriber that will normalize the deviation between unit wise costing total and accounting cost total figure	Financial statements
A&P	Top Down Approach: All kinds of promotion (media commercials, press and billboard advertisements) and trade-marketing (events, merchandizing and channel partner development) costs	Third party reports are cross matched with figures provided in available financials	Financial statements & 3rd party A&P cost reports
Interconnection	Bottom-up (or Base Company) Approach	Crossed matched with the total inter-connection charge figures provided in available financial statements	Financial statements & Call records
Commission	Top Down Approach: Commission paid on start-up of the subscription, the commission on flexiload (e-top-up) and scratch card top up and loyalty commission. Both postpaid and prepaid can be paid by e-load and the industry follows a set standard (4 %)	Cross checking with EBITDA figures after all other costs have been subtracted	Financial statements
Other operating costs	Top Down Approach: Rest of the operating costs grouped into one		Financial statements & Published financial figures
CAPEX	Bottom-up (or Base Company) Approach: Total asset value has been converted to depreciation cost (calculated by dividing the total investment by the lifetime) applied to the period considered (Q2 of 2007)	Allocation is crossed matched with the financial figures and EBIT	Financial statements & Call records

Table 1 Costing groups based on overall available Financial and 3rd party information

It is worth noting that we are mostly referring to subscriptions rather than subscriber/consumer/customer as this is a more accurate definition since the revenue is attached to a subscription account rather than a person. In the same manner, the costs are allocated based on certain attributes or state-changes with a subscription. The study assumes a 'one-to-many' relationship between consumer and subscription.

It is clear that studying income statements of millions and millions of subscriptions will not reveal any clear results. The reason for using the costing on subscriptions is to enable us to group them in buckets upon need. If a campaign-effect is to be studied it is useful to extract and group those subscriptions that availed the offer. In this case we will investigate the phenomena of cross subsidy over network AGE (old subscriptions subsidize new) and usage (high RPU subsidize low). Hence we have grouped the subscriptions in buckets along the time line and the RPU scale.

We have chosen ten buckets for the revenues and five AGE groups. The reasoning for the borders and break-up in the revenue allocation view is focused around current industry break-even. To explore some future predictions we have the finest dispersion and the majority of buckets on the lower side of the break-even. In the timeline view we have considered the exponential growth of the Bangladeshi market and therefore to make a fairly even distribution of customers in different age groups we have shorter intervals closer to date.

Arguments used for grouping the subscriptions to explain the cross-subsidy phenomena are also applicable for the grouping of the costs into headers.[16] As we are only looking at the bottom lines in this study (and not how a certain subscription segment is affecting any given cost driver)[17] – to what level is this cross-subsidy sustainable for the industry? We need not consider the practical grouping; rather, in theory,

16) *Fixed cost of Capex has been opex-ized; if we don't trace back the total cost (Capex & Opex) we cannot identify the bucket-wise profitability.*

17) *For example, if number of subscriptions in RPU bucket USD 1–1.5 is doubled, how much must network capacity increase? Or; if a min-RPU of USD 2 is implemented using validity – what will happen to SAC?*

it would be most accurate if all the costs with the same allocation method were grouped together, even if these were from totally different function or process.[18] With 100 % information this principle could be easily implemented, but with limited information available when studying the whole industry, we were forced to group the costs as per the most prevalent public available information.

The rest of the section will elucidate how we modeled the whole market based on 100 % information of only 60 % of the industry while limited for the remaining 40 %. To summarize, the cost heads applied in the practical example is limited by Occam's razor[19] while the incomplete information is 'forcing' more function-oriented cost headings.

As stated earlier, revenue has been split into a Caller and Receiver part. For the Base Company, most of the revenue is available subscription-wise as well as hour-wise. For the rest of the industry / other operators we have used both the bottom-up (Base Company) and top-down approaches, assuming the Base Company receives 60 % of the off-net minutes outgoing of the rest of the industry.[20] Similarly, outgoing calls to and from other operators within themselves are identified accordingly. Adjustment to the duration of on-net and off-net calls is made according to market promotions and events (on off-net & on-net offers) and with official financials at the end of each period. The process is implemented on each RPU and AGE bucket. The APPM multiplied by duration gives respective revenue figures for each bucket. Further adjustments are made periodically with Value Added Tax (VAT) figures obtained for all the operators (top-down)[21] from available market information.

Manpower Cost portions have been allocated on each bucket according to proportion of network usage for that specific bucket. The relation with network is due to significant utilization of manpower in network and system build up/maintenance for talk-time provision. The bucket-wise figures are clubbed to check with the total financial figures (bottom-up-bottom). Subscriber Acquisition Cost has been allocated by averaging the total cost on new subscriptions (0–3 month old subscriptions), based on top-down approach. The 0–3 month time frame has been chosen as all SIMs delivered within a time frame may not be activated within that period or some previous stock may be included. In such instances the accounting system's total cost will not match the total cost allocated on each subscriber using a unit-wise costing method.

Buckets of RPU (USD/month)	Buckets of Subscription Age	Cost Headings
0 – 0.5	< 3 months	Manpower
0.5 – 1.0	3 – 6 months	SAC
1.0 – 1.5	6 months – 1 year	A&P
1.5 – 2.0	1.0 – 1.5 year	Interconnection
2.0 – 2.5	1.5 year +	Commission
2.5 – 3.0		Other operating costs
3.0 – 4.0		CAPEX
4.0 – 5.0		
5.0 – 10.0		
10.0 +		

Table 2 Overview of i) grouping of subscriptions in monthly RPU, ii) network age, and iii) the cost headers

Advertisement & promotion costs have been equally allocated (top-down) into acquisition A&P expenses and retention A&P expenses by averaging on each group of subscriptions -50 % on new subscriptions (0–3 month old) and 50 % on old ones. Interconnection costs have directly allocated on off-net calls based on MoU outgoing. 60 % of the industry figures have been converted to 100 % on proportionate basis.[22] Commission costs have been allocated proportionate to usage – the more the usage, the more the recharging pattern with proportionate commission being paid to the retailer. Other operating costs have been allocated by averaging on all subscriptions. This cost could not be sub-divided as no figures were available for further breakdown.

CAPEX allocation has been done by allocating cost for actual outgoing Minutes of Usage on subscriptions depending on on-net – off-net and peak – off-peak patterns.[23] As the mentioned example in the model description (Section 2), a subscriber calling to

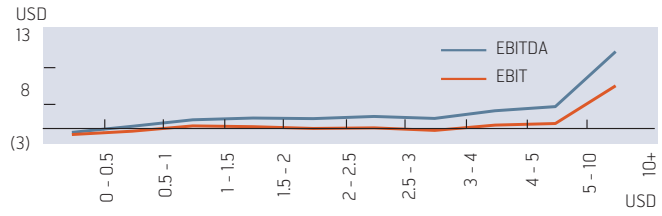
18) *Group the costs that have the same dynamics; they follow the same behavior with respect to the variables (age and RPU).*

19) *The sufficient, necessary principle – "entities should not be multiplied beyond necessity" (law of parsimony).*

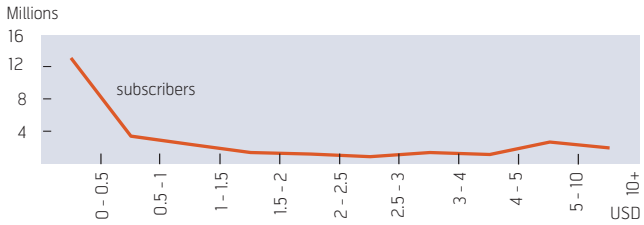
20) *Having 60 % subscriber base.*

21) *The total VAT figures (15 % of voice and SMS revenue) enable us to estimate the total revenue for each operator.*

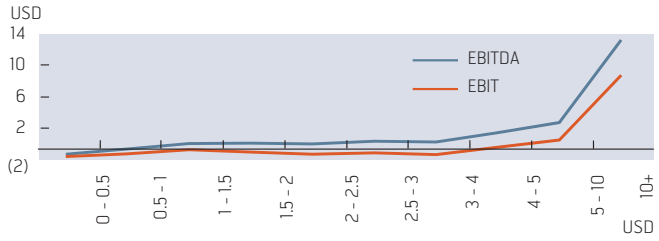
22) *This also gives us the flexibility to split the network costs into the two parties (A & B), unless off-net where A-party takes the whole cost (as the switching out is not based on the BTS cost, but rather a fixed fee of 40 paisa or USD 0.006).*



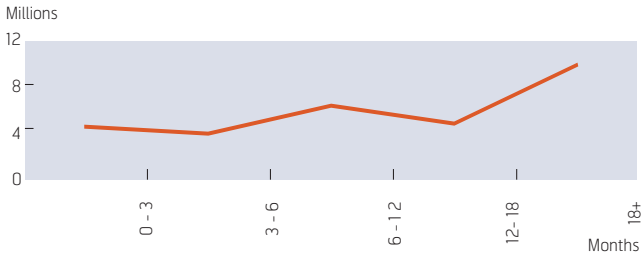
RPU50-50



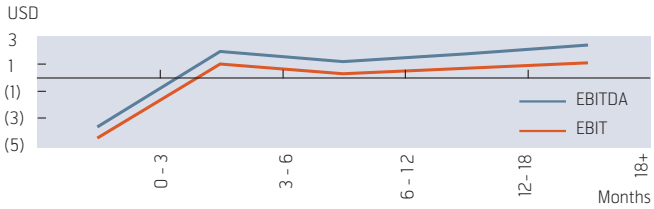
RPU (subs)



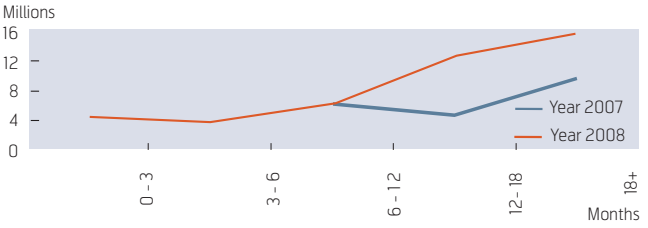
RPU100



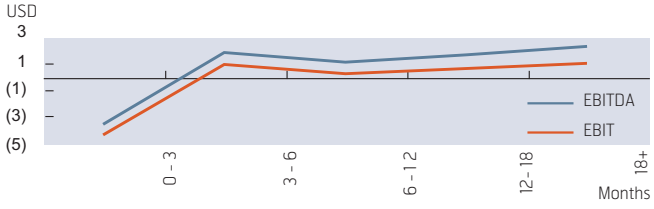
AGE (subs)



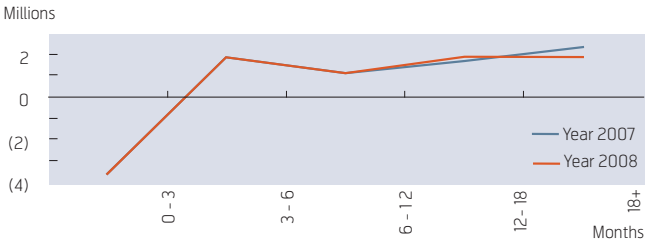
AGE50-50



2008AGE (subs)



AGE100



2008AGE50-50

RPU50-50 denotes the profit or loss on different RPU buckets of subscriptions if revenues are allocated 50 % on caller and 50 % on receiver. For RPU100 the same buckets are used, but the revenue is 100 % allocated on the caller. The RPU (subs) and AGE (subs) plots show the distribution of subscriptions over RPU or AGE bucket. The '2008' prefix indicates the forecasts described in Section 5

fixed lines will have to bear the expenses of PCM and the PoI operational costs. Cost for missed call + error setup is found by ratio of ARPU to missed calls / erroneous calls and used to allocate the respective cost difference on ARPU and AGE buckets.

5 Model Output on the Industry

The previous sections of the paper have described how a subscription-wise income statement can be produced and how useful it can be to test a given hypothesis regarding customer profitability. Further, we have shown one way of implementing the model

23) *A subscriber calling at an odd hour would bear the appropriate portion of cost based on his/her usage as the operator needs to build extra network capacity to support the calling pattern during that specific time.*

on the total industry to investigate certain characteristic, namely whether the operators cross subsidize low-RPU and new subscription with high-end and old subscriptions respectively. In this section we will produce the results and briefly discuss the implications.

We have predicted that the total per month revenues for the mobile operators in Bangladesh were slightly more than MUSD 100 in Q02 of 2007, while the operational expenses as defined in this paper were around MUSD 73.4 yielding close to 27 % industry margin. When depreciation and amortization of MUSD 30 is considered the industry is at a loss of 3 %. This negative EBIT margin means the industry, with the current pricing and taxation, is unable to maintain/operate the asset level which mostly consists of network. Hence, the residual profit from high-end RPU and old subscriptions that covers the operational expenses (including direct taxations such as the SIM-tax) will not cover the subsidies of new and low-RPU subscriptions.

If we now set network depreciations aside,[24] and look at how the industry operates considering only the EBITDA margins we can consider two models for cross-subsidy; top extreme subscriptions paying for low extreme when it comes to the RPU dimension and old subscriptions covering up for newest in the time-view. We denote this 'the tail view'. The second is stacking EBITDA from low (or new) and see how far up the scale one has to go before the losses are zeroed out. We term this 'stacking from below'. First we will focus on the RPU dimensions.

With a 50-50 allocation and stacking EBITDA from below we see that the lower 82 % or the lower 23.5 million yielding subscriptions cancel each other out. This leaves some 5.0 million subscriptions to cover 'ITDA'[25] and yield profits to the shareholders. If we are not applying the 50-50 allocation of revenues, but simply consider all revenues on the calling party, the ratio is 25.3 to 2.2 million.

If we rather use the tail view we see that the operators spend the margins from some 0.9 million of the high yielding subscriptions to cover the cost of handling around 12.8 million subscriptions that incur losses. This ratio is fairly irrespective of revenue allocation.

If the industry were able to set min-RPU levels through for example tacit collusion on top-up validity effectively blocking less than USD 0.5 RPU subscriptions, the industry EBITDA will increase by some 8.9 %. In the same case, if one chooses to look at a 100 % A-party revenue allocation one then considers all subscriptions of less than USD 1.3 as loss incurring. Blocking these 17.4 million subscriptions will theoretically increase the industry margin by 12.4 %.

Now looking at the new vs. the old subscription dimension in the 50-50 view and stacking from below one can deduce that the 12.5 million oldest still active subscriptions are left to pay non-operational expenses – the rest cancel each other out. Looking at the 100 % allocation the same extraction indicates that half a million fewer subscriptions will fuel the EBITDA. If we want to see how many of the oldest subscriptions are necessary to weigh up for the new intake, the 'tail view', the model indicates that between 68 % and 73 % of the total 9.6 million subscriptions activated before January 1, 2006 (more than 1.5 years old) must subsidize some 4.3 million brand new SIMs.

With the time-line dimension of the subscription-wise income statement it is also possible to estimate future profits to some degree by multiplying the type of subscriptions one expects to fill the network in the future. Of course this is a risky method as guessing on how new users will behave is not straightforward, but at least it can give some kind of indication. In this paper we have investigated a simplified forecast: how will the industry look if you double the subscriptions that are less than one year old? This will somewhat replicate what can happen by next year in Bangladesh. We have not doubled-up the subscription acquisition cost, while the A&P for new subs have been doubled. Apart from these heads all other costs are following the same allocation. We are a bit optimistic thinking that we can gain all these subscriptions without lowering the prices, but on the other hand it will then give us a secure upper limit on how the industry can do at best – a good old 'best case scenario'. Note also that as we have allocated the SAC on the first three months of a subscription it is not needed to consider any 'cost of churn' – in the way we have implemented the income statement model it is already included when the SIM is activated. Further, it is worth noting that the study from Wireless Intelligence, *Opex: a bubble or squeeze,*[26] shows that there does not exist any economies of scale in the mobile telco industry, hence one cannot predict major increase in efficiency in Bangladesh due to growth in subscriptions.

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24) *Effectively saying no more investment in the network will take place, which seems highly unlikely as AMPU levels have been fairly stable over time and there is an increasing market demand for data services.*

25) *Interests, profit taxes, depreciation and amortization.*

26) *Garner, M. Opex : A bubble or a squeeze. Wireless Intelligence, 3 February 2006. https://www.wirelessintelligence.com/print/035823.pdf*

Hence in the 'best case' one year down the line the model yields an approximate 51 % increase in revenue from some 14.3 million subscriptions. The EBITDA is estimated to increase from 26.7 % to 30.3 %. Still, in this theoretical best case it is clear that the industry will struggle to retain any earnings. The positive sign is that in a year, and stacking from below, almost twice as many old subscriptions are 'free' to deliver positive return to the operators – the cross subsidy over age will be reduced.

6 Conclusion

In this study we have explained how an operator can implement a reporting on top of the existing information systems that outputs the income statement subscription-wise. There can be multiple uses and the strength of the model is clear when income statements are grouped to study a specific phenomenon. The study further explained briefly how this model was implemented in Grameenphone and what practical challenges the company was faced with. A special case of cross subsidy in the rapidly growing Bangladeshi mobile market was dissected segmenting along the RPU scale and subscription age. Certain challenges were faced moving from an internal company with 100 % information to the whole industry with limited data. Methods for modeling the unknowns were devised and explained.

The results show that looking at ARPU and EBITDA will rather hide facts than yield useful insight. The outcome supports the hypothesis that the industry cross-subsidizes to attract new users. This transfer of margin from old and high-RPU subscriptions (urban, rich) to new and low using (rural, poor) is so massive that the industry in total was left with losses in the second quarter of 2007. At the end was presented a best case scenario for how the industry will look after a year. Although the EBITDA was estimated to increase some 3.6 % and the number of cross subsidizing subscriptions is halved it is questionable whether the industry will generate enough margin to pay for the depreciation of the heavy network investments.

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