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SECTION 7. Mechanics and machine construction.

CALCULATION OF VON MISES STRESS AT PLASTIC DEFORMATION OF A STEEL BUSHING

Abstract: Stress condition of a steel bushing after short-term plastic deformation is presented in the article. The analytical formula for determining of von Mises stress at plastic deformation of the steel bushing is obtained.

Key words: stress, a bushing, tensor, a model, plastic deformation.

Language: English

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Introduction

Hollow metal parts (for example, bushings and liners) are exposed to plastic deformation under external loads during operation [1]. Stresses of various kinds occur in material of the part. A calculation of a value and a distribution in a volume of stresses is carried out taking into account the physical and mechanical properties of material, sizes of the part, action time of loads and other conditions of plastic deformation. A number of multidirectional stresses in material of the deformed part can be presented by von Mises stress (equivalent stress) [2]. The calculated value of von Mises stress must be less than maximum allowable stress in material of the part in comparing. Safety margin of material at short-term plastic deformation of the thin-walled part has determined from the ratio of two stresses. Let us consider stress-strain condition of the thin-walled part in condition of constant radial external force application.

Materials and methods

The calculation of von Mises stress was performed in the COMSOL Multiphysics (Structural Mechanics Module) software environment [3].

The three-dimensional solid-state bushing model was exposed to plastic deformation. Quality structural steel 1045 (UNS G10450) was accepted as material of the bushing model [4]. The outer diameter of the bushing model was accepted by the value of 40 mm, the inner diameter of the bushing model was accepted by the value of 30 mm. Constant distributed force of 1 kN by duration of 1 s acted on the outer cylindrical surface of the steel bushing model. Load was absent in axial direction. The steel bushing model was fixed (the inner cylindrical surface).

The following conditions were accepted for the calculation of stress condition of the steel bushing model at plastic deformation (1 – 11):

1. Solid mechanics

$$\rho \frac{\partial^2 u}{\partial t^2} = \nabla \cdot FS + Fv \quad (1)$$



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$$F = I + \nabla u \quad (2)$$

where ρ is density; u is displacement field; t is time; ∇ is gradient; F is force; S is the second Piola-Kirchhoff stress tensor [5]; F_V is load defined as force per the unit volume; I is unit tensor.

2. Linear elastic material

$$\rho \frac{\partial^2 u}{\partial t^2} = \nabla \cdot S + F_V \quad (3)$$

$$S = S_{ad} + C : \varepsilon_{el} \quad (4)$$

$$\varepsilon_{el} = \varepsilon - \varepsilon_{inel} \quad (5)$$

$$S_{ad} = S_0 + S_{ext} + S_q \quad (6)$$

$$\varepsilon_{inel} = \varepsilon_o + \varepsilon_{th} + \varepsilon_{hs} + \varepsilon_{pl} + \varepsilon_{cr} \quad (7)$$

$$\varepsilon = \frac{1}{2} [(\nabla u)^T + \nabla u] \quad (8)$$

where S_{ad} is additive stress [6]; C is the fourth-order elasticity tensor [7]; ε_{el} is elastic strain; ε is total strain tensor; ε_{inel} is inelastic strain; S_0 is initial stress; S_{ext} is external stress; S_q is stress (viscous damping); ε_o is initial strain; ε_{th} is thermal strain; ε_{hs} is hygroscopic strain; ε_{pl} is plastic strain; ε_{cr} is creep strain; T is temperature.

3. Boundary load

$$S \cdot n = F_A \quad (9)$$

$$F_A = \frac{F_{tot}}{A} \quad (10)$$

where n is outward unit normal vector; F_A is load defined as force per the unit area; F_{tot} is total force; A is the cross section area.

4. Fixed constraint

$$u = 0 \quad (11)$$

Mesh statistics: minimum element quality – 0.2487, average element quality – 0.7027, tetrahedral elements – 3227, triangular elements – 1304, edge elements – 132, vertex elements – 8.

Results and discussion

Calculated von Mises stress in the steel bushing model after plastic deformation is presented in the Fig. 1.

Maximum equivalent stress of material was distributed in surface layers of a hole after removing of external load from the outer surface of the bushing model. Maximum von Mises stress, when considering of the end surface of the bushing model, was found in the second and the fourth quarters of the XY coordinate plane. The volume of the bushing model, which was located in the first quarter of the XY coordinate plane, was less exposed to equivalent stress. Von Mises stress reached the value up to 950 kN/m².

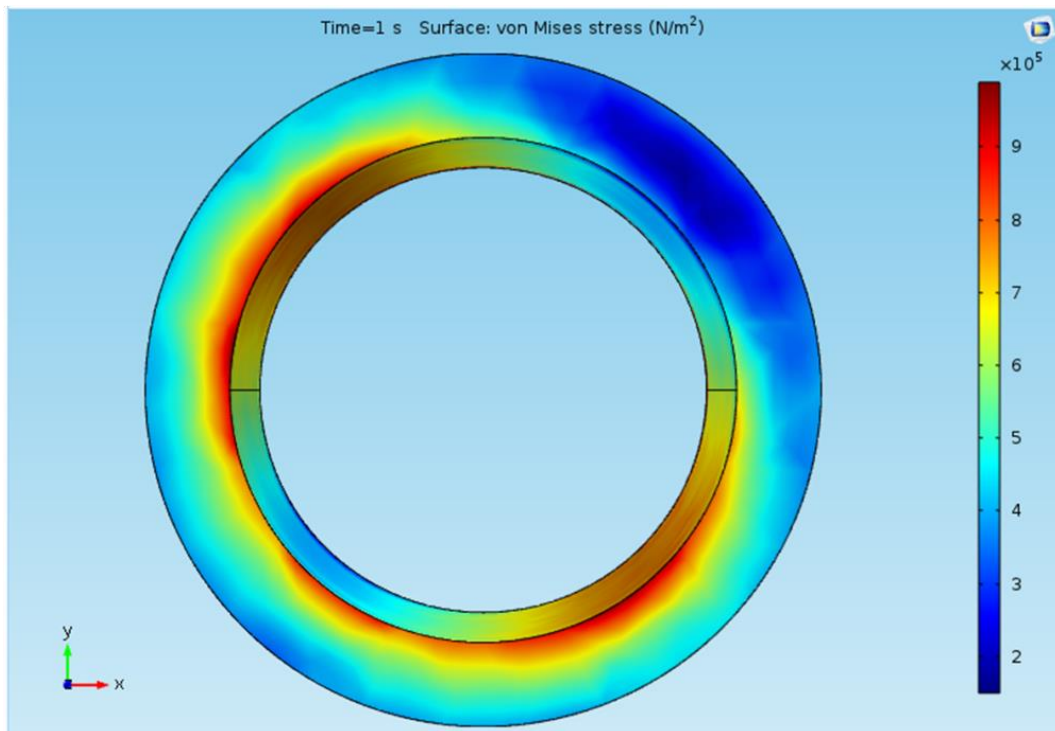


Figure 1 – Von Mises stress in the steel bushing model after plastic deformation.

Maximum allowable stress (tensile strength) of quality steel 1045 is 600000 kN/m². This means that material of the bushing model can withstand external loads by the value in 600 times more than external

load applied in accordance with conditions of the problem.

Von Mises stress can be presented in the mathematical form (12)

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$$\begin{aligned}
 \sigma_{vonMises} = & \left[\frac{1.5 \left(\frac{E}{(1+\nu)(1-2\nu)} \right) \left((1-\nu) \cdot \nabla u + \nu \cdot \nabla v + \nu \cdot \nabla w \right) - \frac{E}{(1+\nu)(1-2\nu)} \left((1-\nu) \cdot \nabla u + \nu \cdot \nabla v + \nu \cdot \nabla w \right) + (\nu \cdot \nabla u + (1-\nu) \cdot \nabla v + \nu \cdot \nabla w) + (\nu \cdot \nabla u + \nu \cdot \nabla v + (1-\nu) \cdot \nabla w)}{3} \right]^2 + \\
 & + 2 \left[\frac{E}{1+\nu} (\nabla v + \nabla u) \right]^2 + 2 \left[\frac{E}{1+\nu} (\nabla w + \nabla u) \right]^2 + \\
 & + \left[\frac{\frac{E}{(1+\nu)(1-2\nu)} (\nu \cdot \nabla u + (1-\nu) \cdot \nabla v + \nu \cdot \nabla w) - \frac{E}{(1+\nu)(1-2\nu)} \left((1-\nu) \cdot \nabla u + \nu \cdot \nabla v + \nu \cdot \nabla w \right) + (\nu \cdot \nabla u + (1-\nu) \cdot \nabla v + \nu \cdot \nabla w) + (\nu \cdot \nabla u + \nu \cdot \nabla v + (1-\nu) \cdot \nabla w)}{3} \right]^2 + \\
 & + 2 \left[\frac{E}{1+\nu} (\nabla w + \nabla v) \right]^2 + \\
 & + \left[\frac{\frac{E}{(1+\nu)(1-2\nu)} (\nu \cdot \nabla u + \nu \cdot \nabla v + (1-\nu) \cdot \nabla w) - \frac{E}{(1+\nu)(1-2\nu)} \left((1-\nu) \cdot \nabla u + \nu \cdot \nabla v + \nu \cdot \nabla w \right) + (\nu \cdot \nabla u + (1-\nu) \cdot \nabla v + \nu \cdot \nabla w) + (\nu \cdot \nabla u + \nu \cdot \nabla v + (1-\nu) \cdot \nabla w)}{3} \right]^2 \Big]^{0.5}
 \end{aligned} \quad (12)$$

where E is the Young's modulus; ν is the Poisson's ratio; $\nabla u, \nabla v, \nabla w$ are displacement gradients.

Conclusion

Evenly distributed radial force leads to asymmetric stresses in material of the bushing model. Stresses symmetry in material of the bushing model is observed in the XZ and YZ coordinate

planes, since the coefficients $\left[\frac{E}{1+\nu} (\nabla w + \nabla u) \right]^2$ and

$\left[\frac{E}{1+\nu} (\nabla w + \nabla v) \right]^2$ in the formula (12) are equal.

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SECTION 32. Jurisprudence.

FEATURES OF LEGAL CONSTRUCTION OF MORTGAGE

Abstract: This article analyzes the features of the mortgage as a way to ensure the fulfillment of obligations, from ancient Greece to the present. The development of the institution of mortgages in the history of the civilians has undergone many changes. But taking into account its special place among other ways of ensuring the fulfillment of civil obligations, since it has a certain degree of reliability and advantages, it has taken its rightful place in binding legal relations.

Key words: mortgage, mortgage lending, mortgage, insurance.

Language: Russian

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ОСОБЕННОСТИ ПРАВОВОЙ КОНСТРУКЦИИ ИПОТЕКИ

Аннотация: В данной статье проанализированы особенности ипотеки как способа обеспечения исполнения обязательств, начиная с Древней Греции по настоящее время. Развитие института ипотеки в истории цивилисты претерпели множество изменений. Но учитывая его особое место среди иных способов обеспечения исполнения гражданско-правовых обязательств, поскольку обладает определенной степенью надежности и преимуществами, он занял свое достойное место в обязательственных правоотношениях.

Ключевые слова: ипотека, ипотечное кредитование, закладная, страхование.

Introduction

Ипотека как важнейший инструмент кредита, в условиях рыночной экономики Кыргызской Республики играл особую роль.

Одним из основных условий ипотеки одновременно обеспечением исполнения кредитных договоров или договоров займа с выплатой процентов выступает обеспечение уплаты кредиторам (заимодавцам) процентов за использование кредита (из заемных средств).

Принятие ряда законодательных актов, государственных программ в сфере ипотечного кредитования, не сыграла роль действенного механизма в системе жилищного кредитования и строительства.

И в качестве причин этому выступили следующие: противоречие, содержащееся в законодательственных актах, экономический и политический факторы, к которым входят недостаточная государственная поддержка.

Коммерческий банк не имеет необходимых денежных средств для выдачи гражданам с

высокой процентной ставкой на длительный срок, или нет заинтересованности в таковых банковских операциях. Кроме того, основная часть граждан не имеют высоких или стабильных доходов, что не дают им, с отсутствием риска для банкира и страховщика успешно получать кредит на покупку либо строительство жилья, и самое главное не уверен сам должник в успешности возврата кредита. На сегодняшний день существует острая необходимость в усилении работы страховой компании, готовой понести часть риска кредитора, развивать институты независимой оценки, с целью правильного утсановления стоимости жилья, с оказанием непосредственной помощи участнику ипотечного кредитования. В этом огромную роль играет рынок ценных бумаг при проведении операций с закладными, что указывает на необходимость укрепления фондового рынка.



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Materials and Methods

Изучая опыт развитых государств, которые основаны на выгодных отношениях кредиторов и должников, Кыргызская Республика через ипотеку, обязана отрегулировать и привлечь на свой рынок дополнительных средств в сферу промышленности, роста производства, что приведет к улучшению благосостояния народа.

В свете исследований залогового правоотношения в действующем законодательстве Кыргызской Республики важно обратить внимание на изучение различных видов залога и исследовать сущность таких разновидностей для объективного определения состояния в сфере залоговых правоотношений Кыргызской Республики. В этой связи заслуживает особого внимания один из видов залога как ипотека.

Современная литература (например, экономическая), посвященной ипотеке, содержит многочисленные определения не заслуживающих особого внимания. Тем не менее, некоторые из них требуют специального рассмотрения и достаточно логичны и научно-обоснованы. Следовательно, необходимо изучить генезис понятия ипотеки. Термин ипотека употреблялся как во времена древних греков и так и в наши дни с несколькими значениями. Во-первых, в качестве определения исторической формы залогов, где составляли предмет залога у залогодержателя. Необходимо отметить, что термин ипотека имеет греческое происхождение от слова "hypoteke", который ввел в обиход знаменитый афинский реформатор и законодатель, один из семи мудрецов. Его звали Солон, который стал автором рационального способа превращения личной ответственности в имущественную. На границе имения должника устанавливали столб с обозначением имущества в качестве предмета обеспечения претензий заимодавца на сумму, которая была заключена в кредитном договоре. Этот столб называли ипотекой (подставкой), которое в переносном значении употреблялся для определения любых залогов под кредит. Устанавливали этот столб на участке земли в качестве запрета заемщику на вывоз из него как отмечал Новицкий И.: «все приведенное, привезенное, принесенное». Поскольку ипотечный кредитор не получает во владение, его интересы могли быть защищены только путем предоставления к нему вещного права, дающего возможность обратиться взыскание на предмет ипотеки, а при необходимости отыскать его у третьих лиц» [1].

В юридической литературе термин «ипотека» охватывает следующие два понятия:

1) «Ипотека» (как правоотношение) есть залог недвижимого имущества с целью получения ипотечного кредита (как правило, в

банке). Для ипотеки характерно оставление имущества в руках должника. Залог в гражданском праве - один из способов обеспечения обязательства - в данном случае банковского кредита. При этом во всех случаях обязательна государственная регистрация залога любой недвижимости. В случае неплатежеспособности должника требования кредитора удовлетворяются из выручки от реализованного имущества в преимущественно перед другими кредиторами или путем перехода заложенной недвижимости в собственность залогодержателя.

2) «Ипотека» (как ценная бумага) подразумевает «закладную» - долговой инструмент удостоверяющий права залогодержателя на недвижимое имущество. Закладная обычно свободно обращается на рынке.

Таким образом, с правовой точки зрения ипотека представляет собой один из наиболее эффективных способов обеспечения исполнения обязательств, а так как объекты недвижимости обладают значительной стоимостью и непосредственно связаны с землей, т.е. невозможно спрятать, переместить в другое место или иным образом вывести из подконтроля залогодержателя. В юридической литературе высказана точка зрения, согласно которой именно видимость недвижимого имущества, а не его непосредственная ценность является «решающим качественным отличием, позволяющим превратить его в средство обеспечения устойчивости кредита через ипотеку» [2].

Понятие «ипотека» неотделимо от понятия «ипотечная система» и «ипотечное кредитование». Под ипотечной системой, согласно словарю «Брокгауза и Ефрона», понимается «порядок приобретения прав на недвижимые имущества путем записки в публичных поземельных книгах» [3]. Ипотечное кредитование – это система, которая включает в себя кроме элемента ипотечной системы кредита, который был выдан с обеспечением залога недвижимости (ипотеки), который имеет регистрацию в государственном реестре прав на недвижимость, и элемент рефинансирования кредитора, выдавшего ипотечный кредит.

Многими широко интерпретируются термин «ипотека» как в качестве получения кредита под залог недвижимости, так и получение кредита для покупки недвижимости. Понятие ипотеки рассматривается в качестве способа обеспечивающего исполнение обязательств, где предмет залога есть недвижимое имущество. В случае выдачи кредита для приобретения жилья, применяется термин «ипотечное (жилищное) кредитование». В некоторых случаях



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употребляется понятие «смешанная ипотека», где заемщик получает кредит под залог имеющегося жилья на приобретения нового. Следовательно, как жилищное кредитование, так и смешанная ипотека являются формами кредитования с одной разницей, что в первом обеспечением ипотечного кредита выступает и залог, и поручительство, а во втором случае таковой рассматривается только залог недвижимости.

Ипотека выступает одной из разновидности имущественных залогов, обеспечивающих исполнение основных денежных обязательств, предметом которых является недвижимое имущество. К ним относятся земельный участок недр, обособленный водный объект, леса, многолетнее насаждение, здание, сооружение и т.д. Вместе с тем, ипотека возникает только в отношении объекта, имеющего кадастровый номер, по которой объект недвижимости идентифицируется в Едином государственном реестре прав на недвижимое имущество и сделок с ним.

В соответствии со статьей 35 Закона Кыргызской Республики «О Залог»: «Ипотека - это способ обеспечения исполнения денежного или выраженного в денежной форме обязательства под залог права собственности или иного вещного права на недвижимое имущество или залог, который содержит недвижимое имущество в составе предмета залога, в том числе залог предприятия как имущественного комплекса. Особенности ипотеки земель сельскохозяйственного назначения регулируются земельным законодательством Кыргызской Республики» [4].

Ипотека относится к виду залога, где имущество всегда остается во владении и пользовании залогодателя. «Владение – это фактическое обладание, хозяйственное господство над вещь, хотя бы и не в натуральной форме (например, залогодатель может временно уезжать из заложенной квартиры, оставаясь ее владельцем)» [5]. В случае заложения недвижимого имущества, переданного залогодателем во временное владение и пользование третьему лицу (в соответствии с договором найма жилого помещения, аренды, безвозмездного пользования и т.д.), тогда признается, что имущество оставленным у залогодателя.

Заслуживает особого внимания понятия и статус ипотеки по законодательству зарубежных стран. Гражданский кодекс Республики Азербайджан дает такое определение ипотеки: «**Ипотекой признается залог, предметом которого является недвижимое имущество**» [6]. Другое содержание ипотеки включает Гражданский Кодекс Республики Казахстан: «**Ипотека - вид залога, при котором**

заложенное имущество остается во владении и пользовании залогодателя или третьего лица» [7].

Тем не менее, указанные законодательства содержат схожести, поскольку ипотека выступая одним из видов залога, включает условие обеспечения уплаты залогодержателю всей суммы долга согласно кредитному договору либо иным обеспечиваемым ипотекой обязательствам всю либо в части, регулируемой договором об ипотеке. Кроме того, ипотека, определенная для обеспечения исполнения кредитных договоров или договоров займа с выплатой процента, обеспечивают также выплаты кредиторам (заимодавцам) причитающегося им процентов за использование кредитов (заемных средств).

Таким образом, в требования, кроме суммы задолженности, включаются процент, неустойка, возмещение убытка, дополнительный расход залогодержателя, понесенный им в ходе обращения взыскания на заложенное имущество. В случае, где не указывается срок взыскания процентов, то он считается не ограниченным.

Самостоятельность договора об ипотеке объясняется его отдельностью к договорам, по которым возникают обеспеченные залогом обязательства. Такое положение об ипотеке в виде средства обеспечения также содержится в основном договоре.

Один из российских ученых Максимов С.Я., утверждает: «Ипотека – это самая лучшая форма залога. Так как ипотека обеспечивает неукоснительное выполнение обязательств. Ипотека в современной цивилистике имеет особое место. Кроме того, в российской практике в суды меньше всего обращаются по ипотечным договорам» [8].

Договоры имеют общие признаки, в качестве которых выступают денежный характер обеспечиваемых требований. Следовательно, как ипотека не рассматривается обязательство по выполнению работы, оказанию услуги и т.д. вместе с тем, ипотека обеспечивает исполнение внедоговорного обязательства, например, обязательство в результате причинения вреда.

Требование, обеспеченное ипотекой, законодатели подразделяют на: «1) основная сумма долга; 2) дополнительное, причитающееся залогодержателям. Ипотека обеспечивает уплату и всей суммы долга, и части» [9].

Залогодателем установлены особые правила с целью обеспечения ипотекой требования, вытекающего из договоров займа и кредитных договоров. Их содержание заключаются в следующем: ипотекой обеспечивается и сумма основного долга, и проценты, причитающиеся за пользование кредитами либо заемными средствами. В случае для кредитных договоров, где выступает возмездными и оговорок не было,

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тогда в договоре займа необходимо заключить условия выплаты соответствующих процентов.

Важно подчеркнуть, в качестве предмета договора ипотеки выступают и объекты недвижимости, и имущественные права, например, право аренды недвижимого имущества. Некоторые изъятия могут определяться законом.

Договор об ипотеке является гражданско-правовым актом, разновидностью сделки, где применяется основное правило, регулирующее порядок совершения. Договор ипотеки предусматривает соблюдение двух условий: 1) осуществление обязательной нотариальной формы; и 2) государственной регистрации [8].

В соответствии с частью 7 статьи 35 Закона Кыргызской Республики «О Залог»: «Правила об ипотеке недвижимого имущества соответственно применяются к залогу права пользования земельным участком, прав арендатора по договору об аренде такого имущества (право аренды), поскольку иное не установлено законом и не противоречит существу отношений.

Залог земельных участков, предприятий и другого недвижимого имущества может возникать лишь постольку, поскольку их оборот не ограничивается законодательством Кыргызской Республики» [4].

В этом случае сторонами, устанавливается отсутствие в кредитном договоре ипотеки, подтверждаются переход права собственности на предмет купли-продажи, где оплата производилась в кредит, и в качестве обеспечения оплаты выступают сами предметы купли-продажи. Следовательно, сторонами, совершаются подобные сделки, стремлением к наступлению соответствующих последствий. В данному случае стремления сторон составляет элемент складывающихся правоотношений. Таким образом, не имеет место совершению договора ипотеки, но она может быть превращена в другой юридический акт – в сделку, где ипотека выступает составляющим элементом.

Если взять пример опыта Республики Казахстан, с институтом ипотеки весьма развитым и преобладающим над другими разновидностями залога. Так статья 303 Гражданского кодекса Республики Казахстан гласит: «Предметом ипотеки могут быть предприятия, строения, здания, сооружения, квартиры в многоквартирном доме, транспортные средства, космические объекты, товары в обороте и другое не изъятые из гражданского оборота имущество» [7].

О преимуществах ипотеки кыргызский юрист Сарымбеков И.Т. пишет следующее:

«1. Главным преимуществом ипотеки все же остается то, что, вместо долгосрочного

накапливания необходимой суммы на покупку квартиры, загородного дома или прочего имущества, возникает возможность уже сейчас жить в новой квартире или, скажем, доме.

2. Приобретаемое жильё, сразу становится собственностью заемщика и существует возможность зарегистрироваться в новом жильё заемщику и членам его семьи.

3. Ипотечное кредитование – это безопасная операция. Нет никакого риска утраты правособственности на имущество, включая случаи потери заемщиком трудоспособности.

4. Заемщику ипотечного кредита предоставляется имущественный налоговый вычет, который снижает процентную ставку по ипотеке за счет того, что заемщик не будет платить подоходный налог с суммы, потраченной на покупку жилья и с процентов по ипотеке» [10].

На основании вышеизложенного можно смело констатировать тот факт, что посредством ипотеки и ипотечного кредитования можно решить ряд жилищных и социально-бытовых проблем в нашей Республике. Ведь одной из важнейших задач государства является обеспечение граждан жильём, в связи с чем должны быть разработаны основные принципы направленные на решение вышеуказанных задач, а именно:

- равное обеспечение защиты интересов как кредитора, так и должника. В ряде случаев заемщику необходимо предоставить право восстановить заем и право выкупить дом в определенные сроки. Для кредитора необходимо создать такие условия, чтобы инвестировать в жилищную сферу и когда он будет уверен в возврате кредита с процентами. Этому служат страхование, специальные правительственные программы, правильная налоговая политика и гарантированная судебная защита;

- доступность ипотечного кредита рядовому потребителю: а) для отдельных категорий граждан например, матерям одиночкам, лиц ограниченных возможностей здоровья ЛОВЗ, то есть социально уязвимых слоев населения, а также учителям, военнослужащим, врачам, чьи заработные платы не достигают 15000 сом в месяц, необходимо предоставление кредита на льготных условиях;

- активное участие государства в ипотечных отношениях. Государство обязано проводить льготную налоговую политику в области ипотечных вопросов, а именно освободить от ряда налоговых платежей организаций, функционирующих в сфере ипотечного кредитования;

- системность нормативных актов. Особую актуальность данной принцип имеет для нашей республики. Развитие национального законодательства идет таким образом, что

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нормативные акты относящиеся к недвижимости, собственности, земле, страхованию, жилищным, налоговым и иным финансовым вопросам, должны быть согласованы между собой иметь единую цель, а вместо этого они прямо противоречат друг к другу, или отсылают из одних норм в другие и в итоге многие нормы не функционируют должным образом;

- довести до логического завершения ранее разработанные государственные программы в области ипотечного кредитования, а также принять новые стратегические планы в этой области, в свою очередь исполнение данных программ Президенту Кыргызской Республики взять под личный контроль.

Conclusion

В заключении хотелось бы отметить, что система ипотечного кредитования одновременно рассматривается государством в качестве механизма, способного решить задачи огромной социальной важности, поэтому ее развитие в нашей республике будет способствовать социально-экономической стабилизации.

Государство может избежать множества негативных явлений, сопутствующих введению системы ипотечного кредитования, если будет использовать опыт развитых стран, который основывается на стремлении максимально гармонизировать отношения кредитора и должника.

Ипотека может способствовать оживлению оборота недвижимости, привлечению в экономику дополнительных средств для развития промышленности, роста производства, ускорению оборачиваемости денежных средств и нуждается в более пристальном внимании законодателей для того, чтобы инвесторы, особенно банки могли с меньшим риском кредитовать экономику государства и облегчить правоотношения между участниками гражданского оборота.

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SECTION 20. Medicine.

DIAGNOSTIC VALUE OF SOME PARAMETERS OF RADIOLOGY METHODS IN BREAST CANCER

Abstract: The aim of our work was to determine the diagnostic value of radiology methods used to detect breast cancer. In this study, we presented the results of a study of 76 women (18 - 79 years) who underwent a breast cancer examination in the Oncological Clinic of the Azerbaijan Medical University during the period from 2014 to 2017. All patients underwent ultrasound with a combination of doppler and mammography. Subsequently, out of 76 examined patients, 48 women had malignant tumors and 28 had benign neoplasms. Considering account the results of our studies, it can be inferred that when evaluating the malignancy of the newly diagnosed tumor, its contours, echogenicity, the nature of vascularization, ratio of antero-posterior dimensions and width of the tumor, as well as the presence of microcalcines have a high diagnostic weight. The tumor size that determined by ultrasound and mammography does not have a high diagnostic weight.

Key words: breast cancer, ultrasonography, mammography, dopplerography

Language: Russian

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ДИАГНОСТИЧЕСКАЯ ЦЕННОСТЬ НЕКОТОРЫХ ПАРАМЕТРОВ ЛУЧЕВОЙ ДИАГНОСТИКИ ПРИ РАКЕ МОЛОЧНОЙ ЖЕЛЕЗЫ

Аннотация: Цель нашей работы - определить диагностическую ценность радиологических методов, используемых для выявления рака молочной железы. В этой публикации мы представили результаты исследования 76 женщин (18 - 79 лет), прошедших обследование по поводу рака молочной железы в онкологической клинике Азербайджанского Медицинского Университета в период с 2014 по 2017 год. Все пациенты прошли ультразвуковое исследование с доплерографией и рентгеновскую маммографию. Учитывая результаты наших исследований, можно сделать вывод о том, что при оценке злокачественности новообразований контуры, эхогенность, соотношение переднезадних размеров и ширины, характер васкуляризации опухоли, а также присутствие микрокальцинатов имеют высокий диагностический вес, при этом размер опухоли не обладает значимой диагностической ценностью.

Ключевые слова: рак молочной железы, маммография, УЗИ, доплерография

Introduction

Рак молочной железы (PMЖ) в структуре заболеваемости и смертности женского населения устойчиво занимает лидирующие позиции. Злокачественные новообразования молочной железы являются одной из актуальных медико-социальных проблем современной онкологии еще и потому, что поражают трудоспособное население, занимая

одно из ведущих мест по утрате трудоспособности и причинам смерти от злокачественных новообразований у женщин [5, с. 28-32]. Немаловажную роль в исходе заболевания играет состояние овариально-менструальной функции женщины, ее возраст, состояние репродуктивной сферы, генетический фактор, особенности характера питания, наличие дисгормональных заболеваний молочных желез.



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Несмотря на то, что РМЖ чаще встречается в возрасте 55-65 лет, в последние годы наблюдается тенденция к возрастанию доли молодых женщин по отношению ко всему массиву больных РМЖ. Несомненно, что единственным способом борьбы с раком молочной железы, а также гарантом сохранения и улучшения качества жизни больного является своевременная диагностика [2, с. 2; 3, с. 52-54; 10 с. 515-520; 21, с. 262-270]. Одним из основных показателей, определяющих прогноз онкологического заболевания, является степень распространенности опухолевого процесса на момент диагностики [4, с.359-362; 6, с. 9-10; 8, с. 29-30; 13, с.773-839]. В этой связи на первый план выходят вопросы эффективного выявления РМЖ, и прежде всего, ранней диагностики на доклинической стадии [1, с. 664-667; 11, с. 23; 12, с.20-25; 16, с.878-881; 17, с.1377-1385; 18]. Среди методов диагностики РМЖ, наиболее изученными являются рентгеновская маммография и ультразвуковое исследование (УЗИ) молочных желез [7, с.10-15; 9, с.53-57; 14, с. 75; 15, с. 437-450; 19, с. 26-34; 20, с. 246-253; 22, с. 16].

Materials and Methods

Целью нашей работы явилось определение диагностической ценности лучевых методов, используемых для выявления РМЖ. В настоящей работе были представлены результаты исследования 76 пациенток, проходивших обследование по поводу РМЖ в Онкологической Клинике Азербайджанского Медицинского Университета за период с 2014 по 2017 года. Возраст пациенток колебался от 18 до 79 лет. Всем больным были проведены ультразвуковое исследование с сочетанием доплерографии и

рентгеновская маммография. Ультразвуковое исследование проводилось на аппарате MINDRAY D70 (Китай), а маммография при помощи аппарата SIEMENS MAMMOMAT INSPIRATION (Германия). При ультразвуковом обследовании оценивались переднезадние и поперечные размеры, контуры, экзогенность, экоструктура, наличие и характер васкуляризации выявленного объемного новообразования, а также её локализация по квадрантам молочной железы. Принималось во внимание состояние регионарных подмышечных, надключичных, подключичных, парастеральных лимфатических узлов. Во время маммографии определялись контуры, размеры выявленной опухоли, также принимались во внимание её форма и наличие микрокальцинатов. После получения результатов плановых гистологических исследований нами проанализирована информативность и точность этих методов диагностики.

Из 76 обследованных пациенток у 48 женщин были обнаружены злокачественные, а у 28-доброкачественные новообразования. Выявленные новообразования имели правильные, лобулярные, неправильные и спиккулярные контуры (Таб. 1). По данным УЗИ и рентгеновской маммографии у пациенток с РМЖ ровные контуры новообразования были обнаружены у 1, неровные - у 21, лобулярные - у 10, а спиккулярные - у 16 женщин. Только у одной пациентки, несмотря на правильные контуры, было морфологически подтверждено наличие злокачественного новообразования. Доброкачественные новообразования у 24 пациенток имели ровные, а у 4-лобулярные контуры.

Таблица 1.

Характер новообразований, выявленных в молочной железе

Характер опухоли		Доброкачественные новообразования	Злокачественные новообразования	Всего
Размеры	>10 мм	20	44	64
	≤10 мм	8	4	12
Контуры	правильные	24	1	25
	лобулярные	4	10	14
	неправильные	-	21	21
	спиккулярные	-	16	16
Эхогенность	гиперэхогенная	2	-	2
	гипоэхогенная	9	44	53
	анэхогенная	17	4	21
Отношение AP и R	AP>R	4	36	40
	AP<R	24	12	36
Характер васкуляризации при доплерографии	Аваскулярный тип	20	1	21
	Периферический тип	7	11	18
	Центральный тип	1	36	37

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AP-передне-задний размер опухоли
R-ширина опухоли

Из данных, представленных в таблице 1, видно что для злокачественных опухолей молочной железы наиболее характерными признаками являются неправильные и спиккулярные контуры, пониженная эхогенность, преобладание передне-заднего размера над шириной опухоли, диффузный (периферический и центральный) тип васкуляризации.

При УЗИ чувствительность формы контуров для оценки злокачественности опухоли составила

97,9±2,1%, а специфичность метода — 85,7±6,6% (Таблица 2.). Предсказательная полезность положительного результата была 92,2±3,8%, предсказательная полезность негативного результата — 96±3,9%. При этом отношение правдоподобия положительного результата составило 6,85 и оценивалось как хорошее, а негативного результата 0,02 и оценивалось как отличное. Общий диагностический вес теста был равен 93,4±2,8%.

Таблица 2.

Диагностическая оценка некоторых параметров УЗИ при РМЖ (в %)

Признак	Se	Sp	pPV	nPV	LR+	LR-
Контуры	97,9±2,1	85,7±6,6	92,2±3,8	96,0±3,9	6,85	0,02
Размеры	91,7±4,0	28,6±8,5	68,8±5,8	66,7±13,6	1,28	0,29
Отношение AP и R	75,0±6,3	85,7±6,6	90,0±4,7	66,7±7,9	5,25	0,29
Эхогенность	91,7±4,0	60,7±9,2	80,0±5,4	81,0±8,6	2,33	0,14
Допплерография	75,0±6,3	96,4±3,5	97,3±2,7	69,2±7,4	21,00	0,26
Регионарные лимфоузлы	91,7±4,0	57,1±9,4	78,6±5,5	80,0±8,9	2,14	0,15

Se – чувствительность - истинно (+) результаты

Sp – специфичность - истинно (-) результаты

pPv – предсказательная полезность (+) результата

nPV – предсказательная полезность (-) результата

LR+ – отношение правдоподобия (+) результата

LR- – отношение правдоподобия (-) результата

Выявленные доброкачественные и злокачественные новообразования в зависимости от размеров мы разделили на 2 группы: 1) размеры >10мм, 2) размеры ≤10мм. По данным УЗИ и рентгеновской маммографии у 44 пациенток размеры злокачественного образования составили больше >10мм, а у 4-х-размеры были ≤10мм. По данным УЗИ 20 из доброкачественных новообразований имели размеры >10мм, а у 8 размеры составляли ≤10мм, в то время, как при рентгеновской маммографии эти показатели были равны соответственно 23 и 5. Чувствительность размеров при оценке злокачественности при УЗИ составила 91,7±4,0%, а специфичность метода -28,6±8,5%. Предсказательная полезность положительного

результата составила 68,8±5,8%, предсказательная полезность негативного результата -66,7±13,6%, отношение правдоподобия положительного результата - 1,28 (оценивалось как непригодное), а негативного результата - 0,29 (оценивалось как посредственное). Общий диагностический вес теста составил 68,4±5,3%.

При рентгеновской маммографии чувствительность размеров опухоли для оценки злокачественности составила 91,7±4,0%, специфичность метода -17,9±7,2%, предсказательная полезность положительного результата - 65,7±5,8%, предсказательная полезность негативного результата - 55,6±16,6% (Таблица 3).

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Таблица 3.

Диагностическая оценка некоторых параметров рентгеновской маммографии при РМЖ (в %)

Признак	Se	Sp	Ppv	nPV	LR+	LR-
Контуры	97,9±2,1	85,7±6,6	92,2±3,8	96,0±3,9	6,85	0,02
Размеры	91,7±4,0	17,9±7,2	65,7±5,8	55,6±16,6	1,12	0,47
Микрокальцинаты	43,8±7,2	96,4±3,5	95,5±4,4	50,0±6,8	12,25	0,58

При этом отношение правдоподобия положительного результата составило 1,12 и оценивалось как непригодное, а негативного

результата - 0,47 и оценивалось как посредственное. Общий диагностический вес теста был равен 64,5±5,5%.

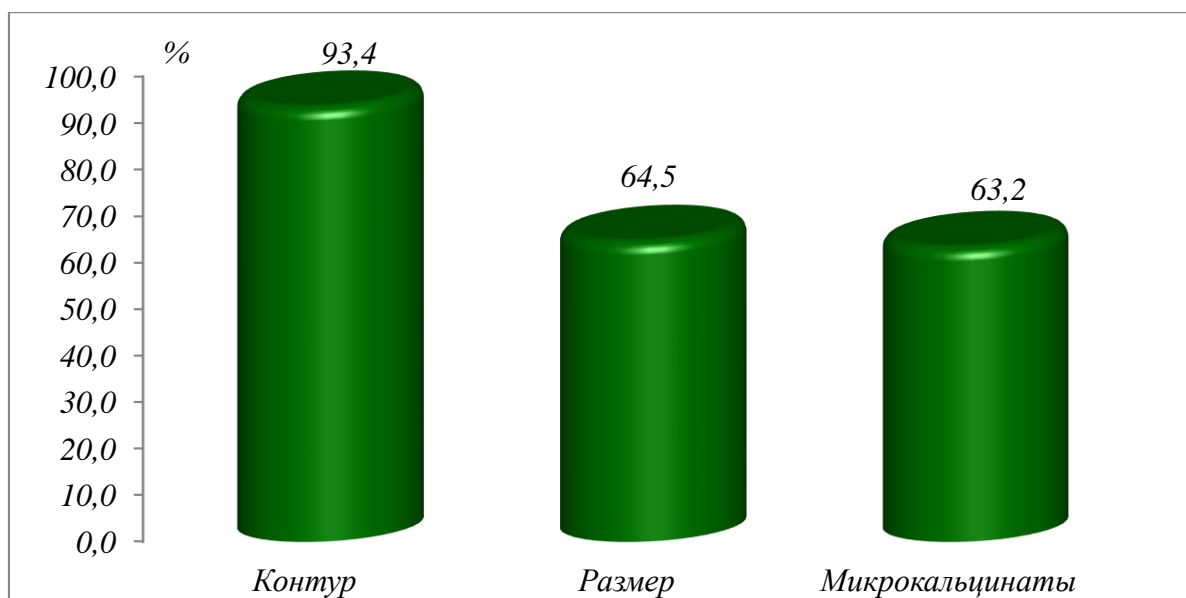


Рисунок 1. Общий диагностический вес параметров маммографии.

При УЗИ исследованиях, проведенных у 76 пациенток, выявленные опухоли имели различную экзогенность. Из выявленных злокачественных новообразований 4 были анехогенными, 44 гипэхогенными, из доброкачественных 17- анехогенными, 2 гиперэхогенными, 9 гипэхогенными. Таким образом для злокачественных образований наиболее характерна гипэхогенность. Чувствительность экзогенности при оценке

злокачественности составила 91,7±4,0%, а специфичность метода-60,7±9,2%. Предсказательная полезность положительного результата была 80,0±5,4%, предсказательная полезность негативного результата - 81,0±8,6%. Отношение правдоподобия положительного результата составило 2,3 и оценивалось как посредственное, а негативного результата - 0,14 и оценивалось как хорошее. Общий диагностический вес теста был равен 80,3±4,6%.

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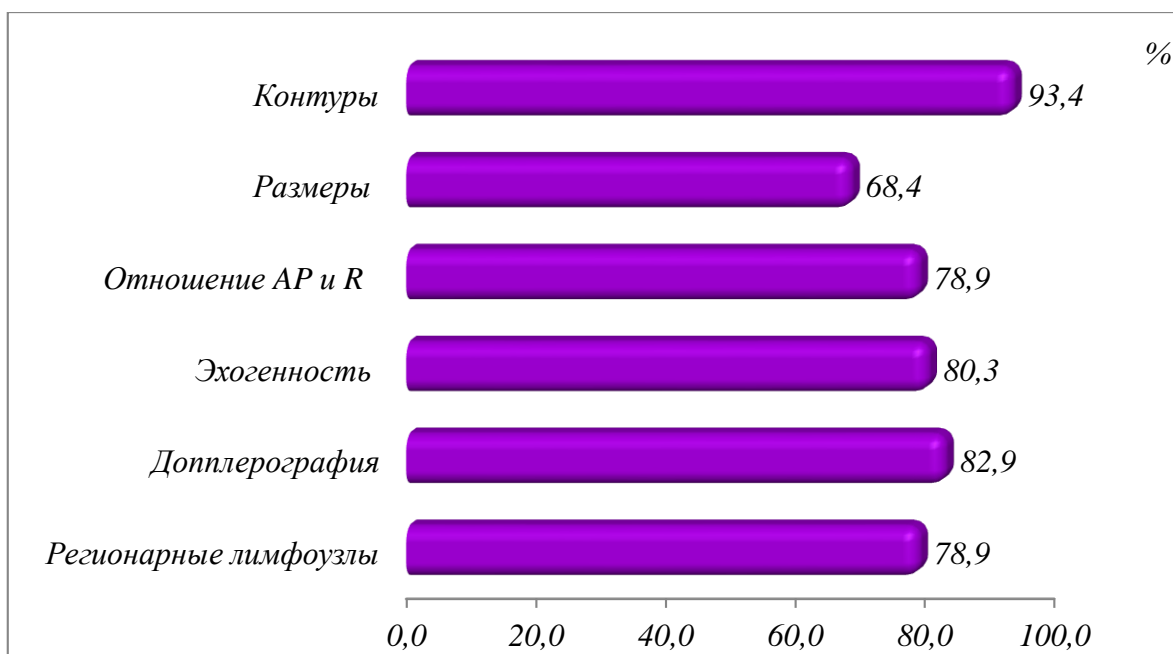


Рисунок 2. Общий диагностический вес параметров УЗИ.

У 36 пациенток со злокачественными новообразованиями, и у 4 с доброкачественными при УЗИ переднезадний размер опухоли превышал ширину, у 12 злокачественных и 24 доброкачественных новообразований переднезадний размер был меньше ширины. Чувствительность этого показателя при оценке злокачественности составила $75,0 \pm 6,3\%$, а специфичность метода - $85,7 \pm 6,6\%$. Предсказательная полезность положительного результата составила $90,0 \pm 4,7\%$, предсказательная полезность отрицательного результата - $66,7 \pm 7,9\%$. При этом отношение правдоподобия положительного результата составило 5,25 и оценивалось как хорошее, а отрицательного результата - 0,29 и оценивалось как посредственное. Общий диагностический вес теста был равен $78,9 \pm 4,7\%$.

При доплерографии образований были получены различные результаты. Так у 36 злокачественных новообразований и у одного доброкачественного новообразования было выявлено интенсивное периферическое и центральное кровообращение. Периферический тип кровообращения был выявлен у 11 злокачественных, и у 7 доброкачественных новообразований. У одного злокачественного и у 20 доброкачественных новообразований кровообращения не обнаружено. Чувствительность доплерографии при оценке злокачественности составила $75,0 \pm 6,3\%$, а специфичность метода - $96,4 \pm 3,5\%$. Предсказательная полезность положительного результата была $97,3 \pm 2,7\%$, предсказательная полезность отрицательного результата - $69,2 \pm 7,4\%$. При этом отношение правдоподобия

положительного результата составило 21,00 и оценивалось как отличное, а отрицательного результата - 0,26 оценивалось как посредственное. Общий диагностический вес теста был равен $82,9 \pm 4,3\%$.

При рентгеновской маммографии у 21 из 48 пациенток с РМЖ и у 1 из 28 пациенток с доброкачественными изменениями были выявлены микрокальцинаты. Чувствительность микрокальцинатов при оценке злокачественности выявленной опухоли составила $43,8 \pm 7,2\%$, а специфичность метода - $96,4 \pm 3,5\%$. Предсказательная полезность положительного результата была $95,5 \pm 4,4\%$, предсказательная полезность отрицательного результата - $50,0 \pm 6,8\%$. При этом отношение правдоподобия положительного результата составило 12,25 и оценивалось как отличное, а отрицательного результата - 0,58 и оценивалось как непригодное. Общий диагностический вес теста был равен $63,2 \pm 5,5\%$.

При УЗИ измененные лимфоузлы были выявлены у 44 из 48 пациенток с РМЖ. Из них у 29 пациенток лимфоузлы были оценены как реактивные, у 8 как метастатические. У 7 пациенток были обнаружены и метастатические и реактивные лимфоузлы, что подтверждалось данными патоморфологического исследования клетчатки, удаленной во время операции. У 12 из 28 пациенток с доброкачественными новообразованиями были обнаружены реактивные лимфоузлы. Чувствительность лимфоузлов при оценке злокачественности составила $91,7 \pm 4,0\%$, а специфичность метода - $57,1 \pm 9,4\%$. Предсказательная полезность положительного результата была $78,6 \pm 5,5\%$,

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предсказательная полезность негативного результата - $80,0 \pm 8,9\%$, отношение правдоподобия положительного результата - 2,14 (оценивалось как посредственное), а негативного результата - 0,15 (оценивалось как хорошее). Общий диагностический вес теста составил $78,9 \pm 4,7\%$.

Conclusion

Таким образом, принимая во внимание результаты проведенных нами исследований,

можно прийти к выводу что, при оценке злокачественности выявленного новообразования высокую диагностическую значимость имеют его контуры (при УЗИ и маммографии), наличие микрокальцинатов (при маммографии), характер васкуляризации (при доплерометрии), а также экзогенность и соотношение передне-задних размеров и ширины опухоли (при УЗИ). Размеры опухоли определяемые при УЗИ и маммографии не обладают высоким диагностическим весом.

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**SECTION 21. Pedagogy. Psychology. Innovations
in the field of education.**

IMPROVEMENT OF LECTURE TRI DHARMA BY SPRITUAL LEADERSHIP APPROACH

Abstract: This study aims to determine which variables are the most significant to form organizational commitment models and productivity so that it can improve the achievement of Tri dharma lecturers at private universities in Surabaya. The population of this study were all college lecturers throughout Surabaya, from which the sample used were lecturers who had minimal functional positions of expert assistants, in accordance with the characteristics of the sample that the researchers expected (purposive sampling). The data analysis technique used in this study uses the SEM-PLS method to determine the structural equation relationship of each latent variable and to find out the measurement of the indicators on the latent variables. The results show that spiritual leadership has a significant effect on the productivity increase of lecturers through calling and membership which is measured through vision, altruistic love, and hope / faith. These results give a signal that the leaders of Surabaya's private universities can apply spiritual values that live in the midst of a community that is believed to be able to bind more closely the relationship between leaders and lecturers that will have an impact on productivity and can improve the achievement of the lecturer's tri dharma. In the process of recruiting lecturers, the management should instill the spirituality values that exist in the Surabaya's private universities to prospective lecturers. This is done to maintain and even enhance the spirituality values that exist in Surabaya's private universities.

Key words: Tri Dharma, Spiritual Leadership, Surabaya's Private Universities.

Language: English

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Introduction

The National Education System states that universities are obliged to carry out education, research, and community service [1,2]. Higher education as part of the national education system has a strategic role in educating the life of the nation and advancing science and technology by paying attention to and applying the values of humanities and the sustainable cultivation and empowerment of the Indonesian nation. In realizing this strategic and large role can be carried out properly, then the role of leadership in developing human resources of higher education must have a superior quality leadership style especially for lecturers as professional educators. One of the main concerns at this time is the leadership style that involves a spiritual leadership style. Spiritual leadership is the formation of values, the attitudes and behaviors needed to motivate oneself (intrinsic motivation) and others so as to create a sense of spiritual survival through calling and membership [3,4,5,6,7,8,9]. This brings

two things, first is to unify the vision of fellow members of the organization through feeling calling in his life so that it becomes more meaningful and makes a change, calling speaks of the calling of the soul on a change in serving people to gain meaning and purpose in life, second is fostering organizational culture based on altruistic love where leaders and those who are led care for each other, mutual attention and respect for each other seriously so as to create a feeling of membership, the membership speaks of kinship relationships and social relations interactions. [3,4,5,6,7,8,9]

The characteristics of spiritual leadership according to [3,4,5,6,7,8,9] are vision, altruistic love and hope / faith, vision is the goal to be achieved by an organization in the long and short term, altruistic love is a picture of an organization's culture which is defined as intact, harmonious, prosperity through attention, caring and appreciation for oneself and others, and hope / faith is a desire for a hope that is fulfilled and is the basis of the establishment of the



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vision, goals and mission of the organization to be fulfilled. From the characteristics of spiritual leadership based on vision, altruistic love, and hope / faith will produce a feeling of spiritual survival through screening and membership which influences positive performance improvement (productivity positive) and lecturer organizational commitment as professional educators, which has an impact on the achievement of Higher Education Tri Dharma

Tri dharma is the obligation of Higher Education to carry out education, research and community service [2]. Tri dharma of higher education is not only the responsibility of students. All lecturers (educators), as well as people involved in the learning process (academic community) have the same responsibilities. Explanation of the activities in tri dharma are:

1. Education is a conscious and planned effort to realize a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation, and countries [2].

2. Research is an activity carried out according to the rules and scientific method systematically to obtain information, data, and information relating to understanding and / or testing a branch of science and technology [2]

3. Community Service is the activity of academicians who utilize Science and Technology to advance the welfare of the community and educate the lives of the nation [2].

Research Methods

This research is a type of quantitative research to find out which variables are the most significant to form organizational commitment models and productivity at private universities in Surabaya. The population of this study were all college lecturers throughout Surabaya, from which the sample used were lecturers who had minimal functional positions of expert assistants, in accordance with the characteristics of the sample that the researchers expected (purposive sampling). The data analysis technique used in this study uses the SEM-PLS method to determine the structural equation relationship of each latent variable and to find out the measurement of the indicators on the latent variables. The variables in this study consist of exogenous variables, endogenous variables and manifest variables so that the following hypothesis is formed:

H1: Spiritual Leadership affects Calling

H2: Spiritual Leadership affects Membership

H3: Calling influences the Organization Committee

H4: Membership influences the Organization Committee

H5: Calling affects Productivity

H6: Membership affects Productivity

Results and Discussion

This study uses secondary data, the data taken in this study is the data of lecturers in 10 private universities that have a minimum department / economic field accredited B with each 50 respondents per university. From the results of the survey, it was obtained data of 359 of the 500 questionnaires targeted for the 10 universities as follows:

Table 1.

Responden

1	STIESIA Surabaya	35 from 50 responden
2	STIE Mahardhika	34 from 50 responden
3	STIE Perbanas Surabaya	50 from 50 responden
4	STIE Yapan Surabaya	33 from 50 responden
5	UNTAG Surabaya	43 from 50 responden
6	UBHARA	25 from 50 responden
7	Ciputra University	35 from 50 responden
8	UWM Surabaya	25 from 50 responden
9	UMS	45 from 50 responden
10	UBAYA	34 from 50 responden

The results from table 1 (number of respondents of data analysis) can be illustrated that Perbanas STIE filled all questionnaires well so that of the 50 data expected to be fulfilled. As for some other universities that almost fulfill the expected questionnaire expectations are STIESIA, UBAYA, STIE Yapan, UMS, UWM and STIE Mahardhika and

UNTAG. From the results of Table 1 above, it can also be seen that there are several universities that are far from the expected target of the desired data, namely UBHARA, Ciputra University. This is because taking the questionnaire at the university coincides with the college holiday. But according to the justification the researcher can still be

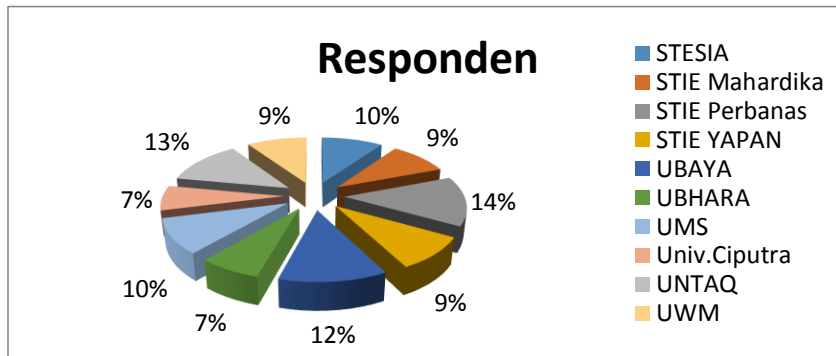


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conservative, so that the sample is included in the model. The summary results of the data can also be

seen in the pie chart below:



Picture 1 - Pie Diagram Responden

After screening the data, data analysis will be carried out. Data analysis in this study there are two statistical analysis methods used, namely the outer model using CFA (Confirmatory Factor Analysis) and the inner model using Structural Equation Modeling (SEM), Structural Equation Modeling (SEM) analysis is conducted to determine the significance of the relationship between latent variables with comparing the T-statistic value with T-table which is then called hypothesis testing. Confirmatory Factor Analysis (CFA) analysis, to determine the validity and reliability by looking at

the value of loading factor, AVE value and composite reliability value.

Outer Model - Confirmatory Factor Analysis

Confirmatory Factor Analysis is used to determine the validity, reliability, and contribution given by each indicator variable in developing the latent variables. Concept. Latent variables are said to be valid and reliable if the value of loading factor > 0.4, AVE value > 0.5 and composite reliability value > 0.7. The results of the Confirmatory Factor Analysis test are presented in table 2 as follows:

Table 2.

Confirmatory Factor Analysis Result

Variable	Indicator	Loading Factor	AVE	Validity	CR	Reliability
vision	A1	0,795645	0,521867	Valid	0,670297	Reliable
	A2	0,764422				
	A3	0,728521				
	A4	0,543652				
	A5	0,752091				
A. Love	B1	0,697823	0,505858	Valid	0,803417	Reliable
	B2	0,736770				
	B3	0,667967				
	B4	0,744725				
	B5	0,765366				
	B6	0,647130				
Hope	C1	0,698892	0,512410	Valid	0,761856	Reliable
	C2	0,744135				
	C3	0,717921				
	C4	0,728408				
	C5	0,688386				

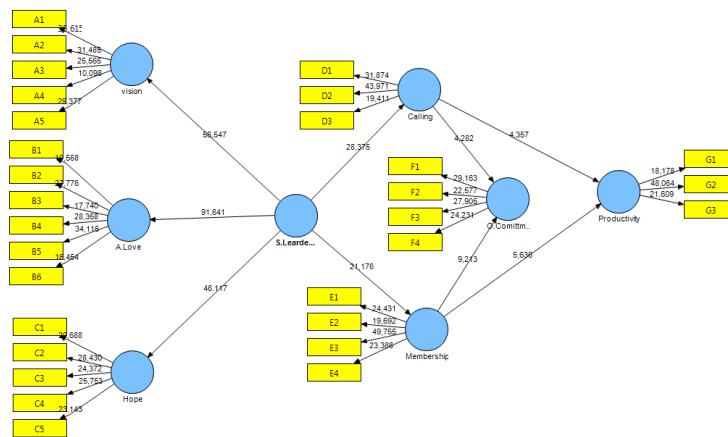
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Calling	D1	0,782352	0,591199	Valid	0,652105	Reliable
	D2	0,825281				
	D3	0,693133				
Membership	E1	0,718137	0,556315	Valid	0,736010	Reliable
	E2	0,718631				
	E3	0,812380				
	E4	0,730169				
O. Commitment	F1	0,740552	0,545690	Valid	0,723006	Reliable
	F2	0,704407				
	F3	0,758726				
	F4	0,749993				
Productivity	G1	0,725841	0,601090	Valid	0,764861	Reliable
	G2	0,851294				
	G3	0,742782				

Table 2 informs that all values of loading factor > 0.6, AVE > 0.5 and CR > 0.7, this indicates that each indicator is able to measure both the latent variable and can be said to be valid and reliable. After a Confirmatory Factor Analysis, the next step is to do Structural Equation Modeling (SEM) analysis. Structural Equation Modeling analysis testing is done by using a variance-based SEM method which is often referred to as SEM-PLS. This method was chosen by the researcher with the

justification of the researcher that this research is explorative and the assumption in the SEM-PLS method is nonparametric, which does not require many assumptions, such as covariance-based SEM which is often called SEM which requires many assumptions because it is parametric. The results of SEM-PLS testing are presented in Figure 2 and Table 3.



Picture 2 - Structural Equation Model

Based on figure 2 (SEM-PLS hypothesis test) and table 2 (SEM-PLS hypothesis test) shows that the T value of Spiritual Leadership on Calling (H1), Spiritual Leadership toward Membership (H2), Calling to Organization Commitment (H3),

Membership towards Organization Commitment (H4), Calling on Productivity (H5) and Membership to Productivity (H6) all above 1.96, this shows that all hypotheses in this study were received.

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Table 3.

Inner Model Result

Laten Variabel	T Statistics	Information
S.Leardership -> Calling	28,374,517	Affected
S.Leardership -> Membership	21,176,341	Affected
Calling -> O.Comittment	4,282,329	Affected
Membership -> O.Comittment	9,213,265	Affected
Calling -> Productivity	4,357,301	Affected
Membership -> Productivity	5,636,419	Affected

Spiritual leadership on calling

The results showed that there was a direct influence of spiritual leadership on calling at universities throughout Surabaya. The higher the spiritual leadership possessed by the leader, the higher the calling / meaning possessed by each lecturer. [3,4,5,6,7,8,9] who stated that spiritual leadership is the formation of values, attitude, behavior needed to motivate themselves and others intrinsic motivation so as to reach a sense of spiritual survival through calling / meaning and membership. Basically every job can be a meaningful and meaningful source (meaning) for everyone, through several organizational leaders who have a purpose to strengthen meaning for their followers [10,11,12]. In spiritual leadership, calling is a transcendent Vision from a form of lecturer responsibility towards students. This allows the lecturer to show intrinsic motivation through calling "doing what it takes" to "spread the organization message" which is related to quality of life and integrity [5].

With the spiritual leadership style possessed by the leader, it can increase meaningful and personal feelings in working. Personal meaning is also a source of personal motivation to influence others and their environment [13]. Therefore, university leaders throughout Surabaya have instilled good values of spirituality, attitude and behavior in the work environment. In addition, it also not only emphasizes world profits, but also benefits in the future. This can be achieved with a strong belief that work is worship in the view of religion. Therefore, in private universities in Surabaya, istiqomah or sustainably can provide an activity that aims to maintain the intention of the lecturers to work for worship so as to increase feelings of calling / meaning.

Spiritual leadership on membership

The results of the study show that there is a direct influence between spiritual leadership on membership at private universities in Surabaya. The higher the spiritual leadership possessed by the leader, the higher the membership owned by each employee. [3,4,5,6,7,8,9] who stated that spiritual leadership is the formation of values, attitude, behavior needed to motivate themselves and others

intrinsic motivation so as to reach a sense of spiritual survival through calling / meaning and membership. Membership itself is one aspect of workplace spirituality that is needed in the spiritual survival dimension. The term membership can be defined as a basic human need, which is to be understood and wanted to be appreciated. Having a feeling of wanting to be understood and wanting to be appreciated is an important issue in reciprocal relationships and social relations interactions.

In a work environment, everyone combines their values so they feel they are part of a large organizational community and relate to one another [14]. Through the leadership's spiritual leadership style, it can increase the feeling of membership, so that employees can relate to each other with positive social relationships among fellow members of the organization and each individual feels more valued and understood as a whole person. In this study membership is measured based on the aspect of feeling wants to be understood and appreciated by the community of organizations, the leadership of private universities in Surabaya understands the importance of social relations between employees which is conducive to a bond so that the achievement of organizational commitment. Because a conducive organizational environment will not be easily created without leadership intervention.

Calling on Organizational Commitment

The results showed that there was a direct influence between calling on organizational commitment at private universities in Surabaya. The higher the feeling of calling possessed by the employee, the higher the organizational commitment possessed by each employee. [3,4,5,6,7,8,9] who stated that spiritual leadership is the formation of values, attitude, behavior needed to motivate themselves and others intrinsic motivation so as to reach a sense of spiritual survival through calling / meaning and membership so that it has an impact on organizational commitment, productivity and firm performance. [15] which states that organizational commitment is employees who have feelings of calling and membership then become interconnected for loyalty, and want to stay (commitment) in an

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organization that has a culture based on the values of love (altruistic love). [16] defines calling as a positive inspiration in the spirit of being responsible for work.

The professional attitude that every employee has based on feeling calling will increase the feeling of being more meaningful to others and the environment of the organization and itself [11]. People will do anything for a calling that is very different from a job or career [11]. When a job is seen as a calling and not a job, it can take on a new meaning [17,18,19]. So calling a strong soul (calling) and spiritual relationships with work that goes beyond professionalism or salary will lead to deep relationships, and thus commitment to one job [20]. In a number of studies it has been shown that employee commitment is positively correlated with several organizational outcomes. For example, employees who are committed to the organization will show a lower level of negative behavior such as absenteeism or turnover [21]. Based on the results shows that the feeling of calling lecturers of private universities in Surabaya has a significant effect. This indicates that feeling calling is owned by the majority of private university lecturers in Surabaya so that it influences organizational commitment.

Membership on Organizational Commitment

The results showed that there was a direct influence between membership on organizational commitment on private university lecturers in Surabaya. The higher the feeling of membership that is owned by the lecturer, the higher the organizational characteristics of each lecturer. [3,4,5,6,7,8,9] who stated that spiritual leadership is the formation of values, attitude, behavior needed to motivate themselves and others intrinsic motivation so as to reach a sense of spiritual survival through calling / meaning and membership so that it has an impact on organizational commitment, productivity and firm performance. [22] which states that organizational commitment is employees who have feelings of calling and membership then become interconnected for loyalty, and want to stay (commitment) in an organization that has a culture based on the values of love (altruistic love) According to William in [3,4,5,6,7,8,9] the founder of modern psychology defines membership as a basic human need that is to be understood and wants to be appreciated. Having a feeling of wanting to be understood and wanting to be appreciated is an important issue in reciprocal relationships and social relations interactions. [23] states "We grow greater, longer lived, more meaningful in proportion as we identify ourselves with the larger social life that surrounds us", which means "We grow bigger, live longer, are more meaningful in proportion as we identify yourself with the broader social life that surrounds us".

The feeling of membership is one of the feelings of spirituality in the work environment (workplace spirituality) which is very important to be developed so that the social relations between lecturers can be interwoven harmoniously, shown based on the results of research that the membership influence is quite significant. This identifies that membership is owned by most private university lecturers in Surabaya so that it influences organizational commitment. And the facts in the field prove that there is strong cooperation, including in the field of research and low turnover of lecturers.

Calling on Productivity

The results showed that there was a direct influence between calling on productivity at private university lecturers in Surabaya. The higher the feeling of calling possessed by the lecturer, the higher the productivity possessed by each lecturer. [3,4,5,6,7,8,9] who stated that spiritual leadership is the formation of values, attitude, behavior needed to motivate themselves and others intrinsic motivation so as to reach a sense of spiritual survival through calling / meaning and membership so that it has an impact on organizational commitment, productivity and firm performance. [21] which states that productivity and continuous improvement (continuous improvement) are people who have hope / confidence in the vision of the organization and people who have calling and membership will do anything to pursue a vision to improve themselves and become more productive. [15] defines calling as a positive inspiration in the spirit of being responsible for work.

The professional attitude that every employee has based on feeling calling will increase the feeling of being more meaningful to others and the environment of the organization and itself [11]. People will do anything for a calling that is very different from a job or career [11] When a job is seen as a calling and not a job, it can take on a new meaning [17,18,19]. So calling a strong soul (calling) and spiritual relationships with work that goes beyond professionalism or salary will lead to deep relationships, and thus commitment to one job [24]. [25] the calling of the soul and trust between employees and leaders can lead to productivity, in this case the employee in question is a lecturer. [25] found a strong relationship between interpersonal trust in organization and organizational commitment. Based on the results shows that the feeling of calling lecturers of private universities in Surabaya has a significant effect. This indicates that feeling calling is owned by the majority of private university lecturers in Surabaya, thus affecting productivity.

Membership on Productivity

The results showed that there was a direct influence between membership on productivity at



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private university lecturers in Surabaya. The higher the feeling of membership owned by the lecturer, the higher the productivity of each lecturer. [3,4,5,6,7,8,9] who stated that spiritual leadership is the formation of values, attitude, behavior needed to motivate themselves and others intrinsic motivation so as to achieve a sense of spiritual survival through calling / meaning and membership so as to have an impact on organizational commitment, productivity and firm performance [22] which states that productivity and continuous improvement (continuous improvement) are people who have hope / confidence in the vision of the organization and people who have calling and membership will do anything to pursue a vision to improve themselves and become more productive.

According to William in [3,4,5,6,7,8,9] the founder of modern psychology defines membership as a basic human need that is to be understood and wants to be appreciated. Having a feeling of wanting to be understood and wanting to be appreciated is an important issue in reciprocal relationships and social relations interactions. [23] states "We grow greater, longer lived, more meaningful in proportion as we identify ourselves with the larger social life that surrounds us", which means "We grow bigger, live longer, are more meaningful in proportion as we identify yourself with the broader social life that surrounds us ". The feeling of membership is one of the feelings of spirituality in the work environment (workplace spirituality) which is very important to be developed so that the social relations between lecturers can be interwoven harmoniously, shown based on the results of research that the membership influence is quite significant. This identifies that the membership is owned by the majority of private university lecturers in Surabaya, which affects productivity.

Conclusions, Suggestions, and Limitations

Based on the results of the analysis and discussion it can be concluded that all indicators are able to measure well the variables measured. And all hypotheses are accepted, this shows that improving vision, altruistic love and hope / faith will increase the productivity of the lecturers. For further research, it can add demographic variables as control variables and use a wider population sample such as East Java. Surabaya Private Higher Education. leader can apply spiritual values that live in the midst of a community that is believed to be able to bind more closely the relationship between the leader and the lecturer. Surabaya Private Higher Education Leaders can develop the values of spirituality towards the corporate culture so as to enhance a sense of kinship and togetherness in a work atmosphere related to the development of spirituality such as congregational prayer, regular recitation, social service, issuing Zakat, Infaq and Sadaqoh (ZIS) together, which is carried out continuously (istiqomah). Create a monitoring system for each lecturer to maintain the values of spirituality in the work environment and encourage (motivate) the performance of lecturers. With this system, it is hoped that the lecturer can maintain his attitude and character: diligent work, order, humility, fortitude, sincerity, trustworthiness, trustworthiness, help. With this system it is expected that each lecturer can be reminded of his career performance progress and feel more cared for. In the process of recruiting lecturers, the management should instill the spirituality values that exist in the Surabaya's Private Universities. to prospective lecturers. This is done to maintain and even enhance the spirituality values that exist in Surabaya's Private Universities..

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SECTION 32. Jurisprudence.

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LEGAL STATUS OF PLEDGOR IN ACCORDANCE WITH THE LEGISLATION OF THE KYRGYZ REPUBLIC

Abstract: In the submitted article, the rights and obligations of pledgor shall be analyzed according to legislation of the Kyrgyz Republic. Necessary amendments to normative legal acts for the purpose of securing interests and rights of pledgor shall be proposed.

Key words: pledge, pledgor, pledge holder, immovable property, pledge agreement, legislation, rights and obligations, law.

Language: English

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Introduction

Pledge is one of the most popular ways of securing of obligations, including credit obligations in law-enforcement practice of the Kyrgyz Republic. Article 12 of the Constitution of the Kyrgyz Republic sets forth inviolability of property [1]. In civil law the way securing performance of obligations is understood as the special measures of property character provided by the legislation or the contract stimulating appropriate performance of obligations by debtors by establishment of additional guarantees of meeting claims of creditors. Therefore, G.F. Shershenevich, analyzing essence of pledge, specified that, first of all, property of debtor in structure which it has at the time of collecting provides claims of creditor [2]. However, creditor is always under the danger that property of the debtor will be lower than value of obligation, that at the same time so many claims will be imposed on property, that it won't sustain weight of its accumulation. In view of such danger, which the creditor isn't able to prevent, he prefers to choose certain property corresponding to amount of debt from all property of debtor and to get the right of exclusive satisfaction from the cost of this subject.

Materials and Methods

With development of market relations pledge as a way of securing performance of obligations, has found the broadest application at conclusion not only loan agreements, but also contract for work and

labor, purchase and sale, etc. The institute of pledge exists in domestic civil law for a rather long time. However, in recent years it has experienced a peculiar rebirth.

Due to popularity, institute of pledge demands well-founded legal regulation, in particular, questions connected with rights and duties realization by the parties of pledge agreement. So, for 9 months of 2017 in comparison with the same period of 2016, number of all transactions with immovable property in Kyrgyzstan has increased, including, transactions on rent, pledge, donation and inheritance of objects of immovable property [3,4]. It causes heightened interest in consideration of legal status of persons participating in pledge legal relations.

So, who can act as pledgor under the pledge agreement? According to Art. 326 of the Civil code of the Kyrgyz Republic the pledgor can be a debtor on obligation secured with pledge, or third party who does not participate in this obligation [5]. Thus, the law defines that the identity of debtor according to main obligation and pledgor according to accessory obligation cannot coincide. However, to be fair, it should be noted, that in most cases in practice debtor and pledgor coincide in one person.

Civil code of the Kyrgyz Republic establishes that person having the property right or other real right on subject of pledge can be pledgor. At the same time, person, who possess right of economic jurisdiction or right of operational management on



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property, has right to put it in pledge with consent of its owner.

The pledgor under pledge of rights can only be person who possess the pledged right. At the same time, pledge of tenancy or other right on special property shall not be allowed without the consent of its owner except as otherwise provided by the agreement.

Thus, pledge of property can be carried out by person who has corresponding right only. In this case, it is possible to observe correlation between norms of Civil code of the Kyrgyz Republic regulating status of pledgor and provisions determining the content of limited proprietary rights. So, according to Art. 230 of Civil code of the Kyrgyz Republic, enterprise has no right to sell immovable property belonging to it on the right of economic management, to lease it, to pledge, to bring it as contribution (share) to authorized capital of business partnerships and entities, or to dispose this property otherwise without the owner's consent. Enterprise disposes other property belonging to it on the right of economic management independently, except for the cases established by the legislation.

Therefore, the provision set forth in Art. 326 of Civil code of the Kyrgyz Republic is an exception provided by the legislation concerning the disposal of movable property by enterprises owning it on the right of economic management.

Art. 6 of the Law of the Kyrgyz Republic «On pledge» (further – Law «On pledge») also defines some aspects, characteristic for legal status of pledgor, and establishes that participants of pledge relations are citizens and legal entities of the Kyrgyz Republic, foreign citizens and legal entities (including foreign banks and specialized financial credit institutions), the Kyrgyz Republic, and also the states, which possess the property right on subject of pledge [6]. It is mentioned separately in the Law «On pledge», that pledgor under the agreement on pledge of agricultural land are citizens of the Kyrgyz Republic having the property right on subject of pledge.

Also the Law on pledge, providing restrictions on pledge of separate types of property, determines additional requirements to pledgor as to person providing pledge.

So, Art. 7 of the Law «On pledge» sets forth that participant of joint shared property has the right to pledge share in general property without consent of other owners, if share of each owner is defined in right of joint ownership. Member of cooperative or other enterprises with joint ownership can pledge independently or collectively rights on enterprise, in order established by the legislation of the Kyrgyz Republic. The owner of apartment in an apartment building makes the decision on its pledge independently.

Thus, the legislator emphasizes features of legal status of pledgor depending on a transferable subject of pledge.

As for the content of legal status of pledgor, it is possible to refer to its existence of general and specific rights and duties. General rights and duties in this case concern general established order of obligations performance. First of all, this is the duty of appropriate execution of obligation, which comprises also its real execution. Also, it is possible to refer right of pledgor to demand from the opposite side execution of duties corresponding to his own obligations, to the general elements of legal status of pledgor.

As for specific rights and duties arising from pledge, they are settled both by Civil code of the Kyrgyz Republic, and by the Law of the Kyrgyz Republic «On pledge».

As a result of legislative rules analysis, we consider following special duties of pledgor:

- a duty to support pledged property in good working order and to incur expenses on maintenance and repair (ordinary and fundamental) of this property (article 12 of the «On pledge»);
- a duty to insure pledged property in its overall cost against risk of its loss and damage, and if overall cost of property exceeds size of claim secured by pledge, - for the sum not lower than the size of claim (Art. 330 of Civil code of the Kyrgyz Republic);
- in case of actual possession of subject of pledge - a duty to take measures necessary for safety of pledged property, including for its protection from encroachments and requirements from third parties, to bear risk of eventual loss or damage of pledged property;
- a duty to immediately notify pledge holder on threat of loss or damage of pledged property;
- a duty to report in writing to each subsequent pledge holder data on all existing pledges of property and also on nature and amount of securing obligations with these pledges and to pay damages caused by pledge holder due to non-execution of this duty (Art. 329 of Civil code of the Kyrgyz Republic);

It is possible to place to the rights of pledgor the following:

- right to transfer subject of pledge to subsequent pledge (if it isn't forbidden by previous pledge agreements on the same property) (Art. 329 of Civil code of the Kyrgyz Republic);
- right to check according to documents actually existence, size, state and storage conditions of pledged property held by pledge holder;
- at gross violation by pledge holder of his duties, if it creates threat of loss or damage of pledged property, right to demand early execution of

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obligation secured with pledge and/or the early termination of pledge;

- right to demand from pledge holder to pay damages caused by loss or damage of subject of pledge;
- right to set off the claim to pledge holder on compensation of losses, caused by loss or damage of subject of pledge, with repayment of obligation secured with pledge;
- right in reasonable time to restore a subject of pledge or to replace it with other equivalent property if subject of pledge was loosed or damaged either property right to it or right of its use was abated on the basis established by the law;
- right to use subject of pledge according to its nature, including to derive an profits and income, on which the pledge right also extends, except as otherwise provided by the contract and follow from the nature of pledge;
- right without consent of pledge holder, but with prior notice, to lease pledged property, to transfer it to temporary use without compensation and under the agreement with other person to grant to him the right of limited use of this property (servitude) under conditions, that term of property use doesn't exceed the term of obligation secured with pledge; the property is transferred for use for purposes corresponding to property nature except as otherwise provided by the law or pledge agreement (Art. 16 of the Law «On pledge»);
- right to devise pledged property.

In modern conditions legal construction of pledge agreement due to its unique nature is used in various economic models. Development of modern domestic science of civil law has to happen including at the expense of concepts formulated and approved on the basis of other legal systems. However, it is necessary to consider traditions of domestic civil law, current legislation, developed provisions of civil law and corresponding doctrinal lines [7].

Pledge generates two types of legal relationship: between pledgor and pledge holder and between pledge holder and property. On the one hand, pledge is a way of providing obligation of debtor by establishment of relative legal connection with creditor, and on another hand, there is a direct legal connection of pledge holder and property.

Pledge in national law-enforcement practice - one of the most often used ways of ensuring performance of obligations. Pledge is among almost convenient and often used ways of providing. Pledge is suitable for ensuring performance of obligations of many types, including non-contractual, and various property - both movable, and immovable, and also property rights of claim (Art. 325 of Civil Code) can

be a subject of pledge. In view of importance and prevalence of pledge in 2005 the special Law of the Kyrgyz Republic "On pledge" has been adopted [6]. Based on analysis of theoretical basis of authors and scientists [8,9] and also normative legal acts of Kyrgyz Republic and court practice [10], it is possible to define, that it is necessary to conduct complex analysis from position of system approach of legal nature of pledge as institute of civil law.

Existence of rights of pledge holder depends on fate of obligation provided with pledge. According to Art. 325 of Civil Code, any property, including property items and property rights (claims), behind a number of exceptions can be a subject of pledge. Art. 325 provides the following exceptions: property withdrawn from circulation, claims inseparably linked with identity of creditor. In particular, there are claims about indemnification caused to life or health, alimony claims, rights which concession is forbidden by the law. Besides, Civil Code contains provision on possibility of expansion of objects of civil rights, which can't be a pledge subject. According to subparagraph 2 of Art. 325 of Civil Code, pledge of separate types of property, in particular property of citizens on which collecting isn't allowed, can be forbidden or limited by the law. According to Art. 4 of the Law of Kyrgyz Republic "On pledge" subject of pledge can be any property, which according to legislation of Kyrgyz Republic can be disposed by the pledge holder.

In order that the contract was considered as settled, agreement on all essential terms of the contract (Art. 328 of Civil Code) should be necessary.

Essential terms of pledge agreement are the following (Art. 328 of Civil Code):

1) Any property, including property items and property rights (claims) can be a subject of pledge. There are exceptions from this rule. First, transfer of the following property to pledge isn't allowed: a) property withdrawn from circulation; b) claims inseparably linked with identity of creditor, in particular alimony claims, on indemnification, caused to life or health, and other rights which concession to other person is forbidden by the law; c) separate types of property in cases provided by the law.

Subject of pledge can be property, which is available at pledgor, and that he will get in the future. So, at receiving of credit pledge agreement of a house which will be constructed by pledgor, can be signed; apartment which will be acquired by him under contract of purchase and sale, etc. If pledge arises on the basis of law, then pledge of property items and property rights which pledgor will acquire in the future can be provided by the relevant law.

2) pledge subject assessment. Assessment is made by the agreement of parties. Pledge agreement is recognized as uncompleted if structure of pledged

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property isn't specified. Pledge agreement in which there is no pledge subject assessment is considered unpledged;

3) definition, which party of pledge agreement will have a pledged property;

4) essence of obligation provided with pledge. If, for example, pledge provides obligation which has arisen from contract of purchase and sale, then it is specified in pledge agreement who is seller, buyer and that is a subject of purchase and sale (which property is on sale);

5) size of claim provided with pledge. In the given example - price of subject of contract of purchase and sale. If, for example, pledge provides obligation from credit agreement, then size of credit and percent which have to be paid for credit use is specified in the contract;

6) date of performance of obligation provided with pledge. In the given examples - term of transfer of property to buyer, term of payment of purchase price - under contract of purchase and sale; term (terms) of repayment of credit and payment of percent - according to credit agreement [5].

The agreement on three last conditions at signing of pledge agreement shall not be required. Essentially, there are conditions of obligation provided with pledge and pledgor and pledge holder cannot somehow change them, add and other. However, it is necessary to define, what obligation is provided with pledge, its size and dates of

performance at signing of pledge agreement. Otherwise, being separated from basis (obligation provided with pledge), it will come to that contrary to laws of logic the accessory pledge obligation will remain unsettled (pledge provides execution of unknown what).

Except mentioned, essential terms of pledge agreement are all those conditions concerning which according to statement of one of the parties the agreement has to be reached. Pledge agreement in all cases has to be signed in writing (328 Civil Code). Usually pledge agreement is made by constitution of one document signed by the parties.

Conclusion

Thus, it is visible, that rights and obligations of pledgor according to legislation on pledge form special legal status of pledgor. It is also necessary to note that law-enforcement practice forming in the Kyrgyz Republic such is that not all of pledgors manage to exercise those rights, which are provided for them by the law. As a rule, the parties foresee other provisions in pledge agreement, than established by the law, forming at the same time a figure of pledgor more vulnerable. We consider that some of mentioned above rights of pledgor should be formulated so that they couldn't be changed by agreement of parties. It will provide necessary guarantees of interests of pledgor.

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SECTION 4. Computer science, computer engineering and automation.

SECURITY INTELLIGENCE FOR INDUSTRY 4.0: DESIGN AND IMPLEMENTATION

Abstract: The development of Internet of Things (IOT) technology became one of the proponents in the industrial revolution 4.0. Digital transformation began to be applied to the entire manufacturing industry, services, transportation and education which have slowly shifted utilizing IOT technology. The industrial revolution 4.0 has an impact on digital transformation and becomes a necessity that can change business patterns such as the ease of data interaction services between industries to customers that are also supported by ease of access and speed of decision making. However, in its development, stakeholders tend to focus on infrastructure and information systems, while the security of information systems is still a comfort zone for industries in the transformation to industry 4.0. The issue of information system security will be a challenge for the industry with open access to information systems, otherwise focus will hamper the business process of the industry. In this research will be discussed about the modeling and implementation of information system security with a combination of web-based security methods with port knocking firewall model and short message service gateway as a security medium with the concept of ease of access with safe and comfortable. The result of this research has been testing penetration testing using network tools.

Key words: industry 4.0, cyber security, port knocking, short message service gateway.

Language: English

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1. INTRODUCTION

The current industrial revolution has grown to 4.0 which replace industry 3.0. According to [1, p. 373] and [2, p. 809] that the basic principle in industry 4.0 is the incorporation of machines, workflows, and systems, by applying intelligent networks along chains and production processes to control each other independently. There are four aspects of the challenges of implementing the industry revolution 4.0 according to Wolter namely information technology security issues, reliability issues and stability of production machinery, lack of adequate skills, lack of motivation of stakeholders to change; and the loss of a lot of work as it turns into automation [3, p. 3] and [4, p. 1497]. Support of the Internet of Things (IOT) became the most important in the industry revolution 4.0 with open access to information systems and automation changed the way business as its own competitiveness for each industry [5, p. 1475] and [6, p. 87]

According to [7, p. 1082] and [8, p. 19] security issues will be a challenge for each industry, sometimes for mature industries with adequate resources often overlooking security issues. For medium and small industries some have difficulty and lack of understanding of the security of information systems, stakeholders tend to focus on infrastructure and information systems as digital transformation in the speed of decision making. According to [8, p. 21] the risks of information system security have an impact, among others, operational risks of Denial-of Service (DDOS) attacks, data theft, website hijacking and reputation risk of lack of trust of business colleagues followed by exposure through media about security vulnerabilities system. In addition, investment risk becomes the most perceived big losses that are large investments but the system is not integrated and the security system used is not in accordance with business needs.

IOT will lead to new problems related to information systems security management, namely the opening of connection lines. This is often used by



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hackers / hackers to steal data through the network. One of the most important components in an information security management system design is the use of firewalls [9, p.1475]. The main role and task of a firewall is to filter and monitor in and out access to application communications connected to the intranet or internet network and communicate the network using TCP and UDP ports that are part of the transport layer of the OSI layer standard [10, p.53]. Through the path will appear communication between wide network / internet with internal network and vice versa. Information systems that are in the internal will open a certain communication path and can be reached.

From this background phenomenon in this research try to do design development of information system security with IOT support with model combination 2 authentication user / password and short message. The device used from the security model uses Raspberry PI devices, mikrotik Router as Firewall and SHORT MESSAGE gateway. The purpose of this research is as a model solution for the security of information systems with easy technical operation but with a high level of security and comfort with a safe and convenient operation techniques.

2. REVIEW OF LITERATURE

Computer Network

A computer network is a system of computers designed to share resources, communicate and access information. The purpose of a computer network is to be able to achieve its purpose, any part of the computer network can request and provide services. Computer networks can also be interpreted as a collection of communication terminals located in various locations consisting of more than one interconnected computer. The purpose of building a computer network is to carry information precisely without any error from the transmitter side to the receiver side through communication media [3, p. 5]; [4, p. 1498] and [5, p. 1476]. Computer networks can also be defined as a collection of different communication terminals in different locations consisting of more than one interconnected computer [7, p. 1083]

Two computers each have a network card, then connected via cable or wireless as a data transmission medium, and there are network operating system software will form a simple computer network. If you

want to create a wider network of computers again reach, it requires additional equipment such as Hub, Bridge, Switch, Router, Gateway as interconnection equipment.

Based on the scalability of computer network classification is as follows [5, p. 1476]:

Local Area Network (LAN) is a network that is used for personal, whether within a building or in one campus area. Reach which can be reached by LAN up to several kilometers. LAN is used to connect private end devices to exchange data.

Metropolitan Area Network (MAN) is a network widely used to connect nodes located at a distance of 20-50 Km, this network is commonly used for inter-city by using radio pocket or telecommunication company facilities [11, p.498].

Wide Area Network (WAN) is a network of data communication systems that each node is located remote (remote location) with each other. WAN is also called the remote network / long distance network. A node is a point that can receive input data into a network or produce output information or both. Node can be either a printer or other print tool or a PC to a computer mainframe that has a modem [12, p. 322].

Security Management Using Web Knocking Port Technique

Knocking port is a technique or method of opening ports externally through a firewall by way of attempting to connect to a closed port with a predetermined connection attempt sequence [6, p. 87]; [8, p. 19] & [10, p.53]. In other words port knocking is a method for building a host-to-host communication with a computer device that does not open any communication ports freely.

The Web Knocking port is implemented by configuring a small program called a daemon to monitor the firewall log for connection requests and determining whether the client is registered on an approved IP address and has done the correct sequence. If the answer is yes, the firewall will open the associated ports dynamically. The main purpose of knocking ports is to prevent attackers from system scanners such as remote access SSH by doing port scanning [6, p. 88] and [11, p.498]. If an attacker sends an incorrect sequence of beats, the protected port will not appear or open as shown in Figure 1 and Figure 2.

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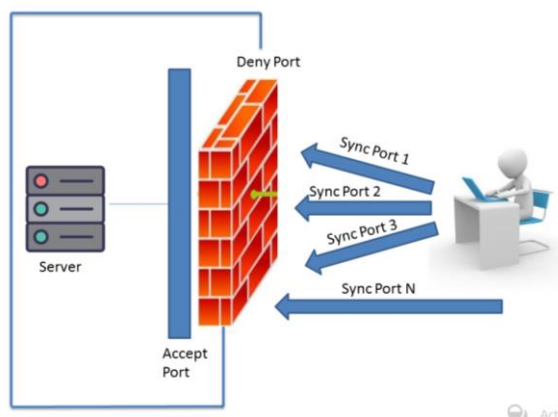


Figure 1. Knocking Port

Firewall Security Management

A firewall is a security system designed to prevent access or attacks from within and outside the network. Firewalls can be implemented in hardware and software, or a combination of both. Firewall implementations are generally used to control the access of users accessing private networks connected to the Internet, especially intranets. All incoming or outgoing activity traffic through the intranet network through the firewall will be controlled for users who do not meet certain security criteria will automatically be blocked [7, p. 1083] and [10, p.55].

The firewalls function as a controller, watching the flow of data packets flowing in the network. The firewall function organizes, filters and controls the data traffic that is allowed to access private networks that are protected, some criteria that the firewall does include: (a) the IP address of the home computer, (b) TCP / UDP port of origin to destination computer (c) IP address of destination computer TCP / UDP port destination data on destination computer Header information stored in data packet [9].

Specifically the firewall function is to authenticate the network access Figure 2.2 is a firewall implementation image.

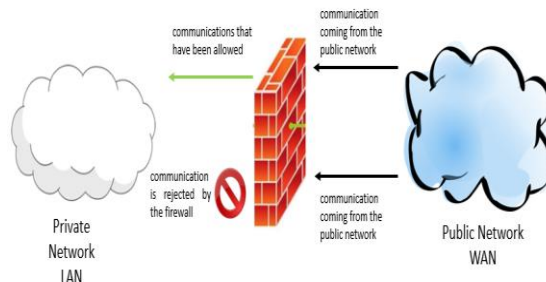


Figure 2. Firewall

How the firewall works in general to protect the internal computer network, among others:

Reject and block data packets that come based on unwanted sources and purpose [10, p.55].

Refuse and filter the data packets coming from interstitial network to the internet. His example when there are users of the internet network will access porn sites.

Reject and filter data packets based on unwanted content. For example, an integrated firewall on an antivirus will filter and prevent files that have been infected with a virus trying to enter the internal network.

Report all network activity and firewall activities.

Short Message Gateway

Short message gateway is an application system that serves short message submissions and receipts, widely used in business applications, both for the purpose of broadcast promotion, information services to users and dissemination of product or service content and so forth. Short message gateway is also an application, in which there is a short message feature that can be modified as needed. For example some of the features commonly developed in short message service apps

The gateway is a mass-shipping automated or scheduled tail cast message [3, p. 5]. In addition, it plays an important role in sending short message service gateway called short message service center which is a mobile phone network that handles the sending of short message service center. So, when someone sends short message service center message through their mobile phone, the short message service

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center in charge sends the message to the destination number. If the destination number is not active, the short message service center will retain the message within a certain period of time. If the short message service still cannot be sent until the time period expires, then the short message service will be deleted from the short message service center storage. Gateway application can use the short message service center path for its operation.

Database

A database is a collection or complete operational data set of an organization that is organized or managed and stored in an integrated manner by using certain methods using a computer so as to provide the optimal information that the user needs [12, p. 322]. While the database system is a system of arranging and managing records using computers to store or record and maintain complete operational data of an organization or company so as to provide optimal information that the user needs for the decision-making process [11, p.498].

According [11, p.499] and [13, p. 514] Understanding Database is: "Collection of files that have links between one file with another file to form a data building to inform an agency company, within certain limits". The above conclusion is the database is a collection of data interconnected with each other, stored in a computer and used software to manipulate it.

PHP Programming Language

PHP is one of the scripting languages installed in HTML. Most of the syntax is similar to C, Java and Perl, plus some specific PHP functions. The main purpose of this language is to enable the web designer to write dynamic web pages quickly. PHP was written and first introduced around 1994 by Rasmus Lerdorf through his website to find out who has accessed his online summary [14, p. 1023].

PHP is a script-shaped language that is placed in the server and processed on the server PHP is a script-

shaped language that is placed in the server and processed on the server. The result will be sent to the client, where the user using the browser. PHP is known as a scripting language, which integrates with HTML tags, is executed on the server, and is used to create dynamic web pages as well as Active Server Pages (ASP) or Java Server Pages (JSP). PHP is open source software. In particular, PHP is designed to form dynamic web. That is, it can form a view based on current demand. In principle, PHP has the same functionality as scripts such as ASP (Active Server Page), Cold Fusion, and Perl [14, p. 1024].

MikroTiks

Mikrotik is a small company headquartered in Latvia, adjacent to Russia, its formation initiated by John Trully and Arnis Riekstins. American John Trully immigrated to Latvia and met Arnis with Physics and Mechanics scholarship around 1995. In 1996 John and Arnis began to rout the world (Mikrotik's vision is to routing the whole world). Starting with Linux and MS DOS systems combined with the 2Mbps Aeronet Wireless LAN (W-LAN) technology in Moldova, Latvia's neighbor, and then serving five of its customers in Latvia, because their ambition is to create one reliable and deployed router software across world.

This is somewhat contradicted by the information that is on the web Mikrotik, that they have 600 point (customer) wireless and largest in the world [7]. Mikrotik is a computer network device in the form of Hardware and Software that can function as a Router, as a tool Filtering, Switching and others. The Mikrotik hardware can be a PC Router (which is installed on the PC) or a Router Board (already built directly from the company Mikrotik). While mikrotik software has known as Router OS there are several versions. One of the well-known versions of Router OS today is RB1100 [7, p. 1082]. One example of Router Board hardware can be seen in



Figure 3. Mikrotik RB450G [8]

Their basic principle is not to make Wireless ISP (WISP), but to make the router program that is reliable and can run all over the world. Latvia is simply the "place of experimentation" of John and Arnis, because now they have helped other countries including Sri Lanka serving about four hundreds of its customers.

Type of Mikrotik

Mikrotik has 2 products such as mikrotik OS and Mikrotik Routerboard.

1. Mikrotik Router OS is an operating system and software that can be used to make the computer become a reliable network router, covering various features made for ip network and wireless network,

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suitable for use by ISP and hotspot provider. For the installation of mikrotik is not required additional software or other additional components. Mikrotik is designed to be easy to use and very well used for the purposes of computer network administration such as designing and building a small to complex computer network system though.

2. Mikrotik Router Board is an embedded router product from mikrotik.

Router board is like an integrated mini pc because in one board embedded processor, ram, rom, and flash memory. Router board using Router OS that serves as a network router, bandwidth management, proxy server, dhcp, dns server. All of them can also function as a hotspot server.

Mikrotik Function

The main function is to make a computer mikrotik as a network router (Routing). In addition, mikrotik also has a function to run applications, including: Application Bandwidth Access capacity, Application Firewall, Wireless Access Point (Wi-Fi), Backhaul Link Application, System Hotspot and Virtual Private Network (VPN) Server

Router

Router is a computer network device that can serve to forward packets of data from one network to another network that is different in a computer network [7, p. 1083]. This router can be built using mikrotik. 3.3. GNS3 GNS3 is a graphical network simulator program that can simulate a more complex network topology compared to other simulators. This program can run on various operating systems, such as Windows, Linux, or Mac OS X [9, p.1476].

Firewall

A firewall is a device that is placed between the Internet and the internal network. Information coming out or incoming must go through this firewall. A Firewall is a software (Software) or hardware (Hardware) that filters out all traffic data (traffic) between our computers, home or office computer networks with the Internet. Firewall in a network, will ensure that when things go wrong bad on one side of the firewall (such as the Internet) then the computer on the other side will not be affected.

The basic function of a firewall is

1. Packet Filtering: All headers of data packets passing through the firewall will be checked, here the firewall makes a clear decision to allow or block each packet.

2. Application Proxy: Firewall is able to check more than just the header of a data packet, this capability requires the firewall to be able to detect specific application specific protocols.

3. Monitoring and recording traffic: Keeping track of what's happening in the firewall is very important, so it can help us to estimate the possibility

of a security crashing or provide useful feedback about firewall performance.

Virtual Private Network (VPN)

VPN (Virtual Private Network) is a private network that connects one network node to another network node using the Internet network. The data passed will be encapsulated and encrypted, so that the data is guaranteed confidentiality. A VPN is a facility that allows remote connections using a public network for access to a Local Area Network (LAN) in an enterprise. VPN is a way to make a network private and secure by using public network such as Internet. VPNs can send data between two computers that pass through the public network so as if connected point-to-point. The data is encapsulated with a header containing the routing information to obtain a point-to-point connection so that it can pass through the public network and can reach its final destination.

VPN Development

VPN was developed to build an intranet with a broad reach through the Internet network. Intranet has become an important component in a company today. Intranet within the company can grow in accordance with the development of the company. In other words, the bigger a company should have wide bandwidth of the intranet. So the problem becomes more complex if a company has a branch office with a long distance. While on the other hand is always related, for example sending a data and data synchronization [4, p. 1497]. The rapid development of the Internet offers a solution for building an Intranet using a public network or the Internet. On the other hand, an industrial development also demands five needs within the Intranet: (a). Confidentiality, i.e. the ability to encrypt messages along unsafe networks. (b). Access control, which determines who is granted access to the network and what information and many people can accept. (c). Authentication, which examines the identity of two companies that make transactions (d). Integrity, i.e. ensuring that files do not change in transit. (e). Non-repudiation, i.e. preventing two companies from denying.

Raspberry Pi

Beginning with concerns over the decline in skills and the number of students wanting to study computer science, Eben Upton, Rob Mullins, Jack Lang and Alan Mycroft from the Computer Laboratory of Cambridge University, England, together with Pete Lomas and David Braben in 2009 founded a nonprofit foundation named Raspberry Pi Foundation. The main purpose of this foundation is to promote the basic learning of computer science in schools.

The name Raspberry Pi itself, then pinned on a credit card-sized minicomputer, was first released to the public in February 2012. Raspberry Pi, or often

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shortened to Raspy, is the type of Single Board Computer (SBC) the size of a credit card developed

by the Raspberry Pi foundation, with a view to learning basic computer science at school.

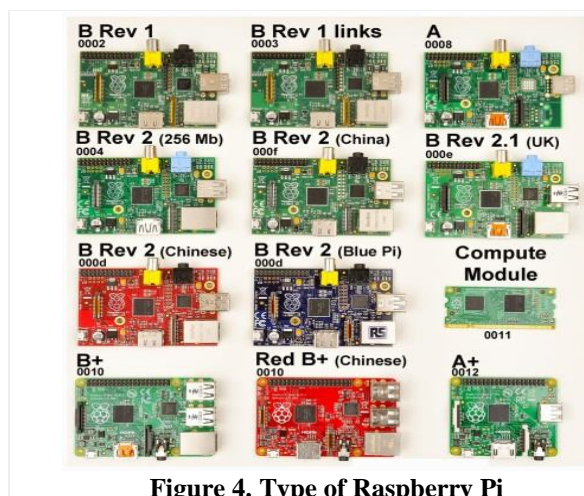


Figure 4. Type of Raspberry Pi

Raspberry Pi and Raspberry Pi 2, manufactured by several electronics manufacturing companies namely; Newark element14 (Premier Farnell), RS Components and Egoman. The hardware produced by some companies is the same with each other. Especially Egoman, this company produces for marketing in Tionghoa (China) and Taiwan. Egoman version can be distinguished on the color of his board is red.

Raspberry Pi does not have a RTC (Real-Time Clock), so Raspi cannot save time when resources are turned off. Alternatively, we can create a script that runs during the first boot process to get the time from the NTP (Network Time Protocol) server. We can also add IC (Integrated Circuit) RTC like DS1307 with backup battery through I²C channel (Inter-Integrated Circuit) in GPIO (General Purpose Input / Output).

Port Knocking

Port-knocking is the concept of hiding a remote service inside a firewall that allows access to the port only to know the service after the client has been successfully authenticated to the firewall. This can help to prevent the scanner from knowing what services are currently available on the host and also serves as a defense against zero-day attacks [4]. 3.5. Hacking is an intrusion activity into a computer or network system in order to abuse or damage existing systems. The definition of the word "misuse" has a very broad meaning, and can be interpreted as theft of confidential data, as well as inappropriate use of e-mail such as spamming or searching for possible network gaps to enter [10, p.53]. Inside the firewall all incoming and outgoing communications are controlled. Unnecessary ports can be blocked (closed) and important and dangerous ports can also be blocked, so only allowed parties can log in through that port. This is the most effective and widely used computer network security system. But sometimes

blocking is often inflexible, when needed to establish communications with what's inside the network, firewalls do not allow it because it might be in an unauthorized area. Firewalls though are a tool communication [11, p.497]. It to be done is very important for the smooth work. For example connecting to the internet and needing to access the web server via SSH to fix the configuration, while the SSH port on the server is prohibited to be accessed from the internet by the firewall, of course this will be very inconvenient. To avoid this sort of thing, there is a very effective method that is by using port knocking method. Port knocking is a method for building communication between computers from anywhere as long as each computer is connected in a computer network, with a computer device that does not open any communication port freely, but the device is still accessible from outside, using a configuration format an experimental tap port to transmit connections on the tap port

Benefit of Port Knocking

Port Knocking is a great method as a way of connecting to their computer devices. Port knocking is suitable for those who still want to strengthen their computer security system and network devices, while still wanting to have a personal connection to it continuously and can be done from anywhere. Personal communication means a connection that is not open to the public like SMTP or HTTP. Usually this personal communication is more administrative and uses services such as telnet, SSH, FTP, TFTP, and more. This personal communication will be very dangerous if it can also be done by others who are not eligible. By using Port knocking, these services will remain closed for public access, but can still be flexibly opened by anyone who has a combination of tap ports.

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Port Knocking Implementation

Implementation or implementation of the knocking port can be implemented on several devices or operating systems that provide features or service firewall for example Linux and UNIX based operating system [9, p.1476] and [10, p.54]. Port knocking on its basis can be implemented by custom-rule firewall rules that exist in each device or Operating system.

Implementation of port knocking on Linux or UNIX based operating system, because in addition to open source firewall rules in the operating system can be modified in such a way that the use of firewall to be more effective in accordance with the interests.

3. RESEARCH METHOD

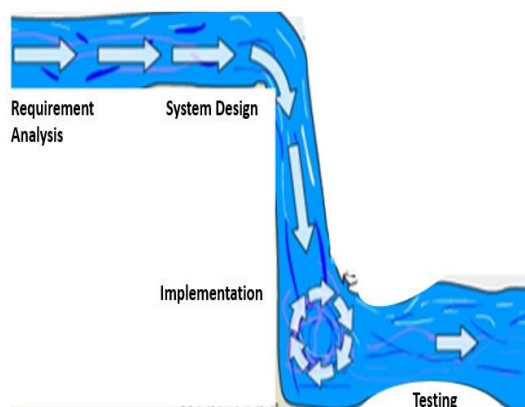


Figure 5. Research Design

Stages performed in the study are:

Stages in this research begin from the identification of needs, literature studies, design of information systems security management, VPN system development, testing, and implementation as Figure 5

Requirement Analysis

At this stage the identification of problems to be solved based on the theory and practice of the application. Besides that, there is also a need analysis of system development, both from network aspect and its security as well as application development aspect. This identification needs to be done so that details of the development of information system security model can be tailored to the needs of its users.

System Design

Some of the literature referred to in this study discuss about network management, network connection, network security, user database, and programming is used to support the development of web knocking model in this research. References used from some similar research that has been done by other researchers also become an important reference in overcoming trouble shooting during development.

Implementation

The model will be based on the results of problem identification and needs analysis. The design of information systems security management tailored to the needs of users. Besides, the components and

parameters that will be applied into the system both hardware and software are made in detail by considering the aspects of network security and user convenience. Models that have been made will be used as a reference in the manufacture of network security systems and web knocking based application system. Information system security management is based on the design of web knocking model that has been made in the previous stage. This security system must be able to ward off attacks by the parties who are not responsible (hackers). The enormous risk must be borne by the server owner and the admin system if an open network connection built can be attacked by a hacker. One of the risks is that hackers can retrieve / delete existing data on the server.

All connections to the server either through the local network (LAN) or via the Internet (WAN) network must be guaranteed security. Protection of server network security (firewall) can be done in layered. There are many ways to perform network security. In this research, network security model used is using knocking port. This server knock method is very well used to secure access to the server via a wide network (internet) because only registered users can login into the server. If the user is not recognized and tap the door is not allowed by the admin system, then the user cannot access the system information and if doing some login error it will be identified as hacker / hacker.

After system development on the network, the next step is to build a web-based application. The applications used for security connections are of some

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sort and usually the app is not user friendly. Development of web-based applications will facilitate the user when logged into the network system, which is just by typing a web address. After the user is allowed to enter through the process of entering account (login) in which will do knock the door firewall (knocking) automatically. After successful knocking identification is done, the server sends the token ID via short message service and asks the user to enter the token ID code on the web.

Testing

After the process of developing the network security system and application login system, the next step is to test. This process requires precision and accuracy by including various possibilities. This is done so that the weakness of the system (hole) that allows hackers to attack can be identified and can be repaired. The smallest possibility should be taken into account considering the open network created allows everyone to try to enter into the built system. The final

stage is implementation and documentation. Implementation can be done in the form of socialization to the leaders, lecturers and employees who want access server STIE Perbanas Surabaya by using internet connection from home respectively.

Overview of Research Model

In Figure 6 an overview of the research model. Stages performed by users who will connect access system information using the Internet network with the condition of the system information server for port 80 (http) is still closed by the firewall, which is begun by logging access through the internet through the browser with web knocking techniques in it. After successful login the user will receive the token ID either via short message or email, the user will enter the token ID on the web. If successful then the Laptop / PC users can access the information system previously port 80 (http) and https (443) closed that can not be accessed through public.

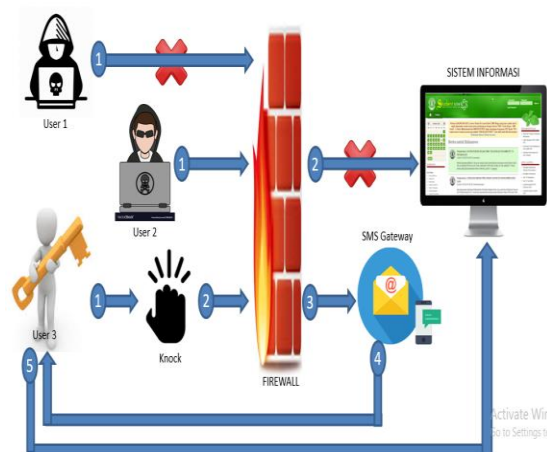


Figure. 6 . Systems Flow Security Intelligent

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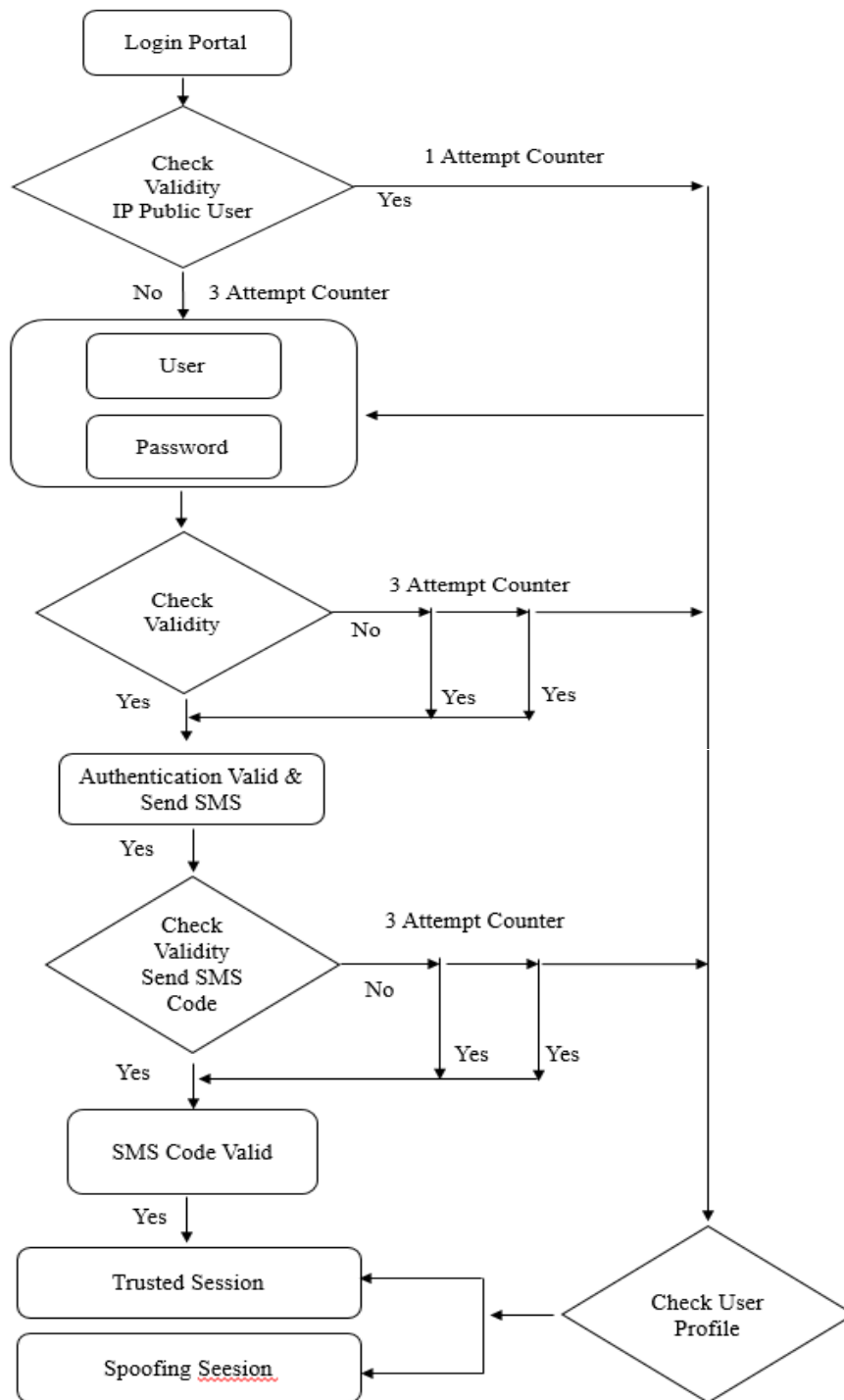


Figure 7. Flows of Login Mechanics

4. RESULTS AND ANALYSIS Authentication Mechanism

At the stage of the security system, trusted users will be registered on the database such as user name, password and phone number are registered. After that the authentication process is developed through three

layers that verify the user is trusted if the user and password are entered correctly then automatically included in it do knocking port to mikrotik firewall and followed by entering the verification code sent via short message to user's phone no user

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Infrastructure Firewall Mechanism

The security system developed can be integrated with system or network infrastructure that has been available, with reference to the concept of security and ease of access. This security system model uses a mikrotik device as a firewall used to close all port access and block all access from the internet. Furthermore, raspberry PI uses Linux operating system which contains webserver and database as storage media detail of trusted user data, public IP information and as a random code delivery media,

from raspberry PI connected with modem shot message gateway as a random message delivery media sent to user via email or short message service. In Figure 8 is a network security infrastructure scheme that can be integrated on the available network, and the three devices are placed in the outermost position on the LAN network as a medium of network security of public access LAN network. This web-based security system with ssl encryption model can be accessed by the user via internet connection using laptop, PC or gadget.

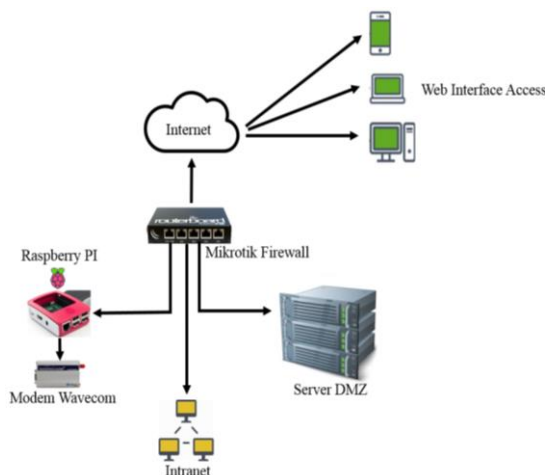


Figure 8 . Web Knocking Network Infrastructure

Ip Public Verification

Public IP address checks on the database will be performed by the system when the user accesses on the web knocking page, if the IP address used by the user is included in the blacklist, then the user is only given 1 chance to login user, password and short message service code on the web knocking page, otherwise then the user gets 3 times a chance in the input on the web knocking page. The public IP entries in the Blacklist are obtained if a user encounters user login errors, passwords and random code 3 times, the IP address public blacklist will be stored in the database for 60 minutes and after that it will automatically be deleted on the database.

Algorithm 1: Public IP

1. Begin
2. Check IP Public
3. If IP Public = Blacklist Then
4. User_Alert > = 1
5. Else
6. If IP_Public = Whitelist Then
7. User_alert > = 3
8. Else
9. User_Auth_Knock
10. End If
11. End if
12. End

User Verification

Authentication users are gained by a trusted user after being registered in the database. The user access stage for the information system is done through the web <https://webknocking.xx.xx>. After the user is registered by the network admin continued in the stages of the staged security system first stage is when checking the user, password and chaptha entered on the web then the system will verify on the database, if checking the user has made error > = 3 it will receive user information suspend, if not user will get chance 3 times input, if user make error > = 3 then user will disable and will be included in accumulated calculation of suspend user. if not then the system will make the process of knocking through the webserver to the firewall and process proceed to the next stage of receiving random code via email / short message service. In anticipation of error 3 times login time on web knocking page available menu forgot password, before user input user and password if user hesitate or forgot password then user can do password reset by click forgot password by entering email address / telephone number registered in database, if the verification matches then the user will receive a password reset link code via email or the user will receive a random code and input a random code short message service for the creation of a new password.

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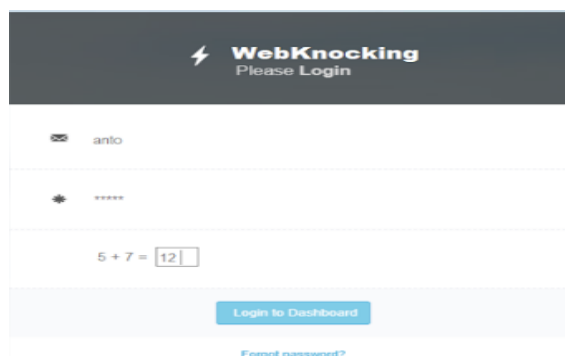


Figure 9. Web knocking page

Figure 9 is a web knocking portal page <https://webknocking.xx.xx>. after checking Public IP used by user and below is process user algorithm auth knock

- Algorithm 2: User_Auth_Knock
1. User Input, Password, Chapcta
 2. Begin
 3. Check Dictionary_Suspend_Count = 0
 4. If Check Log_count_Error_login >= 3 Then
 5. Suspend
 6. Else
 7. If User_Auth_Knock >= 3 Then
 8. Block_Access
 9. Else
 10. Activity_Knock1
 11. End If
 12. End if
 13. End

Knocking Port

Knocking port is a security mechanism that opens a closed firewall port by passing a tap to a firewall with a combination of ports already registered to the firewall. Mikrotik firewall has been integrated with PHP programming language using API.

The step is when the user and password pass the verification in the initial stages, then the web server will do a knock on mikrotik firewall to open a closed port. There are 2 stages of the first tap is the user and password and the second is done opening mikrotik firewall port is when the user passes the short message service code verification. Automatically on the second stage IP public user will be enrolled in whitelist firewall mikrotik to be allowed access to local network source or system information which by default is covered by firewall.

```
[admin@Mikrotik Firewall] /ip firewall filter> print
Flags: X - disabled, I - invalid, D - dynamic
0 chain=input action=accept protocol=tcp src-address-list=LAN dst-port=8291,21,22,23,80,8728 log=no log-prefix=""

1 chain=input action=add-src-to-address-list protocol=tcp src-address=192.168.0.124 address-list=ketuk1
  address-list-timeout=5m dst-port=9000 log=no log-prefix=""

2 chain=input action=add-src-to-address-list protocol=tcp src-address=192.168.0.124 src-address-list=ketuk1 address-list=ketuk2
  address-list-timeout=5m dst-port=9100 log=no log-prefix=""

3 chain=input action=drop protocol=tcp src-address-list=!free dst-port=8291,21,22,23,80,443 log=no log-prefix=""
```

Figure 10. Mikrotik Firewall

In Figure 10 is a mikrotik firewall configuration, line 1 is a combination of first-stage knocking ports to be able to get access knocking permission to the second stage, in the second line is a combination of knocking port to add IP Public user into the address list that can access the local network While on line the third is an access block for access to the local network

unless the address list has been entered in the second stage.

Algorithm 3: Activity_Knock1

1. Begin
2. Activity_Knock1
3. If User_Auth_Knock = valid Then
4. Activity_knock1 = http:// ipFirewall: 9000
5. Else

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6. Short message service_Code_Knock
7. End If
8. End

Short Message Service and Email Code

Short message service Code is the final verification stage for opening access of network resources of LAN / information system, system will send short message service code to user which is random code generated in auto generate system. At this stage every user who passes user verification, password and chapcha will receive short message

service code and insert on the web knocking page, if the short message service code in the entry does not match the unique code in the database up to 3 times then the user will automatically be blocked and the error will be accumulated at database suspend user, if appropriate then the user system through webserver do knocking to firewall and IP Public user will be given access permission to open firewall port. Automatically a trusted user will log on to the portal page and can access the LAN network.

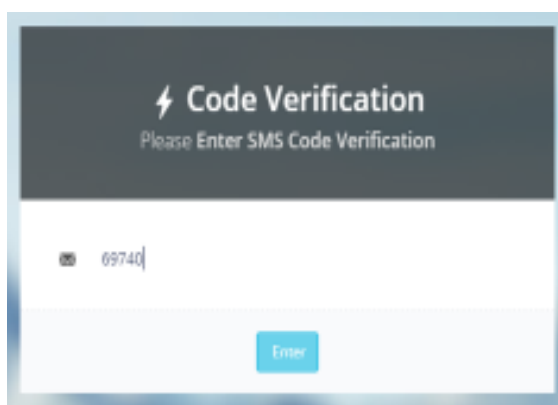


Figure 11. Short Message Service Code Verification

In Figure 10 is the page to enter the verification code obtained by the user via short message service or email.

After successfully entering the short message service code in Figure 11 is the picture when the user

has successfully logged on the system security, automatically users will also access system information that is on the network that by default is covered by the firewall.

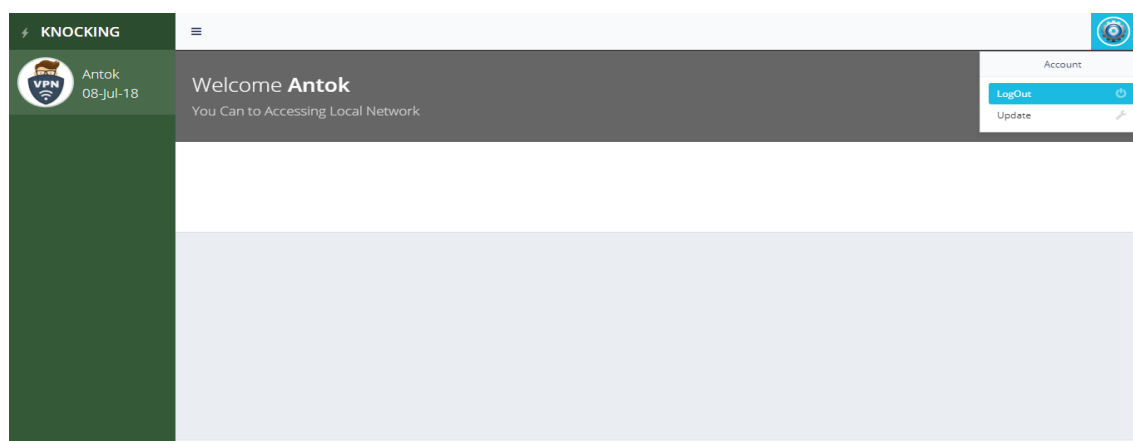


Figure 12. Portal Login Web knocking

1. Begin
2. Short message service_Code_Knock
3. If Short message service code = valid Then
4. Activity_knock2 = <http://ipFirewall:9100>
5. Trusted User
6. Else
7. If Alert Count >= 3 Then
8. Block connection
9. Else
10. Suspend
11. End If
12. End If
13. End

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For suspended users can contact the network admin to reset the password so that the suspend user count will return to 0, the system if the suspend user status <= 2 will update to 0 if the user has successfully done 3 user login, password and short message service code without errors in different time periods. Here is

the information of all user log actives in the database presented in table 1 and table 2, in table 1 it contains about checking public IP status used by user when accessing webknocking page, User status contains about enable, disable, new user Suspend error.

Table 1

User Log Activities

User	IP Public	User Status	Suspend Count	Error Alert Account	Alert Status	Next Alert
antok	Whitelist	Enable	0	1	Allow	Permitted
User 1	Blacklist	Disable	6	2	Suspend	Not Permitted
Yusuf	Blacklist	Enable	5	3	Suspend	Not Permitted
Sumantri	Whitelist	Enable	0	1	Allow	Permitted
Anton	Whitelist	Enable	0	1	Allow	Permitted
Risky	Whitelist	Disable	2	2	Suspend	Not Permitted
Nanang	Blacklist	Disable	3	2	Suspend	Not Permitted
Next SMS Code						
antok	Whitelist	New	0	2	Block	Not Permitted
Sumantri	Whitelist	Old	0	1	Allow	Trusted User
Anton	Whitelist	Old	0	1	Allow	Trusted User

While in table 2 is the log information of Public IP address of user, access date and user access time successfully access on portal page of knocking.

Table 2

Log Information of Public IP.

No	User name	Source IP Address	Alert Date	Alert Time
1	Hariadi	202.xx.xx.xx	03/01/2018	05:10 am
2	User 1	110.xx.xx.xx	03/01/2018	08:15 pm
3	Yusuf	203.xx.xx.xx	20/11/2017	06:03 am
4	Sumantri	158.xx.xx.xx	25/11/2017	11:00 pm
5	Anton	118.xx.xx.xx	01/12/2017	02:15 am
6	Risky	110.xx.xx.xx	05/02/2018	09:10 am
7	Nanang	66.xx.xx.xx	10/05/2018	10:22 pm
8	Romi	118.xx.xx.xx	11/05/2018	08:35 am
9	Bisry	202.xx.xx.xx	22/06/2018	09:25 pm
10	Fuad	110.xx.xx.xx	18/06/2018	10:10 pm

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Penetration Testing Webknocking

In this study the tests were conducted to test the vulnerability or vulnerability of the web or known as the penetration test (pentest) on webknocking pages.

In pentest tools used is to use nmap port scanner to view the open port and use nikto tools to do web knocking vulnerability testing.

```
root@sso: /home/ict
root@sso:/home/ict# nmap -vv webknocking.

Starting Nmap 7.01 ( https://nmap.org ) at 2018-07-30 11:03 WIB
Warning: Hostname webknocking. resolves to 2 IPs. Using 104.27.157.137.
Initiating Ping Scan at 11:03
Scanning webknocking. (104.27.157.137) [4 ports]
Completed Ping Scan at 11:03, 0.20s elapsed (1 total hosts)
Initiating Parallel DNS resolution of 1 host. at 11:03
Completed Parallel DNS resolution of 1 host. at 11:03, 15.84s elapsed
Initiating SYN Stealth Scan at 11:03
Scanning webknocking. (104.27.157.137) [1000 ports]
Discovered open port 80/tcp on 104.27.157.137
Discovered open port 25/tcp on 104.27.157.137
Discovered open port 8080/tcp on 104.27.157.137
Discovered open port 443/tcp on 104.27.157.137
Discovered open port 8443/tcp on 104.27.157.137
Completed SYN Stealth Scan at 11:03, 18.31s elapsed (1000 total ports)
Nmap scan report for webknocking : (104.27.157.137)
Host is up, received echo-reply ttl 58 (0.025s latency).
Other addresses for webknocking (not scanned): 104.27.156.137
Scanned at 2018-07-30 11:03:06 WIB for 34s
Not shown: 995 filtered ports
Reason: 995 no-responses
PORT      STATE SERVICE REASON
25/tcp    open  smtp   syn-ack ttl 62
80/tcp    open  http   syn-ack ttl 58
443/tcp   open  https  syn-ack ttl 58
8080/tcp  open  http-proxy syn-ack ttl 58
8443/tcp  open  https-alt syn-ack ttl 58

Read data files from: /usr/bin/./share/nmap
Nmap done: 1 IP address (1 host up) scanned in 34.45 seconds
Raw packets sent: 3008 (132.328KB) | Rcvd: 20 (864B)
root@sso:/home/ict#
```

Figure 13. Port Scanning

Based on Figure 12, the port scanning results show an open port of 80 for web, 443 for https, 25 for smtp and 8443 for http-alt. Public IP used webknocking has been secured using proxy in cloudflare. From the

analysis of the webknocking does not open the port used to perform the opening knock of the firewall on ports 9100 and 9200. So not visible when the scanning port from the internet.

```
root@sso: /home/ict
root@sso:/home/ict# nikto -h webknocking.

- Nikto v2.1.5

-----
+ Target IP:      104.27.157.137
+ Target Hostname: webknocking.
+ Target Port:    80
+ Start Time:    2018-07-30 11:21:51 (GMT7)
-----

+ Server: cloudflare
+ Cookie __cfduid created without the httponly flag
+ Uncommon header 'cf-ray' found, with contents: 44250a71a52a1798-SIN
+ Uncommon header 'x-frame-options' found, with contents: SAMEORIGIN
+ Uncommon header 'x-content-type-options' found, with contents: nosniff
+ No CGI Directories found (use '-C all' to force check all possible dirs)
+ Server banner has changed from 'cloudflare' to 'cloudflare-nginx' which may suggest a WAF, load balancer or proxy is in place
+ 6544 items checked: 0 error(s) and 4 item(s) reported on remote host
+ End Time:      2018-07-30 11:25:11 (GMT7) (200 seconds)
-----

+ 1 host(s) tested
root@sso:/home/ict#
```

Figure 14. Vulnerability test

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Based on Figure 13, the results of the analysis of vulnerability checking from web webknocking, from the web application nikto webserver web application application firewall (WAF) from cloudflare, so that if not found a dangerous vulnerability.

5. CONCLUSION AND SUGGESTION

Security issues will be a challenge for any industry, sometimes for mature industries with adequate resources often facing security issues. The purpose of this research is to develop and implement security intelligence for the industry with user-friendly system and can be integrated with existing network with relatively cheaper cost. So for some middle and lower industry that difficulty in the implementation of security in information systems can implement this security system with easy use.

This security system has been tested using security penetration test tools with results that have been as expected that no ports are open and little vulnerability is found. Perhaps in its development penetration test can use other tools.

6. FUTURE SCOPES

The system can further be enhanced by providing various options. Adding advance intelligence security will be more given secure operating activities to organization. The development of intelligence security in services industries i.e. banking sector and hospitals were next opportunity to build and develop security information system. More effective and robust security intelligence becomes the next research challenge in the future

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SECTION 29. Literature. Folklore. Translation Studies.

THE PATTERN AS A INDEPENDENT GENRE (an example of Uzbek and Karakalpak children folklore)

Abstract: In the article, the pattern genre of children's folklore - the genre of the phraseology is summarized theoretically in the example of Uzbek and Karakalpak folklore. It focuses on the genesis of the genre, the theoretical essence and the typology of artistic forms. The author seeks to evaluate the nature of Turkic folklore development, the national literary typological community, and the literary interpretation of the narrative genre analogy.

Key words: pattern, typology, analogy, genre, phraseology.

Language: English

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Introduction

The problem of studying the typology of folklore genres in the world of scientific theoretical thinking in the development of world literature and aesthetics is always relevant. Consequently, in the comparative aspect of the oral tradition of the folklore, which has been revived for centuries, reveals the principles of historical traditions, the spirituality and enlightenment of the nation, as well as the holistic-conceptual views of the nation, opens the way for promising areas of science. Existing traditions, while determining the peculiarity of the image spirit, are the basis for the generalization of the universality of the criterion, the history of the art form and the genesis of expression. At the same time, the philosophical concept, which is dramatically changing, has the ultimate goal - "to develop education, culture, science, literature, art and sports, to improve the state youth policy" [1, p. 5] serves the development of society. The experience of poetry indicates that the main task is to cultivate a perceptive perception of the rich culture, the individual lifestyle, and the perceptions of every nation in the world. The sense of involvement with the nation's genius proves its nature.

Materials and Methods

From ancient times Turkic peoples live in a common geographical area, in a holistic socio-historical context. Centralized culture pillar sets up a

solid foundation for worldview, consciousness and imagination. It combines expertise and tradition synthesis, verbal and written speech, aesthetic selection and evaluation criteria. Distinguished folklore genres (age characteristics, psychic needs, vital beliefs) give rise to consciousness-detailing. Second, the accuracy of poetic task (intelligence, haughtiness, riveting technique) is the result of cultural cooperation. It combines value, criterion, outlook and thinking skills. The current dimension is based on the intentional beliefs and the necessities. In this context, a complex study of the similarity of the oral traditions of the fraternal peoples is of particular importance. Typological research, on the one hand, promotes universalism in subject matter, idea and problematic interpretation, and, on the other hand, characterizes the goals, aspirations and aspirations of the nation, which are bound to each other in the same level, the world, and the world.

The folklore of the Uzbek and Karakalpak peoples reflects the mythopoeic attitude. The current situation is due to the tradition, tradition, and geographical area. There are a number of interconnected aspects of the poetic arsenal of two nations that have been living together for centuries, combining traditions, literary thinking, and lifestyle. They are called "patriotism, interethnic consent, peoples' friendship, understanding of labor and beauty" [5, p. 8]. The ability to express public philosophy and the logic of life clearly and



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efficiently, both effectively and expressively, is characteristic of folk oratory. The great Russian scientist V.M.Jirmunskiy examines the genesis of the Turkic peoples in his scientific researches, explains the emergence of the nomadic tribes, its expansion and its historical convergence in terms of linguistic, ethnicity and single space. That is not casual! Since ancient times Turkic nations have established strong socio-political, cultural and economic ties. These relationships helped to move the theme, the plot, and even the motifs. The formation of advanced literary traditions, first of all, is measured by the enrichment of the creative potential of each nation, and, secondly, in the interconnected and literary relationships, and thirdly, that universal values are intertwined with the interethnic interests. It is noteworthy that in the Uzbek and Karakalpak folklore the master-student traditions, the requirements for genres, the images, the interpretation and the style of expression are interrelated, complementary. In fact, the samples of folklore can be seen as the result of a particular historical-social need. The wisdom of the nation, the people's genius, and the wisdom of ethnic unity will be there. The poetical functionality in the genre of folklore is quite limited in experiments and observations strangely. One of the fastest and fastest little genres that serves a definite purpose is the type of (janiltpash) patter.

The art of patter contributes to the deterioration of mind in Uzbek and Karakalpak folklore, raising the skill of thinking and strengthening memory. As a genre of folklore, it acts as a moral perfection for the younger generation. According to official data, the art form was later added to the composition of children's folklore. Generally patters, thesis is based on repeated sounds of artistic vocabulary or sounds that are so complex in their pronunciation. Especially when these words were spoken rapidly, the loser's laughter caused the performer to fall into pronouncing complex voices. Experts say that, as a matter of urgency, the word "fast" was derived from the term "tatal", "chalg'ituv", "chalg'ituvchi", "chalish", "adashish". The "patter" claim was later stabilized.

The genre is predominantly popular in the form of mass gatherings, various ceremonies and weddings. Later, work and mental activity moved to the children's folklore. In ancient fast words, intensification of words confirms accuracy. As a rule, breath can not be respected until the exact phrase is pronounced precisely. There is so much to do with the structure and the amount that it contains so much that they can not tell a child. Another important point of thesis is that it is necessary to clearly pronounce similar sounds in the text:

Qurilishga terak kerak, ko'proq terak ekmoq kerak.

If we look at the nature of the mysterious genre, we can see the prevalence of macros and forms, the prevalence of philosophy and subtle expression. The artistic form does not aim at the logical point of the content, but rather the task of educating aesthetic perception through live speech. It can be conditionally divided into two parts: information and intelligence! The two logical frames provide a sense of image quality. The nature of the genre, which serves to upbringing the aesthetic taste, is a requirement of self-consciousness. An artistic form requiring acute intelligence and executions is a great incentive for babies to create creativity. Usually, flexibility and flexibility help drive the technique.

In Russian folklore studies there are some comments about the genre. In particular, G.Vinogradov distinguishes the word (chordogovorka) in the monograph "Children's folklore and way of life" and evaluates the complex sentences with accentual expression in simple word phrases. O.I.Kapitsa repeats the scientist's remarks in the Detsky Folklore brochure and emphasizes the mockery of the underlying causes. V.P.Anikin also mentions that even with the help of these arguments, M.Melnikov, on the contrary, has long been said to be in Russian earlier [4, p. 49-52].

The Kazakh folklorist A.Baytursinov describes the etymology of the patter: "The notion of patter is derived from the misinterpretation. It is often said that the product of creativity consisting of words, often worded, in a language that does not translate into words or words that can turn into other words."

In the Karakalpak folklore, the rapid genre plays an important role.

Folklore scholars Q.Maksetov and A.Tajjimuratov in the book "Qaraqalpaq folklori", published in 1979, "Thesis is a product of people's creativity created for the world of childhood. He teaches children to speak the right language, to spell speech, and to correctly pronounce the sounds. We are quick to say the word and its sounds, not to be misled, to be right, to say the least "[9, p. 149-151].

Q.Ayimbetov also described in the book Halyq Danalygy, published in 1988, that it is a great branch of Karakalpak oral literature. The children were quick to say that they were right. Rapidly speaking child speaks fluent English. It teaches you to say words without mistaking. Thesis is widely used as a repertoire for children than other types of oral literature "[2, p. 36].

The Karakalpak children's folklore researcher I.Kurbanbaev also writes in Karakalpak literary scholars Q. Mambetnazarov in his book The Karakalpak Children's Literature for Fairy-tales (1979) and Karakalpak Children's Literature (1992), in his book, Karakalpak Auizeki Nakshiki, Q.Jarimbetov, Q.Orazymbetov have also provided some theoretical information about thesis in the 2006 Karakalpak literature.

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"In the Uzbek folklore, patters and vocabulary have existed since ancient times. True, they did not come to us because there was no painting of folklore in the past. However, the great representatives of Uzbek classical literature, such as Lutfiy's works, are examples of various forms of word play in such works as Alisher Navoi's "Khamsa", "Khazoyinul maoniy", "Muhokamatul lug'atayn", "Mezonul avzon", "Majolisun nafa'is" [4, p. 49-52].

"Patter is an oral exercise that enhances the ability to pronounce accurate and melodic sounds in younger children. Works of this genre do not only teach the children to sing aloud, but also give them aesthetic pleasure, enhance their thinking abilities and strengthen their memory" [6, p. 9].

In the 30 years of the XX century, patter such as other folklore creatures were written down and included in some collections.

For example, in the first volume of the book "Uzbek Folklore" founded in 1939 by professor Hodi Zarif, 12 words were given, and 8 - in the word. This hospitality is a valuable resource for us, because it is a distinction between word of mouth and its most important and characteristic examples.

Most of the thesis has been created by adults, including teachers, coaches, and so on.

In thesis the words are repeated. Scientists say that 18 of the 100 samples are based on the sounds of 18 *sh*, 17 *m*, 15 *k*, 10 *s*, 8 *j* and *ch*, 7 *g*' and *q* sounds.

G. Jahongirov makes the thesis in five categories: We try to make the Karakalpak version of the series within the same category.

The majority of the patters of **the first series** is based on phonemes that differ widely from their pronunciation, including *sh*, *r*, *l* consonants. For example: *Osh pashshasi pes pashsha. Lola arralaydi, Sora allalaydi.*

With the help of this patters, it is clear that the child at the age of three to four old may correctly pronounce the voices or replace them with *l* and *s*. If the child's language is "sweetie," he can pronounce: *Os passasi pes passa...* The listener laughs and corrects his speech.

There is a second patters that teaches the child to correctly pronounce some sounds, along with drawing the child's mind and focusing on the logical point of the sentence. Such exercises have also been successfully developed by the people's pedagogy. Here is an example: *Bir tup tut, bir tup tutning tagida bir tup turp. Bir tup tut bir tup turpning tomirini turtib turibdi, bir tup turp bir tup tutning tomirini turtib turibdi.*

As you can see, in addition to the correct pronunciation of the word "tut", "turp" in the example, it is necessary to repeat the phrase correctly, keep in mind the role and position of the snail and radish.

Patters can be summarized in short and long sentences, depending on the speech and memory characteristics of children and adults. In the process of children's speech and memorization, small and short sentences are passed from sentence based on the complex design of sounds.

This passage will also be used to describe the meaning of the sentence for the second kind of fast-track exercise: *Oq choynakka oq qopqoq, ko'k choynakka ko'k qopqoq.* In this example, it is as if the lid of the white teapot is white, the lid of the blue teapot is blue. Even at a rapid pace, speeches need to be ignored, and it is necessary to pronounce this sentence, remembering that difference. There are two more examples: *Jo'ja cho'chib, go'ja cho'qir. Chovli - simdan, chovgum - misdan.*

You can tell these examples by knowing what the chicken is cooking or what to do with the wire - once you understand what to do with the copper, you can tell it right. Now: *Non yasashsizmi, sholi sanashsizmi?* As for the example of the bread maker, the parent should squeeze the tongue before paying attention to it, and the laughter of the comrades. That's what the game is about.

The third series of patters are two or more elemental exercises. For example: *Juvarini chumchuq yeb ketdi. Egasi ertaga kelaman deb ketdi. Kelmay ketgur ko'r chumchuq, juvarini egasi kelguncha vayron qib ketdi.*

This example consists of three independent statements and three events. There are also many elements - sparrows, oats, corn. As soon as the child first learns the order of the events, he can speak straight and fast.

Here, G. Jahongirov gives examples of more complicated forms of thesis. There is a much more sophisticated example. (now different colors work, numbers interrupt): *Osmonda ikkita kalxat. Birining oq dumi kalta kalxat, birining qora dumi kalta kalxat. Oq dumi kalta kalxat qora dumi kalta kalxatga halaqit beradi, qora dumi kalta kalxat oq dumi kalta kalxatga halaqit beradi.* When performing this task, the child is mistaken in the color of the letters, not the sound. The phrase is large - 33 words.

To say more patter: *Namanganda usta Muso puch pista purushning oltmish uch pud pistasi bor ekan. Oltmish uch pud puch pistasi bo'lsa ham o'sha usta Muso puch pista purush, oltmish uch pud pistasi bo'lmasa ham o'sha usta Muso puch pista purush.*

The fourth rush of fast words has been created after the revolution, which reminds us of the greatness of the elders. At the same time, the children themselves are tasked with each other and the other party must respond quickly and effectively. This is no longer just to say pronunciation, but to pronounce pronunciation correctly. For example: a child speaks the word "botany" and the second child is quickly



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referring to every letter of the word: *Bolalar, otalar, tankchi akalar, nemisning iniga, kechasi ataka!*

The fifth type of thesis is to express the fast. In this case, the words in the text that describe the subject matter are replaced by the image of that subject. For example: *G'uj (chumchuqlar rasmi) g'ujum ustida chug'urlashib, g'uj (chumchuq rasmi) qa g'ujum cho'qilatmaydi* [4, p. 49-52].

According to the classification of G. Jahongirov, we try to distinguish the Karakalpak language patters:

The first series includes the following:

Ayir atađdi jyk qartaytar, semiz qoydi may qartaytar, yy qartaytar, byy qartaytar [3, p. 12].

In this fast saying it is possible to pronounce children's voices correctly or change them to *r*. Here is another example: *Adamga sok shopshettirmesin, sok shopshettirsede kop shopshettirmesin* [8, p. 37].

In this fast, it is clear that the child correctly pronounces *sh*, *p* or *t*, or substitutes them to *s*, *p*, *k*.

The second category patters is the following:

Daryaniđ arjag'inda g'arri qarabaraq, g'arri qarabaqti shao'ip atir. Qara baytalli g'arri qaraqalpaq, g'arri qaraqalpaq [7, p. 437].

In addition to telling correctly the words "karakalpak", "karabaraq" in this example, it should be noted and remember the place and condition of Karakalpak.

The third category patters is the following:

Qaladan alg'anım alti arba asqabaq, alti arba asqabaqqa jekkenim, targ'il ala taypaq myyız, aq bokse baspaq, aq bokse baspaq [9, p. 150].

This patters consists of three statements and three events. There are also many elements, such as "taypaq", "baspaq". The child first learns the sequence of events, after which it can be accurate and fast.

Patters will help to improve the pronunciation of children's speech by distorting tough voices and

strengthening pronounced pronunciation. The thesis can be used not only in native language, literature or children's literature, but also in defectology, phonation, and logopedics.

The Uzbek and Karakalpak people are patter to express their thoughts and conclusions about their poetic nature. It is not possible to cover all aspects of the thesis in a single research area. In particular, the rapid expression is a unique artistic-aesthetic and philosophical genre that reflects a broad and deep content.

The popular Uzbek and Karakalpak people are the artistic product of the centuries-old experience of our ancestors. The proximity of poetical, aesthetic, meaningful, ideological and artistic expressions of the two peoples expresses the existence of certain commonities among the two cultures, cultures, thinking, literature and art.

Conclusion

Generally, the patter is to eliminate the pronunciation of some of the sounds of children, to develop the oral and written language of the students, to increase their vocabulary, to avoid misunderstanding, to speak fluent, clear, simple, sounds of sounds, perceptions of sensitivity, practical assistance.

In addition to the fact that the patters are aimed at eliminating the deficiencies of the child, it is also important for young people to be prudent and intelligent, it has also worked as a fun, relaxing voice in the cradle of the grave. The patter genre is an important genre in folklore and children's literature, which meets the aesthetic requirements of contemporary pedagogy and psychology, contributes to the education of children in the spirit of respect for artistic vocabulary and leads to the development of its mental, physiological and aesthetic aspects.

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**SECTION 31. Economic research, finance,
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MANAGERIAL BUDGETING PERFORMANCE TO JOB RELEVANT INFORMATION, DELEGATION OF AUTHORITY, AND MOTIVATION

Abstract: *This study aimed to analyze is an effect of budgetary participation on managerial performance with job relevant information, delegation of authority, and motivation as a moderating variable. This study uses a survey method using a questionnaire as a primary data collection. The populations in this study are all managers at state-owned enterprises in Surabaya. Samples were low and middle manager. Data analysis model used was simple linear regression and moderated regression analysis. Tests on the first hypothesis shows that the influence of participation budgeting on managerial performance. Tests on the second hypothesis indicates that the job relevant information as moderating variable affecting the relationship between budgetary participation and managerial performance. While testing the third hypothesis indicates that the delegation of authority as moderating variable can not affect the relationship between budgetary participation and managerial performance. Fourth hypothesis testing showed that motivation as a moderating variable may affect the relationship between budgetary participation and managerial performance.*

Key words: *Budgetary participation, job relevant information, delegation of authority, motivation, managerial performance*

Language: English

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1. INTRODUCTION

Various efforts have been made so that the organization's established strategies can be carried out well and achieve the goals. In addition, the existence of uncertain conditions and unpredictable future events requires management to manage the organization as efficiently as possible. The realization of efficiency for the organization cannot be separated from the management's ability in planning. One important component in corporate planning is budget. The budget is about the estimated performance that is expected to be achieved over a certain period of time expressed by monetary units. According to [1, p. 51] an organization needs a budget to translate the entire strategy into both short and long term plans and objectives.

Companies that are either profit oriented or nonprofit oriented will face these problems. A company is required to provide quality services, the company is expected to be able to prepare a budget that is used as a planning, coordination and control

tool in accordance with its business goals and objectives and an assessment of the manager's performance in realizing the budget. For this reason, it is necessary to have a budget preparation system that can support the realization of the budget, namely participation in budget preparation [17, p. 1]. The relationship between budgetary participation and managerial performance is used to evaluate the performance of managers and distribute (reward) and punishment. In this context, the existence of a budget is an important part of planning an organizational motivation system to improve managerial attitudes and performance [15, p. 56]. According to [2, p. 1], managerial performance is managerial activities which include planning, investigating, coordinating, evaluating, supervising, staffing and representation. Budgeting participation is the level of how far the involvement and influence of individuals (managers) in the budgeting process.

Job Relevant Information (JRI) is information that can help managers in choosing the best actions in the organization such as information about inflation,



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economic conditions, financial conditions of the company, work and others. If the flow of information goes well, then the work will be optimized optimally so that later managerial performance will increase [3, p. 1325].

Motivation is the degree to which the extent to which individuals want and try to do a job well and higher efforts towards organizational goals will be conditioned by efforts to meet individual needs [5, p. 954]. [6, p. 31] suggests that participation in the budget preparation process for managerial performance will be high if the manager's work motivation is high. In addition, those who become leaders in a business usually have work motivation by the need for high dominance. The results of [7, p. 1025] study concluded that budgetary participation had no effect on managerial performance. [4, p. 592] research results are different from the research conducted by [6, p. 31] which states that budgetary participation has a positive effect on managerial performance. In addition, previous research has used several moderating variables which are moderating variables that link budget participation variables with managerial performance such as delegation of authority [6, p. 33], motivation [4, p. 592]. From the moderating variables used, there are still inconsistencies in research results. Variable delegation of authority proved to be a moderating variable while motivation was not proven as a moderating variable between budgetary participation and managerial performance. Thus an advanced research is needed to increase understanding of the role of this variable in relation to budgetary participatory relationships and managerial performance.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Expectancy Theory

In a person, every action he does has a goal to be achieved. The goal is motivation to achieve what is expected. Motivation is a driving force for someone to do something to fulfill their goal orientation. This theory was put forward by Victor H. Vroom which states that the power that motivates a person to work hard in doing their work depends on the reciprocal relationship between what is desired and needed from the results of the work. This expectation theory is based on expectancy is an opportunity given due to behavior, value is the result of certain behaviors having certain values for each individual concerned and instrumentality is the perception of an individual that the first level results.

Expectancy is something that exists in an individual that occurs because of the desire to achieve results in accordance with the goals. Expectancy is one of the drivers that underlie someone to take action. It is because with this hard effort, the results

obtained will be in accordance with the objectives [3, p. 1325]. In this theory it is stated that a person will maximize effort and minimize everything that prevents the achievement of maximum results. Expectancy theory assumes that a person has the desire to produce a work at a certain time depending on the specific goals of the person concerned and also the person's understanding of the value of work. This achievement is as a tool to achieve that goal. Expansion emphasizes the results to be achieved. The desired outcome is influenced by one's personal goals in covering needs. In this theory, someone will maximize something that is profitable and minimize something that is detrimental to the achievement of its ultimate goal [4, p. 592].

Contingency approach

Contingency theory states that there is no design and use of a control system that is effectively applied to all organizational conditions, but a certain control system is only effective for certain situations or organizations. Contingency approach is the way of applying concepts from various management streams in real life situations. This contingency approach is the answer to the problem faced in company practice, where there are often encountered methods that are very effective in a situation but will not work well in other situations. The task of a manager in a contingency approach is to identify which techniques, in certain situations, under certain circumstances, and at certain times, will help achieve management objectives. Different conditions and situations require different applications of management techniques, because there are no universal techniques, principles and concepts that can be applied in all conditions [8, p. 388].

Contingency approach can be simply seen as a functional relationship "if then", meaning "if" is an independent variable, "then" is a dependent variable. a comprehensive conceptual framework for contingency approaches informs three important parts that must be considered, the environment, concepts and management techniques and the contingency relationship between the two The contingency approach aims to look at the relationship between contextual variables (contingency) and management accounting system design and to evaluate the effectiveness of the relationship between budgetary participation and managerial performance of BUMN companies in Surabaya.

Budgeting Participation

Budget is a work plan that is expressed quantitatively, which is measured in standard monetary units and other units of measure, covering a period of one year. Whereas according to [9, p. 458] the budget is a financial plan for the future that identifies the objectives and actions needed to achieve them. Participation in the budgeting process is an



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effective approach to increase manager motivation. With a high level of participation tends to encourage managers to be more active in understanding the budget and managers will have a good understanding in facing difficulties during budget execution [17, p. 1]. Effective budget success must involve subordinates in the responsibility of cost control to make budget estimates.

Participatory Budgeting is classified into two approaches, namely: (1). The Top-Down Approach, this approach emphasizes that senior management fits the budget for its subordinates. This approach often fails to be implemented due to lack of coordination and commitment between budget makers and budget implementers. (2). Bottom-up approach, this approach involves lower-level managers to participate in determining the budget. Participation will produce results of thought and agreement between managers in the company, but if there is no adequate control over the implementation, it will cause a discrepancy between budget and realization.

The benefit of the participatory budgeting model for companies is the possibility of greater acceptance from employees [8, p. 388]. This budgeting strategy can enable more basic commitments to budget preparation and implementation. The amount of the approved budget is the result of the expertise and personal knowledge of budget makers who have a clearer understanding of their work through interaction with superiors during the review and approval phase. Participatory budgets also have the potential to cause problems if the budget is set too low, there is a possibility that managers may lose interest and decrease performance. Likewise if the budget is set high, this will frustrate the manager in achieving the standards set

Job Relevant Information

Planning is influenced by information available to individuals. Availability of information related to the task will improve planning to achieve the goals set, which in turn will improve the manager's performance [10, p. 237] and [11, p. 409]. Definitely Job Relevant Information is defined as information that facilitates decision making that is relevant to the task. Job Relevant Information provides managers with better knowledge about alternative decisions and actions - actions needed to achieve goals. Job relevant information is needed to take strategic steps in achieving the stated goals.

Delegation of Authority

Delegation of authority is the granting of authority by a higher manager to a lower manager to carry out a job with explicit authorization from the authority manager when the authority is exercised. The delegation of authority relates to the authority of the leadership given to subordinates (managers) whether it is centralized or decentralized [1, p. 51].

The delegation of authority is the process of assigning tasks to other people who are legitimate or legitimate (according to certain mechanisms within the organization) in carrying out various activities aimed at achieving organizational goals which if not delegated will hinder the process of achieving these goals. Benefits of delegation authority are to allow sub-sections or subordinates to learn new knowledge, encourage the achievement of better and useful decisions to accelerate the completion of work. The devolution of authority also has constraints caused by limited staff capacity, lack of responsibility of supervisors due to delegation of authority. The key to delegating the authority to be effective is the trust of superiors to subordinates and the presence of open communication between superiors and subordinates [4, p. 593].

Motivation

[3, p. 1325] states that motivation or encouragement is a condition or energy that moves an employee who is directed or directed to achieve the company's organizational goals. Motivation is very important for employees, managers or leaders because with high motivation, the work (task) is carried out with enthusiasm and passion so that an optimal result will be achieved which will certainly support the achievement of goals that are desired efficiently and effectively. Motivation is a process that encourages or influences someone to get or achieve what they want both positively and negatively.

Motivation will give a change to someone who appears as a result of feeling, soul and emotion so that it encourages doing something that is caused by the needs, desires and goals. In general, there are two types of causes of motivation which are intrinsic and extrinsic. Intrinsic motivation is a motivation that originates from internal factors without coercion, will be more beneficial because it grows from within oneself so as to provide a strong and long-lasting will. Extrinsic motivation is a motivation that comes from outside influences that are difficult to control and can quickly disappear because they are influenced by invitations, orders, specific intentions, words or coercion from others.

Managerial Performance

Managerial performance is a process of planning, organizing, implementing, and controlling performance achievements and is communicated continuously by the leadership to employees and between employees and their direct supervisor. Unlike the performance of employees in general is concrete, managerial performance is abstract and complex. Therefore, managers' need a conceptual framework as a working model that can be used as a communication tool to produce managerial performance.



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Effect of Budgeting Participation on Managerial Performance

According to [4, p. 592] and [12, p. 1214] participation is a concept where subordinates are involved in making decisions to a certain degree with their superiors. In other words, the process of participation in budgeting is the participation of all managers in budget preparation starting from the lowest level of managerial budgeting participation will affect managerial performance, because with budget participation managers who feel involved will be responsible for budget execution so that lower level managers expected to implement the budget better [13, p. 1].

Hypothesis 1: budgetary participation affects managerial performance

Effect of Job Relevant Information on Budgeting Participation Relationships with Managerial Performance

Participation in budgeting provides an opportunity for lower level managers to collect and provide input in the form of important information related to their work or tasks. Managers involved in budgeting will try to gather accurate information to make the budget more relevant. The role of information in facilitating decision-making related to the position of information provided by managers in the preparation of the budget will increase individual ability to performance [15, p. 56].

Hypothesis 2: budgetary participation affects managerial performance with job relevant information as a moderating variable.

Effect of Delegation of Authority to Budgeting Participation Relationships with Managerial Performance

This delegation of authority is intended to support the smooth task and responsible flow of communication [15, p. 57]. The higher the involvement of managers in budgeting will increasingly influence the delegation of the manager's authority. This is because the involvement of the manager indicates that the manager is trusted in the budget preparation process [18, p. 1].

Hypothesis 3: budgetary participation influences managerial performance by delegating authority as a moderating variable.

Effect of Motivation on Budgeting Participation Relationships with Managerial Performance.

Managers who participate in budgeting will internalize established standards or goals and encourage personal satisfaction from work towards achieving budget (motivation) so that it will encourage increased managerial performance [17, p. 1].

Hypothesis 4: budgetary participation influences managerial performance by delegating authority as a moderating variable. The framework of this research can be described in Figure 1.

3. RESEARCH METHOD

Sample Classification

The sample in this study are the manager of accounting or finance, marketing department manager, human resources manager, general section manager, and other managers or assistant managers who are involved in budgeting for state-owned companies in Surabaya. Of the fourteen SOE sector companies in Surabaya, researchers took five sectors used in the research, namely information and telecommunications, financial and insurance services, procurement of gas, steam and cold air, transportation and warehousing, then mining and quarrying. The data used in this study is to use quantitative data sourced from primary data in the form of questionnaires answered by managers of BUMN companies in Surabaya. The research variables used in this study were dependent variables managerial performance, independent variables of budgetary participation, and moderating variables including job relevant information, delegation of authority, and motivation.

Operational Variable Definition.

Managerial Performance

Managerial performance referred to in this study is managerial activities which include: planning, investigating, coordinating, evaluating, supervising, staffing, negotiating and representing or representing. There are ten items of questions used to measure managerial performance using a five-point likert scale, where the lowest score (point 1) shows low performance, while a high score (point 5) shows high performance.

Budgeting Participation

Budgeting participation in this study is the level of how far the involvement and influence of individuals (managers) in the process of preparing the budget in the division or part of it both periodically and annually. There are five questions used to measure participation using a five-point Likert scale, with the lowest score (point 1) showing low participation, while high scores (point 5) indicate high participation [14, p. 41].

Job Relevant Information

Job Relevant Information, which is information that facilitates decision making related to the task. This variable measurement uses 10 (ten) questions with one to five Likert scale where the lowest score (point 1) Job Relevant Information is low, while the

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high score (point 5) shows a high Job Relevant Information.

Delegation of Authority

The devolution of authority here is the granting of authority by a higher manager to a lower manager to carry out a job with explicit authorization from the manager of authority when the authority is exercised. The measurement of this variable uses six questions with a one to five Likert scale where the lowest score (point 1) shows a low delegation of authority while a high score (point 5) shows a high delegation of authority.

Motivation

Motivation in this study is defined as the degree to which an individual wants and tries to carry out the task well. Each part of the motivational instrument for measurement uses ten question items with a five-point Likert scale. Where the lowest score (point 1) shows low motivation while high score (point 5) shows high motivation.

Data Quality Testing

Validity test

In this study, the validity test is done by calculating the correlation of each score in the questions asked by the researcher. As for what the researcher wants to measure is to measure the level of budget participation, job relevant information, motivation, and delegation of authority to the managerial performance of the company's finance department. Calculation of validity in this study uses the help of CSS. An item is declared valid to form a construct / group if it has a value of <0.05 [14, p. 41].

Reliability Test

Reliability is a tool to measure a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable or reliable if someone's answer to the question is consistent over time. Reliability test used is the Cronbach Alpha test statistic with the test criteria if the Cronbach Alpha coefficient is > 0.7 then the variable is reliable [14, p. 41].

Data analysis technique

This research was to examine the relationship between budgetary participation and managerial performance using simple linear regression. Whereas it is to examine the moderating variables on the relationship between the independent variables on the dependent variable using moderated regression analysis.

$$Y = a + b_1X_1 + b_2X_2 + e$$

$$Y = a + b_1X_1 + b_2X_2 + b_5X_1X_2 + e$$

$$Y = a + b_1X_1 + b_3X_3 + e$$

$$Y = a + b_1X_1 + b_3X_3 + b_6X_1X_3 + e$$

$$Y = a + b_1X_1 + b_4X_4 + e$$

$$Y = a + b_1X_1 + b_4X_4 + b_7X_1X_4 + e$$

Information:

Y: managerial performance

a : constant coefficient

X₁: budgetary participation

X₂: job relevant information

X₃: delegation of authority

X₄: motivation

B₁₋₇: regression coefficient

e: residual error

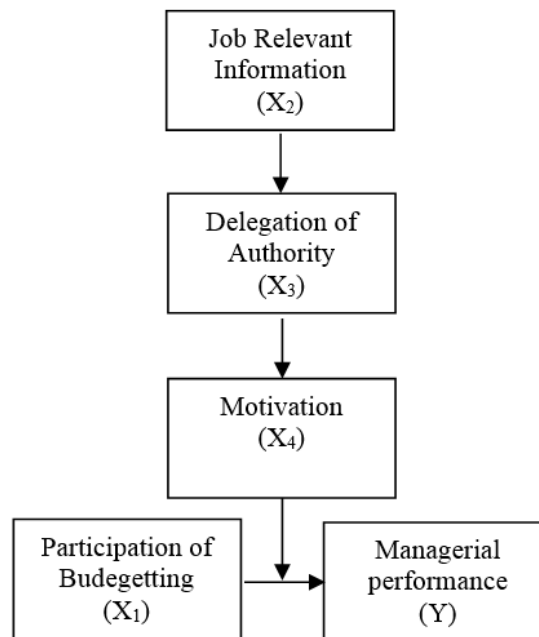


Figure 1. Research Framework

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4. RESULTS AND DISCUSSION

Table 1

Results of Simple Linear Regression Analysis

Nilai R Square	Nilai t	Sig.
0,146	2,428	0,010

Source: data process

Based on Table 1 it can be seen that there is an effect between budgetary participation on managerial performance, which is indicated by the value of $r^2 = 0.146$ which means that budgeting participation

explained 14.6% variability in managerial performance. The t value is 2.428 with a significance of 0.010 which is smaller than $\alpha = 0.05$

Table 2

Equation of the results of the Moderating Job Information Relevant Test

Equation	b_1	Significant	b_2	Significant	b_5	Significant
2	0,416	0,089	0,261	0,043		
3	-0,417	0,851	-0,241	0,882	0,014	0,651

Source: data processed

In equation 2 the value of b_2 is not significant and in equation 3 the value of b_5 is significant, then the job relevant information is a variable pure moderating. This is because the value of b_2 is 0.261, significant.

0.043 ($0.261 > 0.05$) and b_5 0.019, significant 0.651 ($0.014 < 0.05$), which means that job relevant information is a moderating variable between the relationship of budgeting participation to managerial performance.

Table 3

Equation Test Results Moderating Authority Delegation

Equation	b_1	Significant	b_3	Significant	b_6	Significant
4	0,417	0,163	0,749	0,001		
5	-2,336	0,274	-1,419	0,399	0,214	0,277

Source: data processed

In equation 4 the value of b_3 is not significant and in equation 5 the value of b_6 is not significant, then the delegation of authority is not a moderating variable but only independent variable. This is because the value of b_3 is 0.749, significant 0.001

($0.715 > 0.05$) and b_6 0.214, significant 0.277 ($0.214 > 0.05$), which means that the delegation of authority is not a moderating variable of the relationship between budgetary participation and managerial performance.

Table 4

Equation Test Results Moderating Motivation

Equation	b_1	Significant	b_4	Significant	b_7	Significant
6	0,318	0,128	0,588	0,000		
7	-1,773	0,553	-0,346	0,797	0,041	0,418

Source: data processed

Equation 6 the value of b_4 is not significant and in equation 7 the value of b_7 is significant, then motivation is a variable pure moderating. This matter because the b_4 value is 0.588, significant is 0.000 ($0.588 > 0.05$) and b_7 is 0.041, significant is 0.418 ($0.0418 < 0.05$), which means that motivation is a

pure moderating variable between budgetary participation and managerial performance.

Effect of Budgeting Participation on Managerial Performance

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Based on Table 1 it is known that budgetary participation influences managerial performance, which is a significance of $0.020 < 0.05$. This means that H_1 is accepted which means that the results of this study are in accordance with the hypothesis that the author put forward before the research. Budgeting participation is carried out by managers in preparing budgets so that overall objectives can be met. This research is in accordance with the research conducted by [16, p. 29] found that there is a significant influence between budgetary participation on managerial performance. Budgeting participation affects the managerial performance of state-owned enterprises in Surabaya. This can occur because the budget is prepared according to the ability of a section that can be seen in the statement items on budgeting participation second item and other reasons because managers not only play a role in the continuous improvement process but also in the financial perspective of each department, so that the budget can be used to assess the manager's own performance.

Effect of Budgeting Participation with Job Relevant Information on Managerial Performance.

Based on Table 2 it is known that budgetary participation with job relevant information affects managerial performance, which is pure moderating because the value of b_2 is 0.261, significant 0.043 ($0.261 > 0.05$) and b_5 0.014, significant 0.651 ($0.014 < 0.05$), this means that hypothesis submitted can be accepted. The results of this study are in accordance with [17, p. 2]. Budgeting participation can improve managerial performance when accompanied by individual-oriented job relevant information [11, p. 409]. In other words, job relevant information is significantly capable of acting as a moderating variable that influences the relationship of budget participation in improving managerial performance.

The Influence of Budgeting Participation with the Transfer of Authority to Managerial Performance.

Based on Table 3 it is known that budgeting participation with delegation of authority does not affect managerial performance, which is only an independent variable because the value of b_3 is 0.749, significant 0.001 ($0.749 > 0.05$) and b_6 0.214 significant 0.277 ($0.214 > 0.05$), which means that the delegation of authority is not a moderating variable between budgetary participation and managerial performance. This means that $H_{0,3}$ cannot be rejected, which means that the results of this study are not in accordance with the hypothesis that the author put forward before the research. This research is in accordance with the research conducted by [4, p. 593] and [16, p. 2]. The results of this study conclude that budgetary participation with delegation of

authority as a moderating variable does not affect the managerial performance of state-owned enterprises in Surabaya. This can occur when the delegation of authority is not a strong reason to encourage managers, as respondents, to carry out their responsibilities because of the possibility that the accountability adopted by the respondent companies is not only based on functional but strategic (process) so that performance improvement is no longer an individual need but a group [12, p. 1214].

Effect of Budgeting Participation with Motivation on Managerial Performance

Based on Table 4 it is known that budgeting participation with motivation affects managerial performance, which is pure moderating because the b_4 value is 0.588, significant 0.000 ($0.588 > 0.05$) and b_7 0.041, significant 0.418 ($0.041 < 0.05$). This means that hypothesis is accepted which means that motivation affects the relationship between budgetary participation and managerial performance. The results of this study support the research conducted by [13, p. 1] and [17, p. 3]. Motivation is used as a moderating variable with the aim of seeing the strength or weakness of a manager's involvement in budgeting with the motivation (motivation). High motivation will also improve high performance, low motivation from managers and section heads will impact on the low performance of the commitment to be responsible for the goals of the budget target.

5. CONCLUSIONS, LIMITATIONS AND SUGGESTIONS

This study aims to determine the effect of budgetary participation on managerial performance with job relevant information (JRI), delegation of authority, and motivation as moderating variables. Based on the results of the t test shows that budgetary participation affects managerial performance, this is evidenced by a smaller significant value. Job relevant information and motivation are pure moderating. This is evidenced in the results of the t test.

The devolution of authority does not affect the relationship between budgetary participation and managerial performance, as evidenced by the greater value of b_3 and b_6 . Thus, it can be concluded that budgetary participation influences managerial performance and with the presence of job relevant information (JRI) and motivation as moderating variables have a role in strengthening budget participation in managerial performance. The delegation of authority is not a moderating variable but only an independent variable.

This study has limitations (1) the use of a likert scale has disadvantages such as the same score is considered to have the same or identical characteristics. (2) Short time in distributing

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questionnaires and coinciding with the long holiday makes many companies that do not want to receive questionnaires.

Based on the results and limitations of the study, the suggestions that can be given are, in

subsequent studies, it is recommended that researchers use other test equipment so that the test results are better. In addition, in subsequent studies, in order to use interview methods in data collection to obtain more credible results.

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SECTION 31. Economic research, finance,
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THE CONCEPT OF BUILDING MANAGEMENT BY INFLUENCE OF INNOVATION ON CHANGE OF ORGANIZATIONAL STRUCTURE AND PRODUCTION STRUCTURE OF THE ENTERPRISE

Abstract: The article considers the development of the concept of innovation management at an industrial enterprise. The organizational structure of enterprise management is analyzed. A map of the logic of the influence of elements of the organizational structure of management on the factors that determine the production structure of the enterprise is developed. The interrelation between the organizational structure of management and the production structure of the enterprise is studied.

Key words: innovation, innovation strategy, innovation process, organizational structure of the enterprise, matrix.

Language: English

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Introduction

President of Uzbekistan Shavkat Mirziyoyev, by the decree of September 21, approved the Strategy for Innovative Development of the Country for 2019-2021 and the Road Map for its implementation [1].

The main goal of the strategy is "development of human capital as the main factor determining the level of the country's competitiveness in the world arena and its innovative progress".

Among the main tasks of the strategy is the entry of Uzbekistan by 2030 into the composition of 50 advanced countries according to the Global Innovation Index rating. Due to the lack of many indicators and "ineffective coordination of work in this direction," the country has not participated in this rating in recent years.

In this connection, the construction of the management of the influence of innovation activity on changing the organizational structure of the enterprise acquires particular urgency. The basis of further methodological developments, obviously, should be the following reasoning. The core of the research is the establishment of the relationship between the organizational structure of management and the production structure when the enterprise

carries out innovation activities. Allocation of the named interrelation demands detailed elaboration of investigated structures with a substantiation both external, and internal communications between organizational structure of management and industrial structure of the enterprise. It is important to establish the levels of activities that provide these relationships. The implementation of this approach will allow us to develop qualitative-descriptive and quantitative methods for assessing the degree of this relationship. The presence of such estimates will make it possible to formulate a reasonable idea of the need to improve the quality of the functions, procedures, individual operations performed by the structural elements under study [2].

Research Methodology

Theoretical and methodological basis of the study were the results of studies of domestic and foreign scholars on issues of strategic and innovation management, innovation management and investments, the economy of the industrial enterprise, legal acts of legislative and executive authorities. When solving tasks used methods of comparative technical and economic analysis, methods of expert



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estimates, the methods of correlation and regression analysis, concretized in the models of innovation management.

Analysis and Results

To begin this work should be a decomposition into the constituent elements of the organizational structure of management. All the constituent elements of the organizational structure are closely linked. Moreover, factors that have a direct impact on specific structural component indirectly affect the

other structural component, and perhaps all at once. This demonstrates the use of factor research method, including direct analysis, deterministic analysis chain [3]. This study can be conducted with the activation of the matrix, which is clearly demonstrated by the relationship of the structural elements considered by the selection function of each element studied and logical prolongation of the implementation of the functions of other structural elements. A typical form characterized matrix is presented in Table. 1.

Table 1.

Matrix of organizational structure of management

Divisions of management Functions of management of divisions (i)	Marketing activity	Economic activity	Construction activity	(m)
Evaluation of market segmentation	CY_1^1
Expansion of the market	...	CY_i^j
...
(n)	CY_n^m

where I - function unit, $I = 1 \dots n$

j - unit organizational structure management, $j = 1 \dots m$

Continuing to set the arguments should be noted that the implementation of innovative activities involved are:

- Marketing activities;
- The planned activities;
- Design activities;
- Technological activities;
- Supply and sales activities;
- Accounting and control activities;
- Activity on staffing.

Direct relationship these activities are not always evident. To control it should detail the specific activities on the functions, procedures, operations and treat them in a methodical, organizational and informational aspects.

For example, continuing to talk about the relationship of innovation activities with other activities, can be identified:

- The formation of consumer preferences (marketing activities);
- Assessment of the market segment (marketing activities);
- Determination of the volume of production (economic activity);
- Determination of the market price (economic activity);
- Design support (engineering activities);
- Technological support (technological activity), etc.

Characteristics of the essence of the production structure of the enterprise, its structural components and the factors that determine it, had already been given. This circumstance is a condition of building the Matrix industrial structure of the enterprise, which is presented in Table.2.

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Table 2

Matrix of industrial structure of the enterprise

Factors determining the industrial structure	Components of production structure	Composition of units	Structure of production process	Structure of technological process	Structure of staff
	(n)				...
	(q)				(k)
	Specialization and cooperation	PC_1^1			
	Output				
	Implementation of innovation				
	Organizational conditions		PC_q^p		
Location					
(l)					PC_l^k

The composition of elements of industrial structure to a certain extent determined by economics and recognized practice. Regarding the factors that determine the type of production structure, as well as the prevalence of some elements over others, it should be noted that their composition is totally

defined and the importance of each to highlight the type of structure, too. In this connection it seems to build mutual factorial matrix depending on the basis of specific conditions and involves the method of paired comparisons. Type of such a matrix is shown in Table 3.

Table 3

Matrix of mutual dependence of factors of industrial structure

Factors	Specialization and cooperation	Production volume	Implementation of innovation	Organizational conditions (environment)	Location of businesses
Specialization and cooperation		+	-	-	+
Production volume	+		+	+	-
Implementation of innovation	-	+		+	-
Organizational conditions	-	+	+		+
Location of businesses	+	-	-	+	

Research presented in the table of factors is extremely important due to the fact that their expression determines the change in the components of the production structure, gives an answer to the question - how they are changed - and all in full or only some of them [4]. Development of the answer to this question requires consideration of the relationship of each of the management structure, the factors determining the industrial structure and components of the production structure. Of course,

the answer to this question, it is desirable to quantify.

However, quantitative assessment should precede quality represented by the structural and morphological matrix, reflecting the dependence of the investigated. Clearly, a qualitative assessment can be made through the development of "logic Maps influence elements of the organizational structure of management factors causing production structure of the enterprise and its components" exemplary form of which is shown in Table 4.



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Table 4

Map Logic elements influence on the organizational structure of management factors causing production structure of the enterprise and its components

Element of the organizational structure of management	Factors of production structure	Specilization	Output	Implementation of innovations	Organizational conditions	Location of business
M A R K E T I N G		content of business units	content of business units	content of business units	content of business units	content of business units
		structure of the production process	structure of the production process	structure of the production process	structure of the production process	structure of the production process
		structure of technological process	structure of technological process	structure of technological process	structure of technological process	structure of technological process
		staffing structure	staffing structure	staffing structure	staffing structure	staffing structure

Regarding the maps presented in the table can be assumed that these maps should be prepared for each independent type of work, procedures, processes carried out in the framework of the organizational structure of each element of management. The appendix contains these types of cards for some controls. We should think about technology generalization detailed information on types of work, procedures, processes, related to a specific element of the organizational structure of management. It seems that is not always the blocks of the table will be filled, and this intensifies the need to develop a mechanism for summarizing the title. At the same time we should not exclude a situation where you can stop for engagement only of detailed

data.

Classically made five factors that determine the type of production structure and evaluate the role of its components. The composition of these factors has repeatedly called in and submitted to the card (tab. 5). Obviously, these same factors determine the organizational structure and change management. Most likely, the mechanism of the effect of each factor on changing the organizational structure of management and production structure of the enterprise is identical. This circumstance, as well as taking into account the conditions of the problem, allow as a researched factor accept innovation, and, more particularly, innovation.

Table 5.

Map logic influence the organizational structure of management factors causing production structure of the enterprise and its components

Element of the organizational structure of management	Factors of production structure	Specilization	Output	Implementation of innovations	Organizational conditions	Location of business
P L A N N I N G O R G A N I Z A T I O N M C O N T R O L P R O V I S I O N		content of business units	content of business units	content of business units	content of business units	content of business units
		Structure of the production process	Structure of the production process	Structure of the production process	Structure of the production process	Structure of the production process
		structure of technological process	structure of technological process	structure of technological process	structure of technological process	structure of technological process
		staffing structure	staffing structure	staffing structure	staffing structure	staffing structure

In solving the problem of the development of the ideology of the exclusive place is a tricky question about the point or points of contact of the

organizational structure of management and production structure. The tricky issue is that the well-known data structure and all absolutely convinced



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that there is a connection between them, but both at once, hold the line, reflecting this relationship is not possible. The reason for this is the need to solve the problem from the point of release of the totality of the elements of each of the structures and the establishment of the logic operation. Such an approach would panoramically observe the implementation of innovation in enterprises of all hierarchies.

The first element of the management structure in contact with the innovation, it should be recognized across the spectrum of marketing trends, procedures, operations. Marketing allows you to select innovative products that are in demand, set the preferences of consumers with respect to product innovation, to evaluate the capacity of the market. In fact, marketing provides a framework for the activities of other structural elements of the management system. This situation directly affects the design development of the new products, the need for and the possibility of reflection in the product preferences of consumers and market requirements. Proven design should be technologically solved. Regarding her are economical process technology, equipment, form the requirements for staff. The real embodiment of the idea worked in the innovation happening on the stages of organizational support, which selects the organizational charts the development of new products. Obviously, this component of the governance structure determines its direct relationship with the production structure, as it lays

the quantitative ratios of the structural composition of the business units [4]. Each unit has a membership in the implementation of the main, auxiliary, service processes. Accordingly, within each group of processes, the technology of their implementation and are selected personnel able to implement innovation. The stated relationship management organizational structure and production structure of the company is shown in Fig. 1.

The nature of innovation, as well as the amount of work that accompany innovation, diversity. With the development of a fundamentally new facility is necessary to fully implement all the work, procedures, operations performed by each unit of the organizational structure and management of the elements of the production structure. In the case where the object to master the slightly different product types (analog), the production of which the company is debugged, it is necessary to establish the amount of work performed by each unit of the organizational structure, and each element of the production structure. In practice, it is necessary to determine the composition and volume of atypical forms of work (AFW) [6].

Implementation of this work requires the predestination of work scope, procedures, operations performed by a specific unit of the enterprise, which, obviously, should be brought up to regimentation. For each type of work necessary to establish the amount of time by direct measurement or expert.

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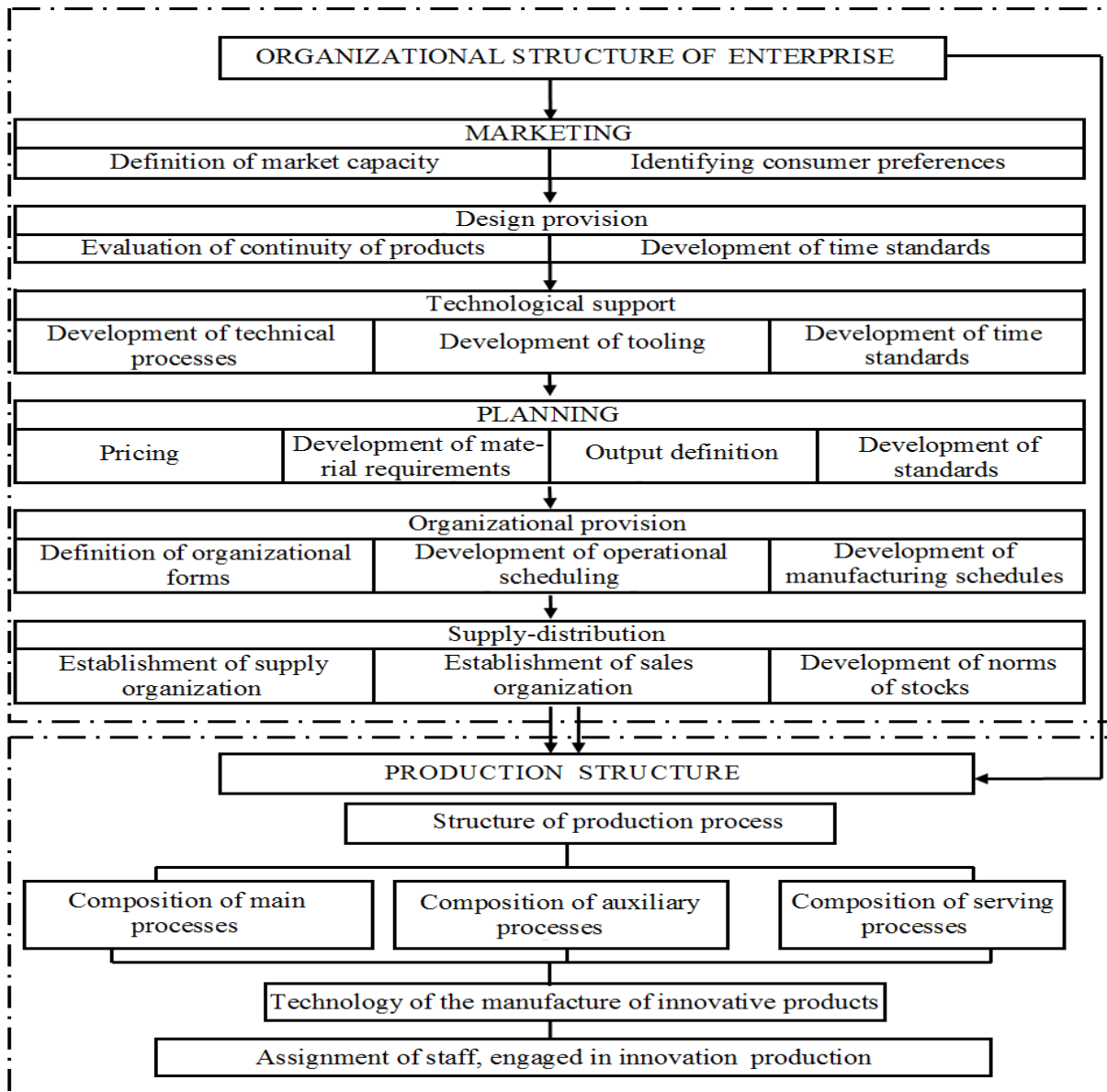


Fig. 1. Relationship management organizational structure and production structure of the enterprise

The composition of atypical types of work stands out by comparison of the work on the development of new products, implemented by each business unit with a typical composition of works brought to regulation. Such a comparison may be nominally by simple comparison required to perform work and is already running, emphasizing identity:

$$AFW, \text{-----} \blacktriangleright BP_{ij} \text{-----} \blacktriangleright BP_{ij} \text{ fact}, \quad (1)$$

where BP plan and BP fact - executed composition of the work planned and actual; i - operation; j - unit

There are two possible solutions represented by the equation:

1. Compliance with the planned composition of the actual work, in this case, the innovation development, has manufactured products:

$$BP_{ijplan} = BP_{ijfact}, \quad (2)$$

2. The difference between the planned amount of work from the previously performed for the development of the product:

$$BP_{ijplan} \neq BP_{ijfact}, \quad (3)$$

where Δ_{ij} - part of i operations to be master in the j -th unit for the manufacture of innovative products.

This development is most likely due to the fact that with the advent of the need for additional, new types of work generated confidence in the development of innovative products is.

Identification of atypical forms of work, as well as the immediate elaboration of a fundamentally new product for the company, in essence aims to establish

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the amount of work to be undertaken. It should be remembered that the need to establish and scope of work and the complexity of their implementation [7]. Presenting practical complexity of the task laid down, we think it necessary to develop a position on the choice of the method of solving it. It is clear that

the most appropriate should be recognized expert methods. They should be the basis for the development of methods of this study [8,9].

The above arguments, which predicts the course of this study and its logic is the concept and are presented in Fig. 2.

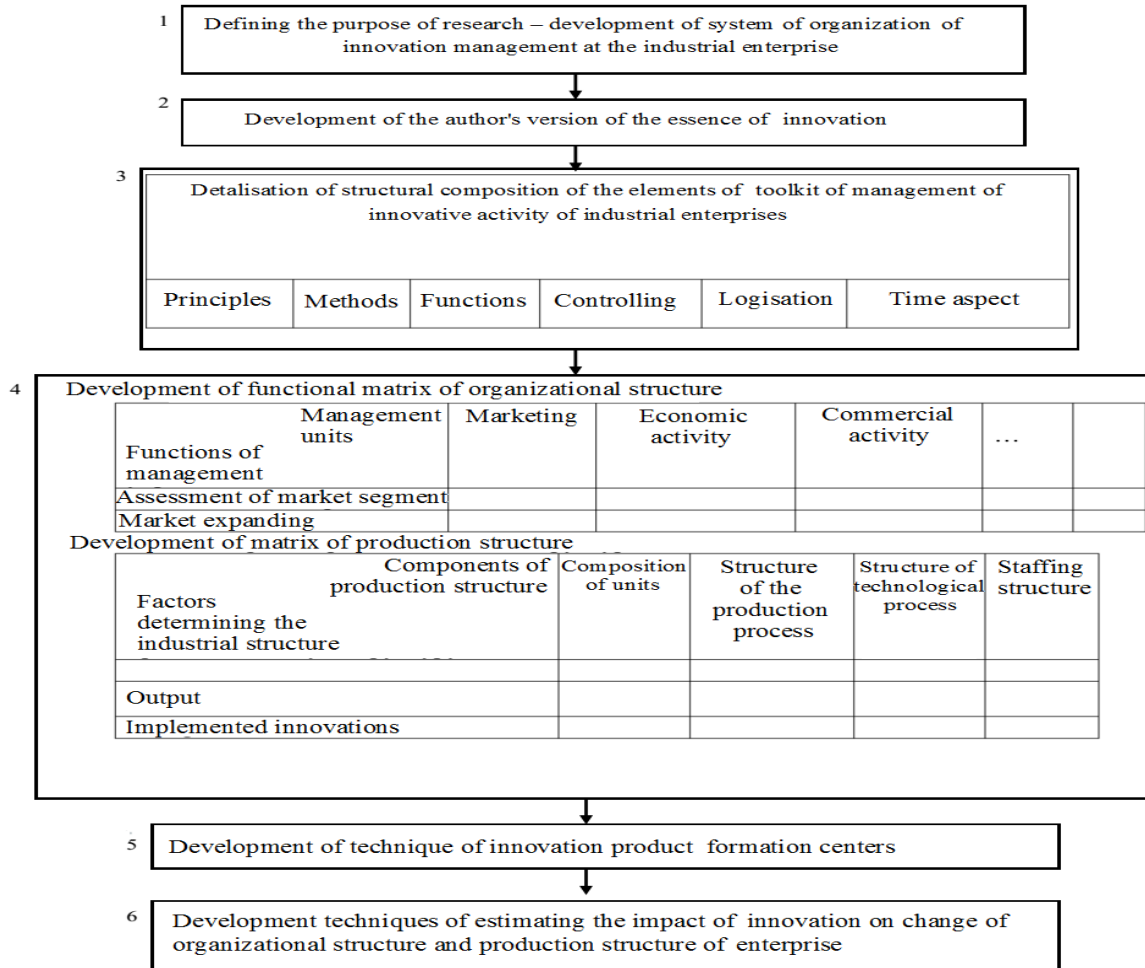


Fig. 2. The structural representation of concept of research

Conclusion

All units, reflecting the structural representation of the concepts presented in the figure, up the course of the study. The theoretical aspects of the study have already been reflected in the text of the work [10]. It should be noted that they are the basis of the decision of applied tasks of this work. These include:

- method of forming innovative food centers due to the conditions and feasibility of the latter;

- method of estimating the impact of innovation to change the organizational structure of management and production structure of the company, which represents a logical continuation of the above techniques.

It seems that the concept represented by predetermined character further work in this study and its possible results.

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SECTION 20. Medicine

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CHANGE IN SOME BIOCHEMICAL INDICATORS IN WOMEN WITH ONCOLOGICAL DISEASES OF THE REPRODUCTIVE SYSTEM

Abstract: This study included 47 patients. All the examined patients were divided into three groups: 1) group - benign neoplasms (23); 2) group - malignant tumors (15); 3) group - metastatic tumors. 15 healthy people were included in the control group. The concentration of CA125 in the group of women with cancer of the female reproductive system was significantly increased (205.1 ± 16.83 ng / ml) in comparison with the group of practically healthy people (12.8 ± 0.06 ng / ml). The data obtained suggest that the increase in CA125 in the serum of patients with malignant tumors is important in assessing the aggressiveness of the process. In patients with malignant tumors, there was a significant increase in IL-8 and TNF- α , as well as the activity of ALP, ALT, ACT, GGT in the serum compared to benign tumors with metastases. The data presented by us indicate that CA125, IL-8, TNF- α and ALP activity are closely related to the pathogenic mechanisms of malignant tumor growth.

Key words: cancer of the reproductive system of women, CEA, CA125, inteleikin-8, tumor necrosis factor, alkaline phosphatase.

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ИЗМЕНЕНИЕ НЕКОТОРЫХ БИОХИМИЧЕСКИХ ПОКАЗАТЕЛЕЙ У ЖЕНЩИН ОНКОЛОГИЧЕСКИМИ ЗАБОЛЕВАНИЯМИ РЕПРОДУКТИВНОЙ СИСТЕМЫ

Аннотация: В настоящее исследование включено 47 пациентов. Все обследованные больные были объединены в три группы: 1) группа – доброкачественные новообразования (23); 2) группа - злокачественные опухоли (15); 3) группа - метастатические опухоли. В группу контроля было включено 15 практически здоровых людей. Концентрация CA125 в группе больных раком женской репродуктивной системы ($205,1 \pm 16,83$ нг/мл) была достоверно повышена по сравнению с группой практически здоровых людей ($12,8 \pm 0,06$ нг/мл). Полученные данные позволяют предполагать, что повышение CA125 в сыворотке крови больных злокачественными опухолями имеет важное значение при оценке агрессивности процесса. У больных со злокачественными опухолями наблюдалось значительное повышение ИЛ-8 и ФНО- α , а также активности ЩФ, АЛТ, АСТ, ГГТ в сыворотке крови по сравнению доброкачественными новообразованиями с метастазами. Представленные нами данные указывают, что CA125, ИЛ-8, ФНО- α и активность ЩФ тесно связаны с патогенетическими механизмами роста злокачественных опухолей.

Ключевые слова: рак репродуктивной системы женщин, СЕА, CA125, интелейкин-8, фактор некроза опухоли, щелочная фосфатаза.



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Введение

Сегодня раковые болезни репродуктивной системы составляет приблизительно 15% от всех злокачественных новообразований у женщин. По частоте на первом месте стоит рак эндометрия, затем – яичника и третье место занимает рак шейки матки [1]. Однако по смертности рак яичника занимает ведущее место. Отсутствие ранних симптомов и своевременного диагноза приводит к тому, что примерно 70% больных

Поздняя диагностика рака репродуктивной системы и бессимптомное течение усугубляет клинику болезни. Появление боли в последней стадии, кровотечение, рост лимфатических узлов, заметный рост и распространение размера опухоли, наличие близких и поздних метастазов и подобные симптомы усложняют проблему [3]. Установлено, что доброкачественные заболевания органов гениталий играют важную роль в развитии злокачественных новообразований. Сегодня наиболее распространенным среди гинекологических заболеваний являются миома матки. Миома является доброкачественной гормонозависимой опухолью эндометрии. Клинические признаки наблюдается только тогда, когда опухоль растёт и вытесняет окружающие ткани. У более молодых женщин обычно высокая вероятность появления миомы в возрасте 30-45 лет. Во время менопаузы наблюдается уменьшение размера или даже иногда полное исчезновение опухоли. Это доброкачественное новообразование появляется на стенке матки и прогрессирование опухоли приводит к увеличению его размеров. Хотя этиология фибромы до сих пор не полностью изучена, но многие исследователи считают, что в возникновении опухоли играют важную роль гормональная чувствительность к эстрогену и генетические факторы. Поскольку гормональная зависимость является преобладающей в образовании опухоли, она не встречается у девочек до менструального цикла и у женщин в постклимактерический период. Дисплазия клеток и тканей приводит прогрессированию предракового состояния и образованию злокачественных опухолей, поэтому к этим патологиям нужно относиться серьезно [4,5,6]. Несмотря на развитие современных методов диагностики и лечения этих опухолей, он по-прежнему остаётся одной из наиболее важной и актуальной проблемой в области онкологии.

Симптомы болезни на ранних стадиях являются неспецифическими, и поэтому для точной диагностики злокачественных опухолей необходимы проведение компьютерной и магнитно-резонансной томографии, различных клинических, радиологических, морфологических и лабораторных тестов. Но некоторые методы выявления патологии

рак яичника и шейки матки при обращении имеют распространенную стадию заболевания. Поздняя диагностика заболевания и неадекватное лечение приводит к прогрессированию заболевания и развитию метастазов, также увеличивает смертность среди больных с онкологическими заболеваниями репродуктивной системы. Средняя 5-летняя выживаемость около 30%, при 3 и 4-ой стадиях заболевания – эта цифра достигает лишь 10% [2].

эндометрия, как биопсия и гистероскопия являются инвазивными и недостаточными для ранней диагностики [5].

Исследования СА125 и СЕА у больных с опухолями репродуктивной системы женщин считаются одним из наиболее важных показателей определения злокачественности. Антиген СА125 представляет собой гликопротеин и имеет молекулярную массу 220 кДа. Он обычно встречается в слизистой оболочке шейки матки-эндометрии. Он также содержится в поджелудочной железе, жёлчном пузыре, желудке, бронхах, почках и кишечнике. Доказано, что концентрация СА 125 повышена у 65–95% больных раком яичников и шейки матки. Концентрация СА125 увеличивается не только при злокачественных заболеваниях, также наблюдалось повышение его уровня при воспалительных заболеваниях различных органов репродуктивной системы, I триместре беременности и эндометриозе. Поэтому определение СА125 является недостаточно чувствительным и специфичным маркером при ранних стадиях болезни [7]. В последнее время значительное внимание уделяется роли цитокинам в патогенезе заболеваний репродуктивной системы. Доказано зависимость между распространенностью опухолевого процесса и цитокиновым профилем у больных раком репродуктивных органов [8,9].

Прогрессирование болезни сопровождается метастазами опухоли в различных органов, в том числе в печени. К основным биохимическим маркерам метастатического поражения печени относятся: щелочная фосфатаза - ЩФ, трансаминазы, лактатдегидрогеназа (ЛДГ) и др [10].

Целью исследования является изучение уровня СЕА, СА125 и некоторых биохимических показателей у пациентов со злокачественными опухолями женских гениталий.

Материалы и методы. С этой целью были исследованы венозная кровь 47 пациентов, которым был поставлен диагноз доброкачественный и злокачественный опухоль женской репродуктивной системы. Больным был поставлен диагноз в онкологической клинике АТУ в 2017 году. Контрольная группа составили 15 практически здоровых людей. Основываясь на



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клинических, инструментальных и морфологических результатах, у 23 пациентов был выявлен доброкачественный, у 15-ти злокачественный, а 9-ти метастатический опухоль репродуктивной системы.

Во время исследования венозную кровь брали в чистую и сухую пробирку для получения сыворотки. Её выдерживали при комнатной температуре в течение 30 минут для образования сгустка. Затем центрифугируют в течение 15 минут.

Исследование концентрации СЕА и СА125 проводили с помощью метода иммуноферментного анализа (IFA) в автоматическом иммуноферментном анализаторе

Достоверность различий между средними значениями изученных параметров до и после лечения определяли с помощью *t* критерия Стьюдента и *U*-критерий Манна-Уитни. Достоверными считались различия при $p < 0,05$.

COBAS (Германия). Биохимические показатели (активность аланинаминотрансферазы (АЛТ), аспаргатаминотрансферазы (АСТ), гаммаглутамилтрансферазы (ГГТ), щелочной фосфатазы (ЩФ) и концентрация креатина) были проанализированы с помощью реактивного набора и диагностической тест-системой: COBAS (Германия) на автоматическом анализаторе (ROCHE).

Концентрацию интерлейкина-8 (ИЛ-8) и фактора некроза опухоли (ФНО- α) в сыворотке крови в исследуемых группах больных с помощью иммуноферментных тест-систем, «Вектор-Бест» (Россия) на иммуноферментном анализаторе «СтатФакс».

Результаты и обсуждения. Результаты иммуноферментных исследований СЕА, СА125, ИЛ-8 и ФНО- α показаны в таблице 1.

Таблица 1

Уровень СЕА vs СА125 у больных с заболеваниями репродуктивной системы

Показатели	Группы			
	Контроль (n=15)	Доброкачественные опухоли (n= 23)	Злокачественные опухоли (n=15)	Метастатические опухоли (n=9)
СЕА (нг/мл)	2,31±0,04 (0,5-4,8)	2,5±0,03 (1,2-5,6)	4,8±0,26** (1,35-8,9)	7,9±2,3** (23,5-19,87)
СА125 (нг/мл)	12,8±0,06 (5,2-29,7)	13,27±0,11 (8,24-26,84)	205,1±16,83*** (48,49-556,6)	714,66±85,92*** (287,2-3041)
ИЛ-8, пг/мл	11,5±1,1 (3,9-15,7)	16,7±0,9 (4,8-27,8)	22,8±1,3* (6,9-31,9)	32,7±1,7** (8,1-39,8)
ФНО- α , пг/мл	3,82±0,74 (1,28-7,95)	6,72±0,89** (3,58-10,58)	10,96±0,92** (4,89-19,78)	29,62±1,02*** (7,54-39,83)

Примечание: * - $p < 0,05$; ** - $p < 0,01$; *** - $p < 0,001$ – по сравнению с контролем.

В результате исследования выявлено, что уровень СЕА и СА125 в крови у больных с доброкачественными опухолями репродуктивной системы почти не отличается с результатами практически здоровых людей. При злокачественных и метастатических опухолях содержание СЕА и СА125 статистически достоверно увеличивается, соответственно, в 3,4 раза и 55,8 раза по сравнению с данными контрольной группы. Полученные данные свидетельствуют о том, что уровень СЕА и СА125 можно оценить в первую очередь для определения агрессивности процесса в опухолях женских половых путей. Мы считаем, что определение СА125 в опухоли женской генитальной системы имеет большое значение для дифференциальной диагностики между доброкачественными и злокачественными процессами.

Как показали результаты исследований, наблюдается повышение уровня ИЛ-8 и ФНО- α в исследуемых группах относительно контрольной группы. Как оказалось, у больных с доброкачественными опухолями содержание ИЛ-8 и ФНО- α увеличилось в 1,5 раза и 1,8 раза соответственно, по сравнению с контролем. У больных с злокачественными опухолями уровень ИЛ-8 и ФНО- α повысился в 1,9 и 2,9 раза; а метастатическими опухолями, соответственно в 2,8 и 7,8 раза по отношению к группе контроля. При злокачественных опухолях уровень возрастания ИЛ-8 и ФНО- α в крови было выражено в большей степени, чем при доброкачественных опухолях (таблица 2).

Повышение содержания в крови ИЛ-8 и ФНО- α свидетельствуют об активации системной неспецифической резистентности организма к развитию опухолевого процесса [8,9].

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Таблица 2
Результаты определения уровня биохимических показателей у больных с раком репродуктивной системы

Группы	Контроль (n=15)			
	Контроль (n=15)	Доброкачественные опухоли (n= 23)	Злокачественные опухоли (n=15)	Метастатические опухоли (n=9)
ЩФ (U/l)	75,8±0,19 (50-136)	80,36±17,64 (75,2-116,8)	113,81±28,92** (91,71-167,2)	231,7±48,54*** (144,84-437)
АЛТ (U/l)	15,82±0,29 (10-42)	16,85±0,25 (10,44-44,83)	18,64±0,27 (12,13-34,33)	94,83±11,95** (29,52-217,69)
АСТ(U/l)	13,48±0,15 (10-57)	20,64±0,18 (12,25-27,29)	23,22±0,19 (11,03-39,7)	55,51±2,95** (29,33-157,9)
ГГТ (U/l)	20,8±0,12 (5-32)	31,22±0,14 (20,9-46,07)	34,85±0,28* (26,1-58,85)	121,49±10,83*** (47,17-272,33)
Креатинин (мг/дл)	0,53±0,07 (0,3-0,95)	0,56±0,03 (0,43-0,84)	0,63±0,09 (0,49-1,13)	0,85±0,11* (0,58-1,42)

Примечание: * - p<0,05; ** - p<0,01; *** - p<0,001 – по сравнению с контролем.

У больных доброкачественными опухолями не выявлено значительных изменений в биохимических значениях. Активность ЩФ, у больных доброкачественными опухолями незначительно отличалось от контрольной группы, но выявлено статистически значимое увеличение его активности при злокачественных опухолях. У больных злокачественными заболеваниями репродуктивной системы с метастазами установлено значительное повышение активности ЩФ, АЛТ, АСТ и ГГТ в 2; 5,1; 2,4 и 5,8 раза, соответственно по сравнению с показателями больных без метастазов.

Выводы

Результаты исследования показывают, что уровни АЛТ, АСТ, ГГТ и ЩФ в сыворотке крови у пациентов с новообразованиями репродуктивной системы тесно связано с патогенезом и прогнозом заболевания. Определение этих показателей у больных обратившихся в клинику, может позволить дифференцировать процессы злокачественности и доброкачественности, а также обеспечить адекватное своевременное лечение.

Таким образом, высокая активность АЛТ, АСТ, ГГТ и ЩФ в сыворотке пациентов с раком женских половых путей вызывает подозрение на метастазы. У пациентов со злокачественной опухолью определение СЕА, СА125, ИЛ-8, ФНО-α и ЩФ позволяет идентифицировать биологические свойства опухоли.

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**SECTION 2. Applied mathematics.
Mathematical modeling.**

DECISION OF THE DIRECT AND REVERSE PROBLEM OF THE TECHNOLOGICAL PROCESS OF SUSPENSION FILTERING

Abstract: The article deals with the solution of an actual problem related to the technological process of filtration and dewatering of liquid solutions from finely divided particles. Above mentioned technological process is realized during filtering and cleaning of chemical solutions, drinking water, pharmaceuticals, liquid fuel, public products, etc. For analysis, research, determination of the main parameters of the technological process, as well as modes of operation of filter units and support for management decision-making, a mathematical model has been developed, where it is possible to take into account the different operating conditions of the filter unit and the physicochemical properties of solutions.

The article notes that the study of the process of filtering a suspension, determining the main parameters of the process under consideration and their ranges of change for the purpose of managing it at functioning objects makes it difficult to collect data on the process, it takes a lot of time to perform a series of experiments in the laboratory that take a lot of labor and time and It is difficult to find the relationship between the parameters of the filter and the technological process for a limited experimental sample.

Taking into account the above, it can be said that the current task is to determine the main parameters and their ranges of change, leading to a decrease in the loss of valuable raw materials, increasing the productivity of the filters used, improving the quality of the output product, etc. when implementing the TPFS.

Based on the analysis of the numerical experiments carried out, conclusions are formulated that serve as the basis for making appropriate managerial decisions.

Key words: mathematical model, numerical experiment, technological process, filtration, gel-particles, porous medium.

Language: Russian

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РЕШЕНИЕ ПРЯМОЙ И ОБРАТНОЙ ЗАДАЧИ ТЕХНОЛОГИЧЕСКОГО ПРОЦЕССА ФИЛЬТРОВАНИЯ СУСПЕНЗИИ

Аннотация: В статье рассматривается решение актуальной задачи, связанной с технологическим процессом фильтрования и обезвоживания жидких растворов от мелкодисперсных частиц. Выше указанный технологический процесс реализуется в ходе фильтрования и очистки химических растворов, питьевой воды, фармацевтических препаратов, жидкого топлива, продуктов общественного назначения и т.д. Для анализа, исследования, определения основных параметров технологического процесса, а также режимов работы фильтровальных агрегатов и поддержки принятия управленческих решений была разработана математическая модель, где можно учитывать различных режимов работы фильтровального агрегата и физико-химических свойств растворов.

В статье отмечается, что исследование процесс фильтрования суспензии, определение основных параметров рассматриваемого процесса и их диапазонов изменения с целью управления им на



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функционирующих объектах затруднительно сбор данных о процессе занимает много времени, надо провести серию экспериментов в лабораторных условиях которые отнимают много рабочие силы и времени и трудно найти взаимосвязь между параметрами фильтра и технологического процесса по ограниченной экспериментальной выборке.

Учитывая выше изложенного можно сказать, что в работе решается актуальная задача определение основных параметров и их диапазонов изменения приводящий к уменьшению потере ценного сырья, повышение производительности используемых фильтров, улучшение качества получаемого выходного продукта и т.д. при реализации ТПФС.

На основе анализа проведенных численных экспериментов сформулированы выводы, служащие основанием для принятия соответствующих управленческих решений.

Ключевые слова: математическая модель, численный эксперимент, технологический процесс, фильтрование, гель-частицы, пористая среда.

Введение

Многочисленные отрасли производства заняты выделением отдельных составляющих многофазных и многокомпонентных смесей. В зависимости от физических и механических свойств составляющих, а также от масштаба обрабатываемого материала разработаны различные способы и устройства фильтрования и разделения отдельных составляющих смесей. Необходимость увеличения производительности фильтровального агрегата и улучшения качества целевого продукта обусловлены усовершенствование этих устройств и подбор режимных показателей для каждого отдельного взятого процесса.

Фильтрование - эффективный метод разделения жидких неоднородных систем и растворов, широко применяемый в лабораторных и промышленных условиях (в химической, пищевой, нефтеперерабатывающей, горнорудной и других областях промышленности).

В технологии при фильтровании жидких растворов и суспензии используются различные по физико-механическим свойствам фильтры и фильтровальные перегородки. Работоспособность фильтрующего оборудования во многом определяется фильтрующими перегородками, с помощью которых осуществляется отделение частиц твердой фазы от жидкости или газа, гель-частиц, ионов от растворов и других. Фильтрующие перегородки, как правило, выполняются из пористых материалов в виде плоских или цилиндрических поверхностей, называемых фильтрующими элементами. Фильтрующие элементы обычно изготавливаются из ткани, керамики, металлокерамики, различного вида сеток, набора пластин, из волокнистых материалов и других, образующих фильтрующие проходные сечения заданной величины. Общим во всех перечисленных фильтрующих элементах является неизменность фильтрующих зазоров.

Как следует, из проведенных лабораторных экспериментов и анализов технологического процесса фильтрования смесей (ТПФС) в начальном этапе рассматриваемого процесса сопровождается некоторым периодом времени, в

течение которого происходит образование слоя осадка над поверхности фильтрующими каналами агрегата. В этот период ТПФС неизбежен проскок твердых частиц, содержащихся в фильтруемой растворе. После формирования над каналами устойчивых фильтрующих слоев наступает период непосредственного фильтрования с получением чистого фильтрата на выходе фильтрующего агрегата. Чистота выходного раствора в этот период будет зависеть во первых от устойчивости фильтрующих сводов по отношению к воздействию давления фильтруемой суспензии; во вторых от устойчивости фильтрующих сводов по отношению к возможным вибрациям фильтрующей перегородки.

От величины пор фильтрующей перегородки зависят все стадии фильтрования: во-первых, время образования сводов, а, следовательно, и величина первоначального проскока твердых частиц суспензии; во-вторых, прочность образованных сводов; и, наконец, качество последующего установившегося процесса фильтрования. На этапе установившегося процесса фильтрования качество фильтрата (его чистота) зависит от пористости слоя, сформированного из задержанных частиц. Частицы, не задержанные слоем осадка, сумевшие проникнуть сквозь фильтрующие своды имеют возможность прилипнуть к внутренним поверхностям фильтрующих каналов за счет сил адгезии и уменьшить проходное сечение фильтрующей перегородки. Этот процесс прогрессирует с течением времени в случае использования пористой перегородки. Исходя из выше сказанного следует, что при фильтрование суспензии на технологический процесс содействует много параметров с различными весами. Отклонение этих параметров от нормы приводит к качественному и количественному изменениям рассматриваемого технологического процесса в целом. Поэтому определение основных параметров и их диапазонов изменения - один из основных вопросов в теории исследования и управления технологического процесса.



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Надо отметить, что исследование процесс фильтрования суспензии, определение основных параметров рассматриваемого процесса и их диапазонов изменения с целью управления им на функционирующих объектах затруднительно:

во-первых, сбор данных о процессе занимает много времени;

во-вторых, надо провести серию экспериментов в лабораторных условиях которые отнимают много рабочие силы и времени;

в-третьих, трудно найти взаимосвязь между параметрами фильтра и технологического процесса по ограниченной экспериментальной выборке.

Учитывая выше изложенного можно сказать, что в работа решается актуальная задача, выбор технологий и устройства и их режимы работы, а также определение основных параметров и их диапазонов изменения приводящий к уменьшению потере ценного сырья, повышение производительности используемых фильтров, улучшение качества получаемого выходного продукта и т.д. при реализации ТПФС.

Поэтому для достижения максимально лучшего результата по очистке конечного продукта от нежелательных примесей ТПФС должен быть организован как технологический цикл с оптимальными параметрами, включающими характеристики самих сепараторов и фильтров и режимы их работ.

В работе [1] предложена уравнение для описания процесса разделения промышленных суспензий в начальный период времени с целью исследование и установление экспериментальных закономерностей процессов разделения суспензий и обезвоживания получаемых осадков, а также выявление основных факторов, влияющих на производительность и эффективность работы промышленных фильтров и фильтровальных установок. Получены эмпирическая зависимость коэффициента Козени-Кармана от среднего диаметра частиц твёрдой фазы разделяемых концентратов и эмпирическое уравнение для кинетики обезвоживания осадков разделяемых суспензий, а также зависимость для определения величины расхода воздуха на вакуум-фильтрах при проведении процесса обезвоживания осадков на фильтровальных перегородках с учётом свойств обрабатываемой суспензии и её твёрдой фазы. В диссертационной работе Ширяева Е. В. Исследовано влияние удельного сопротивления слоя осадка на течение процессов фильтрования и обезвоживания осадков, разработать методы определения расходов воздуха, необходимых для обеспечения требуемой степени обезвоживания, а также для выбора комплектующего оборудования, а также процесс просушки осадков на фильтрах, разработать методики расчёта параметров

процесса обезвоживания и определения наиболее рациональных режимов и условий проведения просушки на фильтре.

В работе [2] развита теоретические основы методов расчета гидромеханических процессов при фильтровании и центрифугировании суспензий с ньютоновской и неньютоновской реологией для широкого класса разделительного оборудования. Для достижения этой цели решается проблема, связанная с расчетом течения гетерогенных сред с твердой фазой.

Разработаны математические модели и проведены численные расчеты процесса фильтрования гетерогенных сред с образованием и без образования осадка при ее тонкослойном течении по проницаемым поверхностям произвольной формы с учетом начального участка, а также для процесса фильтрация суспензии по вращающимся проницаемым поверхностям произвольной формы.

Исследованы основные закономерностей движения дисперсных включений при течении гетерогенной среды с расслоением фаз под действием массовых сил, а также с учетом нелинейности ее реологического состояния. В многокритериальной постановке решена задача оптимизации работы барабанного вакуум-фильтра со сходящей рабочей лентой.

В статье [3] дано математическое описание процессов фильтрования суспензий, образовавшихся в процессе механической обработки пластин арсенида галлия, через металлические плоские пористые перегородки. Приведены формулы по математическому расчету процессов фильтрации суспензий через пористые металлические перегородки. Для разработки методов расчёта производственных установок проведён анализ зависимостей, приведённых в литературе и полученных в результате математической обработки экспериментальных данных.

В диссертационной работе Дьяченко Е. Н. [4] решены задачи связанные с нестационарным процессом фильтрования суспензии через пористых сред. Разработана статическая и динамическая модель формирования пористых сред. Получены научные результаты по поведению частиц и структур на микроуровне, которые были недоступны ранее в виду недостаточной вычислительной мощности ЭВМ и при использовании классических подходов механики сплошных сред. На основе метода дискретных элементов разработана численная модель фильтрования суспензии на насыпных фильтрах. Получены результаты моделирования фильтрования суспензии, показывающие пути увеличения производительности фильтров и оптимизации их работы.



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В [5] статье разработана математическая модель процесса фильтрации в производстве цинка, основанная на уравнениях материального баланса по расходам технологических сред и концентрациям отдельных компонентов. Модель позволяет определять расходы и количества получаемых продуктов процесса, оценивать его текущее состояние и прогнозировать будущее состояние.

В работе [6] рассматривается тупиковый режим фильтрации суспензии в канале. Такая ситуация характерна, например, для трубчатых и полуволо-конных мембранных элементов и аппаратов с "тангенциальной" фильтрацией. Разработан численный модель процесса нестационарной фильтрации суспензий, позволяющей оптимизировать режимы работы фильтрационных установок и снизить затраты на научно-исследовательские и опытно-конструкторские работы при создании промышленных установок. Для течения суспензии в канале принята модель вытеснения. На внутренней поверхности канала расположена фильтрующая перегородка, через которую проходит фильтрат за счет трансмембранного давления. Поток фильтрата зависит от гидравлических сопротивлений фильтрующей перегородки и слоя осадка на ее поверхности

В работе P.J.Monteiro, Ch.H.Rycroft и G.I.Varenblatt [7] разработана математическая модель фильтрация жидкости в нано-пористых породах. При выводе модели процесса предполагается, что фильтрационный слой состоит из двух компонентов: трещиновато-пористая среда и специфические органические включения, состоящие из керогена, в основу которая положена гипотеза о том, что проницаемость включений существенно зависит от градиента давления.

В работе F.Boyer и др. [8] описывают некоторые аспекты моделирования диффузного потока несжимаемых сред, состоящих из трех несмешивающихся компонентов, без фазовых превращений, где при процессе моделирование трехфазных потоков дополнено путем включения уравнений Кана-Хилларда и Навье-Стокса. При этом поверхностное натяжение принимается во внимание через объемные капиллярные силы. Дискретизация уравнений выполняется по временной и пространственной

переменным. Внимание авторов обращается на то, что большая часть основных свойств исходной модели, таких как сохранение объема и оценка энергии, должны быть сохранены на дискретном уровне. Для получения решения в случае очень тонких движущихся внутренних слоев используется адаптивный метод уточнения с ограничением общего количества узлов в сетке дискретной модели.

A.Raeini, M.Blunt и B.Bijeljic [9] представили стабильную численную схему для моделирования многофазного потока в пористых средах, когда характерный размер области течения составляет от микрона до миллиметров. Численный метод разработан для эффективного моделирования многофазных потоков в пористых средах со сложным характером движения границы раздела фаз и нерегулярных твердых границ. Уравнения Навье-Стокса дискретизированы с использованием подхода конечного объема, в то время как метод объема жидкости используется для нахождения расположенных интерфейсов. Капиллярные силы вычисляются с использованием модели полупроницаемой поверхностной силы, в которой область перехода для капиллярного давления эффективно ограничена одним узлом сетки.

M.A.Трапезникова, Н.Г.Чурбанова и А.А.Люпа [10] развивают математическую модель течения слабосжимаемой жидкости в пористой среде, построенной по аналогии с квазигазодинамической системой уравнений. Модель обобщена для случая трехфазной жидкости и дополнена уравнением сохранения энергии, что позволяет использовать ее при моделировании перспективных термических методов нефтедобычи.

Анонсируя выше изложенного можно сказать, что для комплексного исследования объекта, определения основных параметров и режимы работы фильтровальных агрегатов необходимо создать легко реализуемый инструмент. С этой точки зрения более подходящим методом решения поставленной задачи являются математическое моделирование (ММ) и вычислительный эксперимент (ВЭ) на основе анализа которых можно принять целесообразное решение.

Постановка задачи. Математическая модель процесса фильтрования в безразмерной форме имеет вид [11-13]:

$$\frac{\partial W}{\partial t} + W \frac{\partial W}{\partial x} = -Eu \frac{\partial P}{\partial x} + \frac{1}{Re} \frac{\partial^2 W}{\partial x^2} + \frac{W}{1-\theta} \frac{\partial \theta}{\partial t} - \frac{1}{Re_1} \frac{W}{(1-\theta)(1-\delta)^2}, \quad (1)$$

$$\frac{\partial \theta}{\partial t} + \frac{1}{m} \frac{\partial W \theta}{\partial x} + \frac{\partial \alpha}{\partial t} + (1-m_0) \frac{\partial \delta}{\partial t} = \frac{\mu_0 \alpha_r}{H_0^2} \frac{\partial}{\partial x} \left(\frac{\partial \theta}{\partial x} \right)^2, \quad (2)$$

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$$\frac{\partial \delta}{\partial t} = \lambda_0 (\theta - \gamma \delta), \quad \theta = \frac{\alpha}{1 - \delta}, \quad (3)$$

$$\left. \begin{aligned} W = 1 \quad \theta = e^{-\frac{\lambda m H_0 (1 - m_0) x}{W_0}} = \varphi(x), \quad \delta = 0 \quad \text{ï ðè} \quad t = 0 \\ \frac{\partial W}{\partial x} = \frac{H_0^3}{H k_0} \left[P_0 - \frac{W}{(1 - \delta)^2} \right], \quad \theta = 1 \quad \text{ï ðè} \quad x = 0 \\ \frac{\partial W}{\partial x} = 0, \quad \frac{\partial \theta}{\partial x} = \frac{m H_0 \lambda (1 - m_0)}{W_0} (\gamma_0 \delta - \theta), \quad \text{ï ðè} \quad x = 1 \end{aligned} \right\} \quad (4)$$

где

$$\lambda_0 = \lambda \alpha_r, \quad \gamma_0 = \frac{\gamma \delta_0}{\theta_0}, \quad P_0 = -\frac{k_0}{W_0 H_0 \mu} \frac{\partial P}{\partial x},$$

$$R_\ell = \frac{\rho H_0 W_0}{\mu}, \quad R_{\ell_0} = \frac{\rho H k_0 W_0}{\mu H_0^2} \quad - \text{число Рейнольдса};$$

$$P_0^* = \frac{\partial P}{\partial x} = const,$$

$$Eu = \frac{P^*}{\rho W_0} \quad - \text{число Эйлера}$$

W - скорость фильтрования; θ - объемная концентрация взвеси в движущей смеси; δ - концентрация взвеси осевшей массы в порах фильтра; α - концентрация частиц, находящихся во взвешенном состоянии; ρ и μ - плотность и вязкость суспензий; P - давление в колонке агрегата; H, H_0 - соответственно, высота фильтровальной колонки агрегата и толщина фильтра; k_0 - коэффициент проницаемости фильтра до начала его работы; β - эффективная константа обменивающихся ионов; χ - коэффициент продольной диффузии; λ - кинетический коэффициент; γ - коэффициент дисперсии; β - эффективная константа скорости обменивающихся ионов; m_0, m - начальная пористость и пористость фильтра.

Входные параметры k_0, λ, γ являются опытными параметрами, которые определяются из лабораторных наблюдений. Однако, учитывая тот факт, что математическая модель является упрощенной и включает в себе член, полученный из обработке экспериментальных данных, то лабораторные данные этих параметров могут быть не пригодны для решения прямой задачи данного процесса. Поэтому, параметры математической модели целесообразно определять математически, т.е. из решения обратной задачи чем лабораторным.

Опытный параметр - коэффициент проницаемости имеет исключительно важное значение при расчетах ламинарного течения жидкости через пористую среду. Поэтому

определение значения этого параметра в лабораторных условиях уделено много внимания. При выполнении этих работ удалено особое внимание зависимости его от размеров частиц грунта (фильтра) от вязкости жидкости и ее температуры и т.д. В работе [1] приведена методика определения проницаемости пористой среды при фильтрации газа и жидкости. Была установлено, что проницаемость определенная по газу, значительно выше проницаемости той же породы по жидкости. Кроме того было установлено, что проницаемости среды зависит от свойства жидкости. По мнению этих авторов различие в численном значении проницаемости породы при фильтрации жидкости и газа происходит в следствии физико-химических процессов взаимодействия жидкости с породой.

При лабораторных измерениях коэффициента проницаемости, из-за чрезвычайной сложности проведения эксперимента нередко допускаются ошибки (эти могут быть, как ошибки экспериментатора, так и погрешности приборов), которые приводят к неточному значению параметра. Следовательно, полученные численные значения прямой задачи с таким ошибочным параметром может привести к несоответствию результатов математической модели с экспериментальными данными и данными производства. С этой точки зрения проведение дополнительных расчетов с использованием уже других опытных данных с математической моделью, т.е. решение обратной задачи представляет особый интерес.

Если существуют опытные данные $W(t_j)$ при $\Delta P = const$ или $\Delta P(t_j)$ при $W = const$, то решая обратную задачу, можно определить численные значения параметров k_0, λ, γ . Нужно отметить, что получить эти опытные данные проще чем определение параметров. Например, в самой фильтровальной колонке, работающей при $W = const$ установлен прибор, который фиксирует, изменения давление на специальной бумажной диаграмме (Ферганский завод искусственного химического волокна). Эти

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диаграммы можно использовать при решении обратной задачи

$$\frac{1}{k_0(1-\delta)^2} = \frac{1}{k_0^{(s-1)}(1-\delta^{(s-1)})^2} - \frac{k_0^s - k_0^{(s-1)}}{(k_0^{(s-1)})^2(1-\delta^{(s-1)})^2} - \frac{2}{k_0^{(s-1)}((1-\delta)^{(s-1)})^3} \cdot \frac{\partial \delta^{(s-1)}}{\partial \gamma} (\lambda^{(s)} - \lambda^{(s-1)}) - \frac{2}{k_0^{(s-1)}((1-\delta^{(s-1)}))^3} \frac{\partial \delta^{(s-1)}}{\partial \gamma} (\gamma^{(s)} - \gamma^{(s-1)}),$$

$$\frac{\partial \delta}{\partial \lambda} = \theta_0 e^{-(Bx+t\gamma^{(s-1)}\lambda^{(s-1)})} \left[\left(\frac{Bx\lambda^{(s-1)}}{2\gamma^{(s-1)}} - \frac{1+t}{\gamma^{(s-1)}} \right) \cdot (Bx+t\gamma^{(s-1)}\lambda^{(s-1)}) - \frac{Bx}{\lambda\gamma^{(s-1)}} \right],$$

$$\frac{\partial \delta^{(s-1)}}{\partial \lambda} = \lambda^{(s-1)} e^{-Bx\lambda^{(s-1)}} \left(\frac{Bx}{2} - \frac{1}{\lambda^{(s-1)}} \right) \cdot \frac{1}{\gamma^{(s-1)}} \cdot \left[\frac{1}{\gamma^{(s-1)}} - e^{-(\lambda\gamma)^{(s-1)}} \left(\lambda^{(s-1)}t + \frac{1}{\gamma^{(s-1)}} \right) \right],$$

где

$$B = \frac{1-m_0}{W_0}$$

Математическая модель для обратной задачи могут служить уравнения (2)-(3). Интегрируя это уравнения в пределах от 0 до H_0 , получим:

$$P(t_j) - P_0 = \frac{\mu H_0 W_0}{H k_0} \int_0^{H_0} \frac{dx}{(1-\delta)^2} - \rho H_0 W_0 \left. \frac{\partial \theta}{\partial x} \right|_{x=H_0} \quad (5)$$

Тогда параметры могут быть определены из минимума функционала

$$R = \int_0^t |P(\tau, k_0, \lambda, \gamma) - \tilde{P}(\tau)|^2 d\tau = \min \quad (6)$$

Функции δ в (5) можно вычислить из решение уравнение баланса и кинетики Ю.М.Шехтмана, полученное им в работе [14].

Для этого разложим функцию $I_0(2\sqrt{\lambda^2\gamma Bxt})$ входящую в ряд, ограничиваясь двумя членами и выполняя операцию интегрирования, получим

$$\delta(x, t) = \theta_0 \lambda e^{-\lambda Bx} \left[e^{-\lambda Bt} \left(\frac{Bx}{\partial \gamma} - \frac{1+f}{\lambda \gamma} \right) + \frac{1}{\lambda \gamma} - \frac{Bx}{\lambda \gamma} \right], \quad (7)$$

Тогда параметры можно определить из системы алгебраических уравнений

$$\left. \begin{aligned} \frac{\partial R}{\partial k_0} &= 0, \\ \frac{\partial R}{\partial \lambda} &= 0, \\ \frac{\partial R}{\partial \gamma} &= 0 \end{aligned} \right\} \quad (8)$$

Методы решения задача. Система уравнения (8) является нелинейной относительно неизвестных k_0, λ, γ решение которой связанной с определенными трудностями. Однако, применяя метод квазилинеаризации [15] к (5), (7) можно свести к линейной системе. Для этого предполагая, что все условия теоремы дифференцирование под знаком интегралом выполнены, подставляя эти значения в (5) получим:

$$P(t) = f_1 + f_2 k_0 + f_3 \lambda + f_4 \gamma$$

где

$$f_i = f_i(t, k_0^{(s-1)}, \lambda^{(s-1)}, \gamma^{(s-1)}), \\ \delta^{(s-1)} = \delta(x, t, \lambda^{(s-1)}, \gamma^{(s-1)}),$$

Таким образом, из системы (8) можно определить искомые параметры.

Основные теоремы устойчивости обратные задач впервые сформулированы и доказаны в работах А.Н. Тихонова [15].

Решение обратной задачи в данной случае заключается в том, что зная приближенные значения или совершенно не зная их, определить такое численное значение, чтобы оно адекватно соответствовало математические модели с производственными процессами. А без наличия указанных «оценок» теряет определенный смысл само решения задачи и решаемых на ее основе.

Поскольку $\tilde{P}_j = \tilde{P}(t_j)$ получены из опыта, то очевидно они содержат некоторые погрешности (это могут быть вибрации аппарата, ошибки при чтении данных из диаграммы,

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человеческий фактор при ввода полученных данных в вычислительной машины и т.д.).

Если опытные данные P_j подставить в (6), а интеграл заменить суммой, то вообще говоря, получится способ для определения $k_0, \lambda \in \gamma$. Но такой метод определения параметров, как указано в работах многих авторов, будет неустойчивым, т.е. для определения поправок может получиться плохо обусловленная линейная система. Для решения задача в такой постановке можно применяя регуляризацию А.Н. Тихонова [15] и можно решить задачу до конца.

Однако, для массовой обработки опытных данных, с достаточной для практики точностью, можно получить устойчивый метод решения обратных задач, если пользоваться следующей методикой.

Опытные данные \tilde{P}_j , заданные таблично, аппроксимируются полиномом Чебышева. Оценки дисперсий аппроксимирующих полиномов степени n и $n+1$ обозначим через S_n и S_{n+1} соответственно. Если $S_n > S_{n+1}$, то степен предпочтительнее, то для принятия окончательного решения необходимо использовать критерий Фишера [16], т.е., если

$$\frac{S_n}{S_{n+1}} > F_v(\bar{\psi}_1, \bar{\psi}_2)$$

(v - уровень значимости; $\bar{\psi}_1 \in \bar{\psi}_2$ - степенны свободы), то степень аппроксимирующего полинома принимается равной $n+1$, в противном случае - n . Повторяя этот процесс для $n=1, 2, \dots$ находим степень аппроксимирующего полинома.

Аппроксимирующий полином представляется в виде:

$$P(t) = \sum_{k=1}^n a_k \varphi_k(t)$$

где

$$a_k = \frac{\sum_{i=1}^m \tilde{P}_i \varphi_k(t_i)}{\sum_{i=1}^m \varphi_k^2(t_i)}$$

$\varphi_k(t)$ - полином Чебышева k -ой степени; a_k - коэффициент аппроксимирующего полинома, который определяется по известным рекуррентным соотношениям.

Оценка дисперсий аппроксимирующего полинома вычисляется с помощью соотношения

$$S = \frac{\sum_{i=1}^m (\tilde{P}_i - P_i)}{m - (n-1)}$$

После получения аппроксимирующего полинома вычисляется корреляционное соотношение

$$\eta = \sqrt{1 - \zeta_k},$$

где

$$\zeta_k = \frac{r_n}{r_0}; \quad r_n = S_n(m-1);$$

$$r_0 = \sum_{i=1}^m \tilde{P}_i^2 - \left(\sum_{i=1}^m \tilde{P}_i \right)^2.$$

Корреляционное соотношение η характеризует тесноту аппроксимирующего полинома и опытных данных. Если η близко к 1, то теснота хорошая. В частности, если $\eta = 1$, то аппроксимирующего полином должен во всех точках опытных данных. Поэтому всегда должно выполняться условие $0 < \eta < 1$.

Подставляя в (6) вместо опытных данных \tilde{P}_j полиномы Чебышева, получим

$$R = \int_0^1 [P(\tau) - \varphi(\tau)]^2 d\tau = \min$$

или

$$R = \sum_{i=1}^m \left[P_n + \sum_{i=1}^m \frac{\partial P_n}{\partial \alpha_\ell} - \varphi_i \right]^2 = \min$$

здесь, учитывая непрерывную зависимость P от параметров, предварительно разложено последнее выражение в ряд Тейлора

$$P_{n+1} = P_n + \sum_{i=1}^3 \frac{\partial P_n}{\partial \alpha_\ell} + 0(\alpha_\ell^2);$$

$$P_n = P_n(t_i) = P(t_i, k_0, \lambda, \gamma);$$

$$\frac{\partial P}{\partial k_0} = \frac{\partial P(t_i)}{\partial k_0}; \quad \frac{\partial P}{\partial \lambda} = \frac{\partial P(t_i)}{\partial \lambda}; \quad \frac{\partial P}{\partial \gamma} = \frac{\partial P(t_i)}{\partial \gamma};$$

$$\varphi_i = \varphi(t_i) = \sum_{i=1}^m \alpha_i \varphi_\ell(t_i).$$

Таким образом, параметры $k_0, \lambda \in \gamma$ находятся из системы алгебраических уравнений (8), решение которой получить не представляет труда. Итерационный процесс продолжается до выполнения условия

$$\max_{\ell} |\alpha_\ell| < \varepsilon, \quad \varepsilon > 0 \quad (9)$$

(S - номер итерации).

Вычислительный процесс проводится по следующей схеме:

- Задаются начальные значения $k_0^{(0)}, \lambda^{(0)}, \gamma^{(0)}$, вычисляется значение $\delta(t, k_0, \lambda, \gamma)$;

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• Затем, из (2.32) находятся значения $k_o^{(1)}$, $\lambda^{(1)}$, $\gamma^{(1)}$;

• Проверяется условие (9). В случае не выполнения, за начальные значения параметров принимая уже найденные значения $k_o^{(1)}$, $\lambda^{(1)}$, $\gamma^{(1)}$, находятся из (8) $k_o^{(2)}$, $\lambda^{(2)}$, $\gamma^{(2)}$, и т.д. При выполнении условия (9) на итерации, за искомые параметры принимаются значения $k_o^{(N)}$, $\lambda^{(N)}$, $\gamma^{(N)}$.

По изложенной схеме были произведены расчеты по следующими исходными данными: $W_0 = 0,0025$ м/сек; $m_1 = 0,4$; $m_0 = 0,15$; $H_0 = 0,5$ м.; $\rho = 25$ г/см.; $H = 1$ м.; $\mu = 980$ спуз.

Анализ результатов и выводы. На основе выше изложенного алгоритма проведены численные расчеты на ЭВМ, результат которых представлены на рис 1-

На рис. 1-4 построены кривые по этим исходным и соответствующие им аппроксимирующие полиномы по Чебышеву.

Анализ полученных результаты проведенных численных расчетов (рис. 1-4) и сопоставление их с экспериментальными данными показали, что вычисление истинные значение параметров технологического процесса играет существенный роль при моделирование объекта исследования, а также определения их основных показателей со временем. Как показали проведенных численных расчетов на ЭВМ с ростом вычисления истинного значения параметров процесса степень адекватности разработанного ММ объекта повышается (рис. 1-4). Эта можно особенно заметить при сопоставление результатов полученные с модельными и экспериментальными данными (рис. 4).

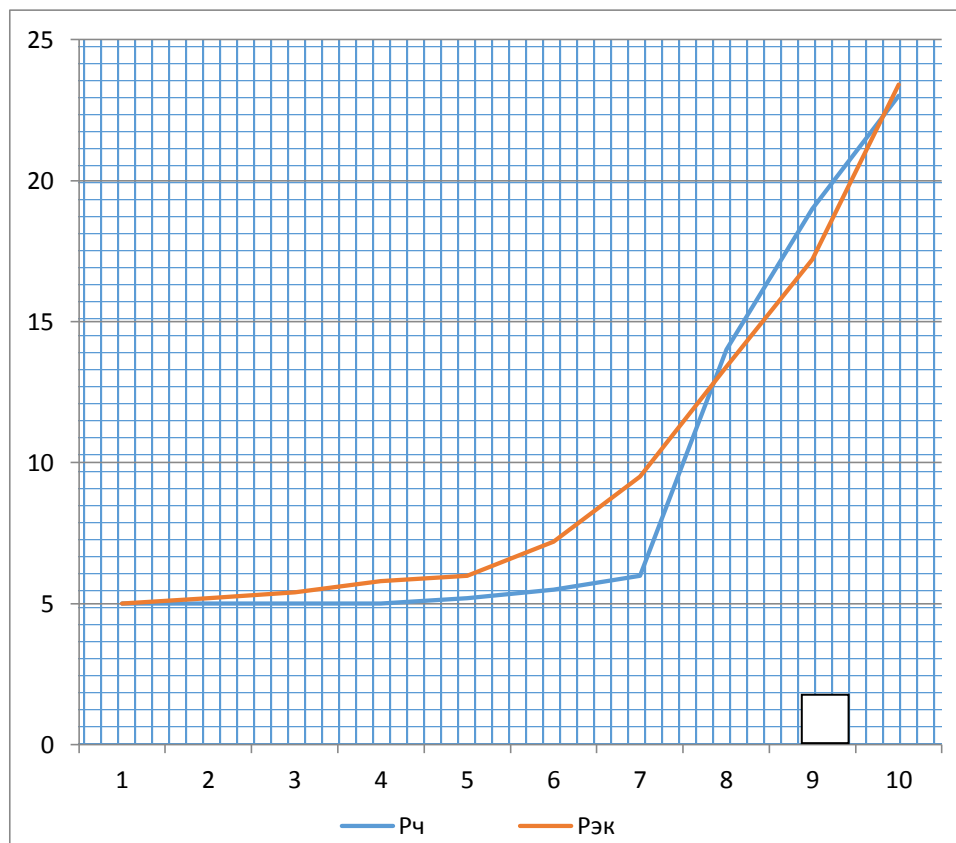


Рис. 1. Рост изменения давления внутри фильтровальной колонки агрегата при $k_0 = 9,6$ Дарси; $\lambda \cdot 10^{-3} = 0,24$ 1/сек; $\gamma = 0,004$

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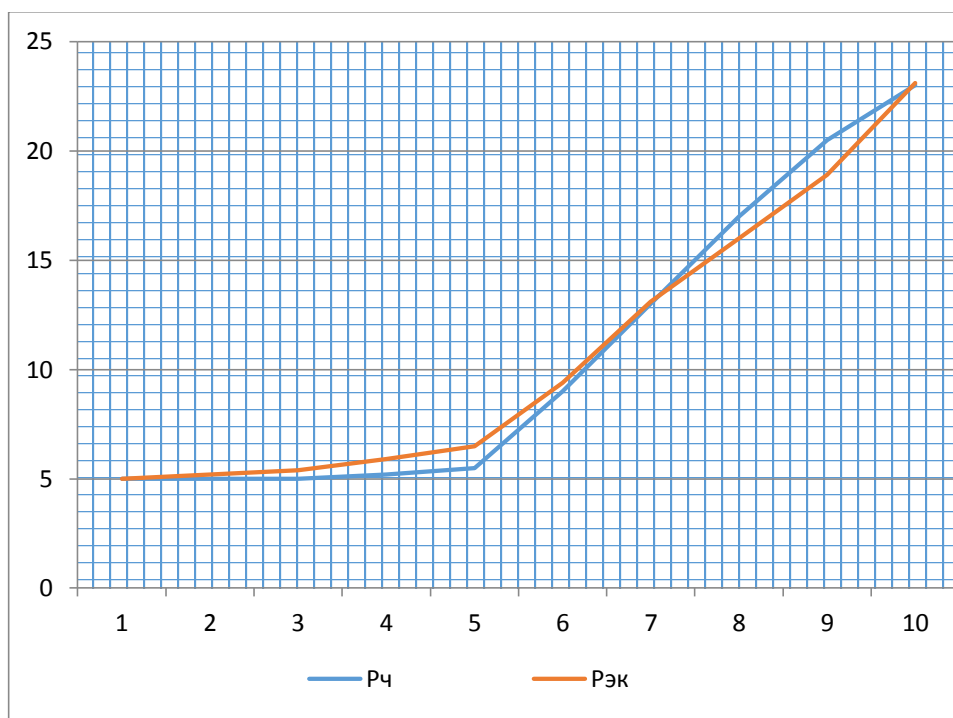


Рис. 2. Рост изменения давления внутри фильтровальной колонки агрегата при $k_0 = 9,82$ Дарси; $\lambda \cdot 10^{-3} = 0,24$ 1/сек; $\gamma = 0,004$

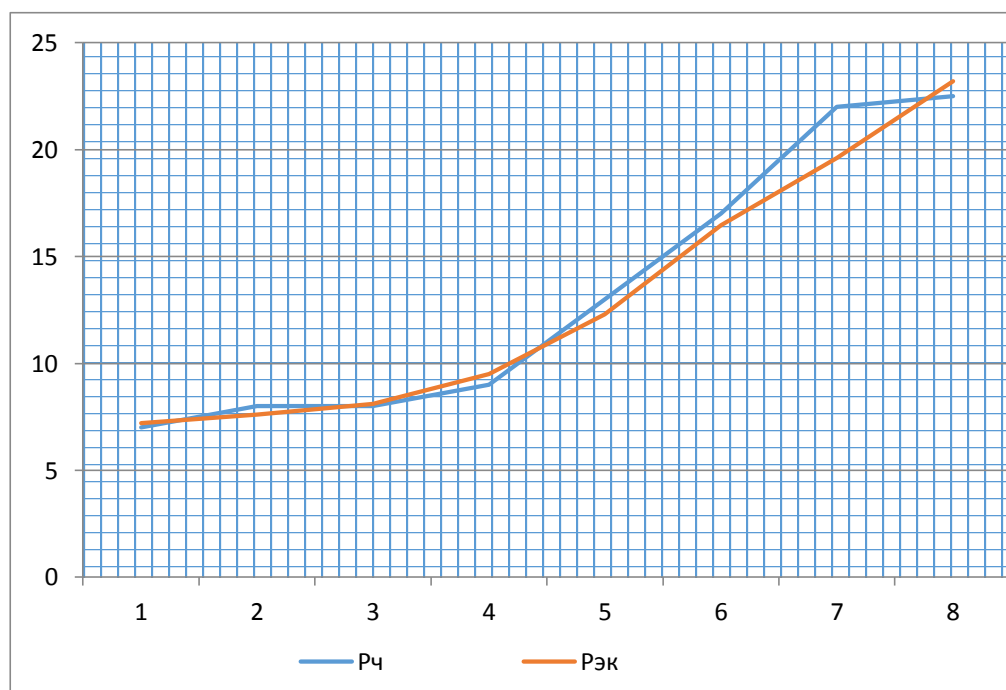


Рис. 3. Рост изменения давления внутри фильтровальной колонки агрегата при $k_0 = 8,7$ Дарси; $\lambda \cdot 10^{-3} = 0,21$ 1/сек; $\gamma = 0,47$

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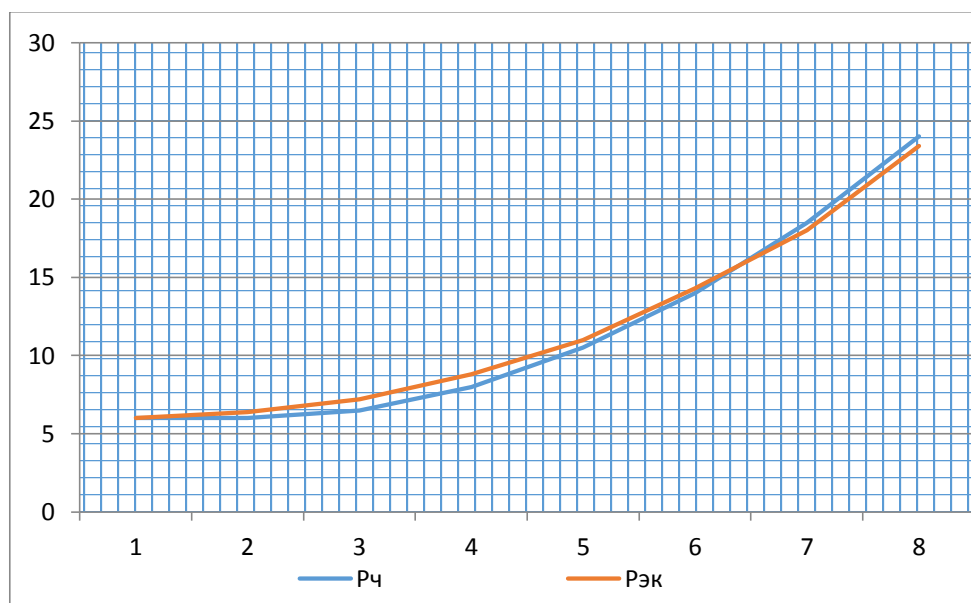


Рис. 4. Рост изменения давления внутри фильтровальной колонки агрегата при $k_0 = 9,0$ Дарси; $\lambda \cdot 10^{-3} = 0,21$ 1/сек; $\gamma = 0,0043$

И так можно утверждать, что решая обратную задачи и подставляя найденные значения параметров в исходную систему уравнений вычисляются искомые функции W , δ , θ .

Выводы.

Во первых, в ходе проведенных исследование утверждено, что полученные из обработке экспериментальных данных, то ест лабораторные данные входные параметры

k_0 , λ , γ не пригодны для решения прямой задачи процесса. Поэтому, параметры математической модели целесообразно определять математически, т.е. из решения обратной задачи чем лабораторным путем (рис.4). Во вторых, адекватность разработанного ММ объекта можно достичь за счет вычисления точного значения параметров рассматриваемого ТПФС.

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SECTION 13. Geography. History. Oceanology.
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THE HISTORIOGRAPHY OF THE HISTORY OF MATERIALISTIC CULTURE OF UZBEKISTAN (1917-2010)

Abstract: The article is devoted to the analysis of materialistic culture history of Uzbekistan during the Soviet period and in the years of independence through scientific literature.

Key words: materialistic culture, historical monument, national culture, architectural monuments, madrasah, museum

Language: English

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Introduction

The study of materialistic culture and historical monuments has always held an important role in the life of a society. This way, the literature concerning the history of materialistic cultural heritage of Uzbekistan can be divided into two categories:

1. The literature, articles, and guidebooks published during the reign of Soviet government;
2. The researches published in the years of independence.

When studied and analyzed carefully, the literature and scientific research works carried out during the soviet period indicate that the matter was approached under the communistic ideology. Majority of the researches carried out during the Soviet period had seen only one side of the history of Uzbek national culture, materialistic-cultural monuments and architecture.

It should be specifically pointed out that most of the researches of this period had been carried out by Russian orientalists. For instance, the researches of N.S. Likoshin, V.V. Bartold, V.L. Vyatkin, M.E. Masson, A.A. Mironov can be taken to prove the above mentioned idea. The data about Madrasahs, which are considered to be architectural monuments in Turkestan, and their constructional style and the way they worked holds unique position in the articles of N.S. Likoshin [1]. The articles of the author look at the performance of madrasahs and religion schools only negatively. However, V.V. Bartold's works devoted to the history of cultural heritages of Turkestan [2] is distinguished from other Russian

authors' works in terms of fair point of view. Orientalist scientists clearly states that the government of the empire was not paying attention to the preservation and restoration of historical sightings in Turkestan.

Among the researches concerned about the culture of Turkestan, in the 50s-60s of the XX century there emerged special scientific researches devoted to the enlightenment. These were the works of V.Kocharov, K.Bendrikov, Y.Abdullayev [3] that along with the history of enlightenment of Muslim nations of Turkestan, cultural monuments of the land were also partially mentioned.

During the 70s of XX century, which is the Soviet reign in the land, there appeared many major monographs devoted to the history of the culture of Uzbekistan. These were the works of T.N. Koriniyozov, I.M. Muminov, M.G. Vahobov that they are mainly about historical and architectural monuments, and the history materialistic culture of Uzbekistan under Soviet reign [4].

A group of art researcher scholars had special brochures published on architectural monuments and heritages of the Republic. Although researcher-scholars T.Ikramov, G.Pugachenkova, I. Pletnev, K.Kryulov, L.Mankovskaya [5] approached cultural monuments with soviet spirit, it is still possible to obtain crucial precise data about the construction and reconstruction date of architectural monuments, the career of mudarrises and scholars in madrasahs.

The research of Yu. Rahmatullayev is devoted to the preservation and investigation of architectural



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and cultural memorials. It only looks at the efforts of soviet government on preservation of cultural destinations and memorials positively [6].

Most of the researches conducted in the 80s of the XX century were directly devoted to the museums, materialistic culture and architectural memorials in Uzbekistan. In particular, the researches of N.Sodikova [7] the object of the research was activity of historical and cultural monuments and museums, their historical development stages were mentioned. The coverage of the author's article is so wide that it is devoted to the situation of the museums of Turkestan before October Revolution, then it focuses on the study of the history of museums served in Uzbekistan from the early years of soviet period up to 1973. Although the research work was based on many archive data, as it was the requirement of the era the dissertation was under influence of the soviet ideology.

Although the work of F.Norkhujayev on the history of cultural memorial was watered with soviet ideology, it honestly writes that the number of historical cultural memorials increased. In particular, during the years under the soviet rule in Uzbekistan "There are over seven thousand architectural, archeological, historical and monumental art related memorials" [8] as it is mentioned.

The work of P.Zohidov provides detailed information about the importance of architectural heritage, the history of ancient buildings, materialistic-cultural monuments and architectural memorials, Mosques and madrasahs of Samarkand, the art of architecture, the observatory and mosque of Ulugh beg [9].

The monograph of I. Azimov [10] is devoted to the study of the history of the architectural memorials of Fergana valley, in particular, unique public architecture of Andizhan, Namangan and Fergana regions, their historical monuments and architectural heritages, Major mosque and madrasahs, palaces and wood carving.

The second category includes works, researches and articles published in the years of independence. In the years of independence, the new way of studying history the process of fair approach towards history has emerged. Number of articles, special researches, study books and monographs related to materialistic cultural history, national enlightenment destinations (mosques and madrasahs) in Uzbekistan have been published in this period.

Several researches devoted to the higher religious educational institutions of madrasahs that has been constructed in a unique architectural design, which has had important position in the spiritual-cultural life of Uzbek people throughout centuries, and their activities have been conducted. Research works of history scientists I.Alimov, R.Shamsutdinov, B.Rasulov, O.Komilov,

A.Salmonovs research works [11] are worthy to specific attention.

Positive developments that took place on the matter of the preservation and study of cultural memorials in Uzbekistan, the tragedies of a number of deserted mosques and madrasahs because of negative attitude of soviet government towards religious institution were studied fairly in the research work of M.Mirzaev [12] for the first time. The dissertation of the aforementioned author studies the establishment and development of the preservation and study of historical and cultural memorials in the period starting from 1917 to 1941 in exactly Uzbekistan. The first chapter of the work is concerned about the organization of the study and preservation of memorials in Turkestan ASSR, the establishment of the Turkestan committee of the preservation of museum activities and ancient monuments, and art and nature (Turkkomstaris), and the second chapter is concerned about further modification of studying and preservation of memorials after the establishment of national republics in Central Asia.

A grand work [13] devoted to the culture, architectural monuments and memorials of ancient city Khiva has been published under co-authorship of history scientists. The book includes information about the culture of Khorazm, Khiva in ancient and Middle Ages, scientific developments of the land, architecture, graphic and practical art, and the art of manuscript books, literary heritage, music, public fairs and holidays. In the monograph [14] published by the Sciences Academy of the Republic of Uzbekistan depicts the matters of Uzbek culture, the situation of national culture in the past, non-materialistic attitude towards cultural pearls and the matter of limited rights of soviet nations towards their own cultural-spiritual heritage during the two empires, in other words, during the Russian Empire and the Soviet Republics.

The research work of D.Kurbonova is devoted to historical and materialistic memorials dating back to the Temurid period that are kept in museums overseas. Similarly, the dissertation is also concerned about reasons of how materialistic wealth was carried out to foreign lands and the issues of returning those back to Uzbekistan [15].

On the behalf of twenty years of Independence of Uzbekistan an album-brochure on the art of architecture and monumental sculpture [16] has been published. It is stated that Uzbek national architecture and city construction was cut off its roots and was being formed in strange frames which contradicts our national traditions in the period of former soviets.

Conclusion

To sum up, the materialistic culture of Uzbekistan, the history of historical monuments has



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attracted attention of many researchers. The matter was approached only through one side during the soviet period because of existing ideology. The researches published in the years of liberty have been created basing on the fairness tendency.

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**SECTION 31. Economic research, finance,
innovation, risk management.**

STRENGTHENING THE INTELLECTUAL POTENTIAL OF THE WORKABLE POPULATION AS A DIRECTION OF INCREASED EMPLOYMENT

Abstract: In this article, the author discusses issues of strengthening the intellectual potential of the working population. It has been scientifically proven that the impact of enhancing the intellectual potential of the working-age population to increase employment. Also, foreign experience of labor incentives in enterprises has been deeply studied.

Key words: intellectual potential, education, able-bodied population, income, labor, stimulation.

Language: English

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Introduction

The result of social progress should be not just the mechanical development of economic indicators, but human development, the disclosure and realization of its potential. Therefore, the level and quality of education of the population and the professionally qualified readiness determine the possibilities for carrying out the necessary types of human activity. Thus, in a modern civilized society without elementary technical literacy, it is not possible to increase the efficiency of using the intellectual potential in the national economy of the Republic of Uzbekistan.

Intellectual potential begins to be actively used there and then, where and when the connection of various types of labor activity is required. It can be argued that the intellectual potential performs an integrative function in relation to its constituent components, when none of them in itself, apart from communication with others, is sufficient to solve problems. For example, education is not related to science, the creation of new technologies, etc. in the end, all manifestations of intellectual potential naturally mate with each other. Thus, at the theoretical level, obstacles to the establishment of organic relationships between education, science, technology and production are eliminated. [1-2] At

the practical level, their unity is ensured by adequate forms of organization. Thus, the basis of integrative processes that form the intellectual potential as a whole is the solution of practical problems of employment of the population.

It should be emphasized that the role and importance of the development of human capital is determined by the fact that further progressive shifts [3-4] in social and economic life, ensuring the competitiveness and security of Uzbekistan as a whole and its regions depend on its level. Human capital management should take into account the demographic characteristics of our country. In particular:

- Consideration of the able-bodied, healthy population as a valuable resource and the constant increase of its educational and vocational level;
- Organic development of human resources management with the national Development Strategy of the Republic of Uzbekistan for 2017-2021;
- Creating objective and subjective conditions for realizing the potential of the population and turning them into human capital.

Thus, since the competitiveness of the innovation economy depends more and more on the achieved level of human capital development, it is necessary to gradually and continuously implement all the relevant objectives of the national Strategy.



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Stimulation of labor as a direction to increase employment

The labor market in Uzbekistan is becoming increasingly important issues of stimulating the work of workers, improving the quality and productivity of labor. It is quite difficult to develop a single, universal incentive system for employees of enterprises belonging to different forms of ownership. By and large, it is quite difficult even in the framework of several typical enterprises with the form of ownership, but functioning in different sectors of the economy, will offer a unified system. Any enterprise in the Republic of Uzbekistan is a collective, that is, people who have their own needs, and very dynamically changing. Consequently, the labor incentive system should also keep pace dynamically ahead of the desires of our citizens and be built in such a way that with visible observance of all the stimulating factors, there is no stagnation of national enterprises when "everything suits everyone". Labor efficiency (productivity, performance) is the basis for the success of any enterprise. Consequently, it is from this that one should make a start. So, when building an incentive system in an enterprise, regardless of the type and form of ownership, first of all, set the bar to be achieved, the task or a specific goal, expressed in digital or other form, that is optimal for the enterprise. Following the result, you should calculate the maximum or minimum costs spent on stimulating the work of employees, which the company is willing to spend. [5-8] To test the incentive system, you need to start with a minimum and keep track of how large or, conversely, the impact of the new incentive system is useless.

Let us turn directly to the forms of stimulation, to their generalized structure:

- material (monetary, non-monetary);
- the intangible (social, moral, creative)
- Stimulation by free time. Of course, the most common form of incentive is material monetary

incentives. In the system of material incentives, wages are central. Wages in the labor market of the Republic of Uzbekistan are subject to several principles:

- direct dependence on the quality and volume of work performed;
- interest in the result of the work;
- transparency;
- increase in productivity should be ahead of the growth rate of wages;
- Salary must be indexed. Various social benefits (benefits in monetary terms - compensation for playing sports, the provision of social packages such as medical services, insurance, organization of leisure programs, meals at the enterprise, organization of official vehicles, housing benefits, etc.) can be attributed to material incentives.). Turning to the experience of foreign companies, you can give an example of an SAP company engaged in software. This is a vivid example of the use of material, non-monetary stimulation of labor. The salary of the employees of this company is not so high, but for the period of the crisis situation in the economy, everyone is confident in the preservation of jobs. Moreover, this company has created a huge developed system of material, non-monetary incentives, which is compensation for low wages. The company makes literally everything for its employees: from kindergartens to children and a "generous" social package, ending with hairdressers for employees. Naturally, this ensures the preservation of qualified personnel in the enterprise and an increase in work efficiency. After all, the confidence of employees is the key to successful work, when nothing distracts from immediate work duties. [9-10]

It is also worth noting that in actual practice, none of the types of incentives is used in its pure form, but will be used in recruitment and various combinations. Not to be unfounded, we turn to foreign practice on the following table:

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Table-1

Foreign experience of labor incentives in enterprises

Kind of incentive	Japan [11]	USA [12]	European countries [13-14]
Material money:	- Linking salary with age; - gradual transition to the dependence of salary on qualifications (only 40% of salary is determined by the length of service in the company); - differentiation of wages by industry; - the change in wages from the actual labor contribution; - the pay of managers is linked to the results of the work of the enterprise; - increasing the salary through a rating system.	- Salary depends on the result of the work; - salary differentiation taking into account qualitative differences in labor; - differentiation of individual payment within individual categories or positions depending on personal labor achievements; - compensation and incentive payments; - fixed minimum wage and a variety of allowances; - increasing the salary through a rating system.	Incentive models: - unreasonable (salary); - bonus, including payments, the value of which is related to the size of the income or profit of the enterprise; - bonus, providing payments, the size of which is set taking into account individual results of labor; - increasing the salary through a rating system.
Material non-monetary:		- benefits, free services from social consumption funds; - right for income in the form of shares and equity shares.	- compliance with the qualifications of their position; - with the increase in length of service the position rises.
Intangible:	- lifelong employment; - the head is a universal specialist in all fields; - movement of workers horizontally and vertically every two to three years.	- job growth or preservation of the existing position with an increase in wages to pay the head;	- social incentive package at work (health insurance paid by the employer, grants for study and advanced training, provision of low-cost housing for rent, etc.)
Stimulation of free working time		- flexible working schedule.	- flexible work schedule depending on the efficiency and effectiveness of the employee.

Source: Made by author.

It is obvious that the Japanese model differs radically from the American-European one, but with the passage of time it approaches it, preserving its own traditions. One should not underestimate the experience of foreign countries in the context of

material and non-monetary incentives for employees. In the context of the current analysis, it is reasonable to divide the incentives of workers into several types: private, small, medium, large, public and joint (table-1).

Table-2

Characteristic types of incentives for national enterprises

Type of enterprise	Tangible	Material non-monetary	Intangible	Stimulation of free time
Private	Most applicable: - stability of the folding part; floating premium.	Almost inapplicable.	Maintain the corporate spirit.	Flexible working hours.



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Small & Medium	Most applicable: -the part is often equal to the premium.	- gifts for the holidays; -Some types of compensation for costs (fitness, vouchers for children); -reinforcement of qualification at the expense of the enterprise.	-maintaining the corporate spirit; - thankful letters, letters; -Various conferences and social events.	Not often, but there is a flexible schedule.
Large	-complex multi-level system of payment with a variety of bonuses: for experience, for the quality of work performed, for the conduct of projects; -payments for holidays and significant dates (birthday, wedding, child birth); -material aid.	-providing insurance; -medical services; -device children in kindergartens; - a variety of vouchers; - compensation of expenses; - food at work.	- rest rooms at the enterprise; -maintaining the corporate spirit; - thankful letters, letters; - a variety of conferences and social events; -organization of holidays.	Not applicable.
State	-Relatively small salary; -a rigid regulation of the capacity, position and binding to salaries; -system length of service; - quarterly, annual bonus; -binding of qualifications, position and length of service for the salary.	-full social package; -medical services; -compensation of food and transportation costs; - official transport; -device children in kindergartens.	-stability; -prestige; - promotion of the most distinguished employees; - "Hall of Fame".	Not applicable.
A joint	Depending on the rules established in the parent company.	Depending on the rules established in the parent company.	Depending on the rules established in the parent company.	Not applicable.

Source: Made by author.

As can be seen in the above Table 2, there are universal ways to encourage employees at different types of enterprises. So, for example, the salary part of the salary should not be so low that an employee leaves his job and not so high that he can no longer be promoted by bonuses. Also for different categories of employees different forms of incentives are applicable. For example, a mid-level specialist is ready for overtime hours, while the manager will not be interested because he has a fairly high salary and free time is much more popular for him. Today, at national enterprises, salaries often consist of two parts: a salary and various bonuses. It is noteworthy that a variable part of the earned income

should be essential in order to be an incentive to increase the efficiency and effectiveness of the work. In the practice of employers, the situation in the local labor market is somewhat different: the salary part often constitutes 60-70% of the total income, and the premium part is not stimulating, but only actually written in the employment contract. The bonus part of remuneration for work is a non-varying unit and represents a small lever of influence on labor productivity in enterprises of Uzbekistan. Allocation of an insignificant place to premium incentives in the corporate policy of many national enterprises is explained by the fact that the degree of qualification of an employee is not taken into account in



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calculations of labor productivity, since the quality of productivity is not always measured by many employers. Against this background, there is a disproportionate increase in the salary of managers compared with skilled employees. At the same time, the ratio in the remuneration of skilled and unskilled workers remains almost unchanged. In other words, the salary of qualified specialists slightly exceeds the salary of unskilled workers, but much lower than the compensation package, which is provided for management personnel. Thus, there is a violation of the main principle of the labor market: the compliance of wages to the level of qualifications of an employee and the quality of his work. Proceeding from the foregoing, it can be argued about the underdevelopment of the labor incentive system in the Republic of Uzbekistan. In addition, there is the following problem of stimulating labor. The economy of labor in our country is such that a legislative increase in the minimum wage always leads to price inflation in the market for goods and services. In response, employers raise their salaries, whose real purchasing value does not change because of inflation. In this connection, it turns out that the monetary incentive mechanism in the national economy of the country has long ceased to work effectively. It is believed necessary at the state level to push the private sector to use non-material incentives to increase employment. [15] These include: career planning, intracorporate openness of information about existing or potential vacancies, diverse support of the corporate spirit, recognition of merit to the workforce. At the same time, with the transition to high levels of the market economy, it is necessary to revise the labor legislation in order to provide for new forms of labor incentives. One of these forms, as mentioned above, is to stimulate efficiency and productivity by providing employees with free time. This additional weekend, flexible work schedules, the normalization of the working day is not a specific duration and period of working time, and the implementation of a certain work rate, the choice of vacation time, the provision of excessive leave for heavy and harmful work.

Conclusions

From the standpoint of scientific methodology, when developing the state employment policy of the population of the Republic of Uzbekistan, it is necessary to combine two completely independent disciplines: problem analytics and legal technology and management technology. In this case, it is meant that all work, and especially its final synthetic stage, must meet the requirements set forth for managerial government documents in accordance with the current regulations of state management procedures and legal acts.

Regarding the organizational foundations of the democratic development of the structure of the

national labor market, we developed a methodology for the development of the state employment policy in terms of organization and management. State employment policy is defined as a set of value objectives, government and management measures, decisions and actions and the order of implementation of state-political decisions set by the government.

In connection with this methodologically, the work on the formation of the state policy in the sphere of employment as management practice is proposed to be divided into two stages. The first stage is a problem-analytical, including a review and original study of the main problems, the systematics of the problem field, its decomposition, the generation of ideas and concepts for solutions. The second stage is a synthetic design, which includes a transition based on a set of conceptual ideas obtained at the first stage, to instrumental solutions in the competence space of state administration of employment issues, building the necessary legal acts and other regulatory documents, their software packaging in brief -, medium and long term.

The legal basis for the democratic development of the labor market structure is no less significant than the organizational and managerial one. The following aspects were explored in this part of the study. First aspect: Optimization of work processes through the improvement of labor standards. The essence of the process of substantiating the norm of labor is the choice of the optimal value of the norm and the characteristics of the labor and technological processes that determine it. The criterion of optimality of a normative act is an indicator that, as a result of solving a specific task of optimizing labor relations in the labor market of the Republic of Uzbekistan, can even take on an extreme (greatest or smallest) value. The system of restrictions determines the range of permissible values of labor standards, within which their compliance with international legal standards, national traditions, psychophysiological characteristics of age or gender groups of the population and social characteristics of the labor process is observed. Citizen participation in the labor process is characterized by acceptable socio-demographic and regulatory working conditions. Multicriteria tasks of normative and legal provision of employment of the population must be taken into account in the adoption and implementation of targeted state policy. The improvement of labor legislation should be carried out in such a way that the socio-demographic characteristics are the most favorable for the labor resources of our country.

The second aspect: Legislative regulation of informal employment issues. One of the negative phenomena in the labor market of Uzbekistan is the outflow of the employed population of their official sector of the economy into the informal, shadow



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sector. This is due to the significant impact of informal processes on the socio-economic state of labor resources. The growth of informal employment in the Republic of Uzbekistan in the first decade of independence was due to the difficulties of the transition period.

The current legislation regarding the registration of unemployment and the employed population does not provide for any mechanism for calculating the informal part of the employed population. Thus, the term “informal employment” or meaningfully similar concepts are not found in the Labor Code and other regulatory acts of the Republic of Uzbekistan. Only indirectly addresses issues of informal employment. The procedure for conducting such surveys is not fixed in any of the regulatory legal acts of the Republic of Uzbekistan.

The third aspect: Strengthening the regulatory framework for the employment of professionally educated workers. The rational use of the educated youth of Uzbekistan in the sphere of labor acquires a special urgency due to the fact that its number significantly influences and determines the balance of working resources. The complexity of the situation is due to the fact that higher education has become widespread. Consequently, the graduation of top-level specialists has grown unreasonably, while the proportion of people with secondary special education, in the objective sense of the word, has decreased.

The way out of this situation in the labor market of Uzbekistan is seen in a cardinal revision of the regulatory framework of employment. For without a certain gradation of qualification criteria for employment, which are legally enshrined, the labor market cannot “dictate” to the educational system which specialists are becoming most in demand. This is on the one hand. On the other hand, the law should clearly provide not only the classification of specializations, but also their characteristics to the extent that employers could orient themselves when applying for a job. Moreover, in the legislative procedure it is necessary to fix installations that prevent inadequate educational response to the economy. That is, the Government of the Republic of Uzbekistan should periodically review the educational policy based on the needs of the internal labor market and fix it in the manner prescribed by law. The fourth aspect is the need for regulatory regulation of corporate social responsibility. Legislation regulating corporate social responsibility should be developed from the perspective, so that business entities do not consider themselves as objects of the law enforcement function of rule-making, and become law enforcers themselves. Legislative support of social labor management is a qualitatively new form of employer participation in increasing employment and, thus, the effectiveness of the national economy of labor. Encouraging the

state of social responsibility of employers would also help the latter to strengthen the approving attitude to the law in force. In addition, it would lead to a reduction in the shadow economy of labor.

The state and employment prospects of the population are closely interrelated with the political decisions of the Government of the Republic of Uzbekistan concerning migration, labor market regulation and wage fixing practices, retirement rules and pensions, as well as education and education policies will be particularly important to ensure an increase in supply. labor and labor productivity.

In this paper, forecasts were made of changes in the structure of the labor force in the Republic of Uzbekistan until 2020, made by the ILO, the World Bank Group and the United Nations Population Division. For comparison, they cited similar forecasts for countries in Eastern Europe and the CIS, including alternative scenarios that may increase the supply of labor compared to the base case. Therefore, it is possible to present a generalized picture of how the age of the workforce affects the results of the labor market and aging affects productivity.

The state of the labor market in Uzbekistan is largely predetermined by the demographic structure of the able-bodied population, despite the fact that the possibilities remain open to influence the structure of the labor force in the domestic labor market and migration. In the base case, the working age population is considered (traditionally, from 15 to 64 years old) with current indicators of the labor force share. Then alternative scenarios change these indicators in different ways to assess how different potential policy leverage can increase the supply of labor in the future.

Together, the forecasts show that in the countries of Eastern Europe and the western area of the CIS, the active involvement of foreign labor will be crucial in the future. However, Uzbekistan, which has a relatively large number of labor resources, will need a new economic and demographic strategy aimed at maintaining a balance between supply and demand on the national labor market, which may be disrupted due to external migration of the working age population. Changing the demographic picture of the world is due to the regulation of demographic processes and has a direct relationship to the level of employment of the population. The state of affairs can be clarified by retrospective analysis and forecasting. First, it is expected that until 2030 the world's working-age population is growing to 900 million people, i.e. on 20% from today's indicator. This increase can be compared with a similar indicator for the period from 1990 to 2010, which was 1.3 billion people; the increase was then at 40%. Annual growth rates of the working-age population declined from a peak of 2.3% in 1985 to 1.1% in 2015, and a decline to 0.7% in 2030 is projected.



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Secondly, the growth of the working-age population largely depends on the region and the level of economic development. In the period up to 2030, Europe and China will experience a decline in their working-age population, while many low-income African countries will have growth rates of over 2% per year. In 2010-2015, Sub-Saharan Africa added more than 1.1 million people a month to the labor force. This figure will reach the bar to 1.6 million people per month in 2025-2030.

Third, the differences in the rate of growth of labor in different countries are mainly due to differences in the number of youth workers, which reflects the disparity between the indicators of the degree of fertility. In many African countries, the number of young labor resources is increasing annually by 4% for the entire working-age population, which is compensated for by the death and aging of the population by about 1%. Fourthly, at present the youth workforce (age 15-24 years old)

reaches a peak in many countries where a rapid decline in the birth rate is observed. While these youth groups are large, their numbers stopped growing in many countries, with annual growth rates dropping from peaks by about 4% in the 1970s to about zero in 2017. An important exception is Africa, where labor force growth rates for young people have declined slightly, but for several decades they will remain close to 2%.

Fifth, in the base year of 2010, the working-age population was about 2/3 of the world population, with almost the same proportion predicted for 2030. The age composition of the vulnerable strata, which represent 1/3 of the world's population, will change significantly, as the proportion of minors, i.e. population under 15 years, is gradually decreasing and the proportion of elderly (65 years and older) increases.

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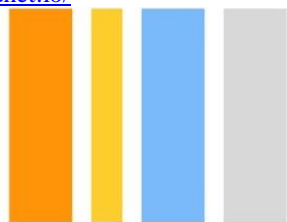
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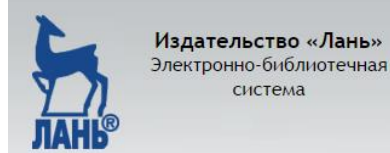
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